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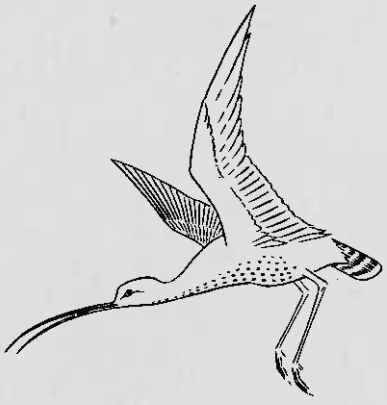

SURVEYS OF LEICESTERSHIRE NATURAL HISTORY

THE BADGER

IN CHARNWOOD FOREST

BY A. E. SQUIRES

NUMBER 2 1963

"THE CUBS READILY FEED FROM A SPOON HELD IN THE HAND AND ILLUMINATED BY A POWERFUL TORCH."

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EDITOR'S PREFACE

"The Badger in Charnwood Forest", the second in the series of the Loughborough Naturalists' Club's Surveys of Leicestershire Natural History, is the result of the work and enthusiasm of one member in contrast to the Bradgate Survey (No.1) which was essentially a team effort.

Most amateur naturalists have only a limited amount of time to devote to field work and this time can often be best used by the study of a single species or group. We hope that this paper will stimulate other members to a similar study of a more specialised aspect of their field interests.

The inclusion in this work of a comprehensive section dealing with the art of badger watching will be of assistance to readers who have not yet experienced the pleasure of seeing the animal at close quarters. The principal section dealing with the badger in Charnwood Forest we feel to be a significant contribution to our knowledge of the mammal fauna of the area.

The author, Mr A.E.Squires, has lived on the outskirts of the Forest for most of his life and his intimate knowledge of the area combined with his patience and enthusiasm has resulted in a work which we are pleased to include in this series of surveys.

At such an early stage in this series of publications, lack of funds prevent us from being too ambitious in presentation but use of the 'Xerox' lithographic process is a step forward from the stencil duplicator used in the Bradgate Survey. It is hoped that we can improve still further in future publications, provided the necessary support is forthcoming.

Editors:- J. Crocker
P. Gamble
M. Walpole

THE BADGER

The badger is one of our larger British wild mammals and, together with the otter, stoat, weasel etc., is placed in the family Mustelidae of the Order Carnivora or flesh-eaters.

Throughout the country the badger is known under a wide variety of local names. The most common of these are "brock", "pate" and "grey"; the first one being the usual term in Leicestershire. This name survives in several English place names such as Brockenhurst, Brockhampton etc. In this county there is a Brock's Hill near the City and several other places known to local people under similar names.

DESCRIPTION

Perhaps the most noticeable feature of the animal is the head, small in comparison with the rest of the body, with its conspicuous black and white markings. The long thick-set body appears at a distance to be uniform grey in colour. An adult animal may be three feet in length of which only about five inches will be head. The legs are short, so short in fact that in old animals with long coats they seem barely visible at dusk. They are however very strong and the animal

is capable of quite remarkable speeds over short distances. Each foot bears five claws which are very strong and which normally leave a clear impression in soft ground as the badger shambles along on the flat of its feet. The claws are used for digging and in very old animals may be almost worn away.

Overall, an adult badger stands eighteen to twenty inches off the ground. The tail is short and stumpy and appears to serve the animal no useful purpose. The external ears are small, but the animal has exceptionally good hearing.

Badgers have very tough skin covered with thick wiry hair, which is thickest on the back. A close examination reveals that the overall grey appearance is due to the hairs on the back and legs being individually part black and part white. Individual badgers may vary considerably in body colour and as the animal gets older it tends to take on a more silvery appearance. Several colour variants are known. Occasionally, very black badgers occur; but albinos are rare. An erythristic form occurs more usually where the black pigment in the hair is replaced by a brick red colour. A yellowy form also occurs.

There has been considerable speculation concerning the function of the animal's distinctive black and white head markings. Early writers suggested that the black and white stripes are a form of protective colouration, serving to conceal the animal on its nocturnal ramblings "... among the silver patches of moonlight and ebony shifting shadows ..."*. Clearly this is very doubtful for badgers are heavy, clumsy animals making considerable noise and giving warning of their approach. Furthermore badgers do not like strong moonlight, whilst in all but the blackest gloom the white patches are as clearly visible as is a waving white flag. The favoured theory now is that the contrasting colours are largely a warning device, a kind of "keep your distance" advertisement. The main evidence in support of this idea is the noticeable fact that most other species possessing such conspicuous colouration are either nocturnal or crepuscular in habit. Also each possesses some very efficient defence mechanism. In the skunk this takes the form of a nauseating odour and in the badger it is a terrific bite. Furthermore all of these animals are, unless provoked, slow moving and inoffensive, having neither to pursue their prey nor flee from enemies, feeding at their leisure.

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* Mortimer Batten.

All of the members of the family Mustelidae possess a pair of musk glands situated below the tail, the secretion of which varies in potency from species to species. That of the skunk is well known, whilst nearer home the British Polecat is also capable of producing a very unpleasant scent. In the badger the secretion is comparatively slight, but the scent nevertheless distinctive. It is emitted for example during periods of intense play or on the sudden recognition of danger. It may also have a sexual significance.

Badgers are surprisingly heavy for their size. Weights vary considerably from animal to animal and season to season. In winter, after a summer's feeding, they are at their heaviest; but by February and March they have used up the large supply of fat accumulated the previous year and are much lighter. The average weight for an adult boar is close on 30 lbs., the female a few pounds lighter. However, weights much in excess of this figure are not uncommon. There are on record instances of 60 lb badgers; but these must be regarded as very exceptional. The heaviest local specimen on record is that of an old adult boar, caught by Mr Issac of Loughborough in May 1891, which weighed 40 lbs.

HABITS

Badgers are very much creatures of habit. They are largely nocturnal animals, retreating to the safety of their underground sets during daylight hours, to emerge after sunset under cover of darkness. This shy and retiring habit minimises contact with their only serious enemy, man, and partly explains the fact that colonies of badgers may flourish quite unnoticed in very close proximity to human habitations. Their sight is only fair but their hearing and sense of smell are acute. Above ground the animals frequently stop to listen and test the air with their noses. The first evening emergence from the set may be a lengthy operation, for the animal will not fully reveal itself until it is quite satisifed that all is well. Only at play do badgers lose their caution. Young and adults alike are given to very vigorous and playful exercise, often accompanied by yelping and snarling. Vegetation may be completely flattened in the playing areas and the bark of favoured playing trees worn smooth.

The badger is extremely clean in its habits. Bedding is changed frequently; the old is discarded and thrown out of the set entrance along with freshly excavated soil. The new is taken down in large quantities, in bundles tucked beneath the snout. Bracken, grass and dry leaves are the usual choice. Bedding is not fouled by the adults.

Sanitary arrangements consist of a series of small "dung pits". Food is never brought back to the set, but is eaten on the spot. The general cleanliness of the set and its surroundings largely explains why badgers are healthy animals, having a comparatively low mortality from disease and playing host to few parasites.

The badger is omnivorous, feeding on a large variety of organisms. Almost anything which is edible is taken, but a strong preference for sweet things is shown. Young mammals are eaten in fair numbers: rats, rabbits, mice and voles are taken from their nests by means of direct excavation. Adult moles and hedgehogs may also be devoured. The latter present no serious problem: the victim's skin is deftly turned inside out by the badger which thus avoids the spines.

Invertebrates are also taken in quantity, earthworms especially are an important article of diet in some districts. Large numbers are taken on a wet night; upwards of two hundred are on record. Insect prey includes beetles, which are usually located by the turning over of stones and vegetable debris with the nose. The elytra of Dor Beetles (Geotropes spp.) can easily be recognised in the dung at some seasons of the year. The elytra of large black ground beetles (Carabus spp.) are also often in evidence. Badgers often make considerable nuisances of themselves by tearing holes in the turf of golf courses and even private lawns in their search for soil dwelling invertebrates. Wasps are a delicacy, the badger unhesitatingly inviting what would appear to be almost certain death by locating and excavating wasps nests in search of the tender larvae. Few badgers seem to come to much harm as a result of the attentions of the irate members of the nest.

Vegetable material is never shunned; roots, bulbs, berries and miscellaneous fruits, picked up or grubbed up, are eaten. Even grass is consumed when other food is scarce. Foods laid by watchers and eaten by badgers include the great favourites treacle and honey, also bread, jam, cake, raisins, iced buns and an almost endless variety of other sweet forms of confectionery. Domesticated badgers display an equally catholic taste.

For many years controversy has existed on the subject of poultry killing by badgers, and many claims have been put forward that young lambs and even piglets have also been taken. Opinions are many but facts are few and it is only recently that a true picture of the situation has emerged. There is no doubt that the vast majority of badgers do not take poultry as a regular item of diet; but there is equally no doubt that under certain circumstances badgers do take to raiding poultry houses,

perhaps as an easy way to a meal. Once begun the habit may remain, in which case the badger becomes a pest and has to be destroyed. Foxes, however, regularly and persistently take poultry and many of the depredations attributed to badgers are really the work of the fox. Proven instances of badgers taking lambs are almost nil, though it is known that still born lambs may be eaten on occasions. Losses of gamebird eggs due to badgers are generally small, though once again the fatal habit once adopted may be pursued. Spasmodic cases are due to odd nests being located in the course of a night's wanderings.

BREEDING

The badger has an interesting life cycle. For many years considerable speculation existed among naturalists on such basic details as when mating took place, the period of gestation, and the anomaly of delayed implantation. The results of recent intense field work by a group of enthusiasts have been summarized by Neal and Harrison (1958).

In Britain most female badgers become sexually mature when they are twelve to fifteen months old; males mature at a somewhat later age, probably two years. Early writers claimed matings for every month of the year, but it is now clear that there are really two kinds: of long and short duration. The former usually occurs most frequently between February and May; whilst the latter occurs also at this time, and again during July and October. It is possible that only the long matings between February and May result in fertilization, and that spring is therefore the fertile mating period. From a successful mating the fertilized eggs develop into blastocysts which do not at once implant themselves in the wall of the uterus. Instead they remain free and virtually unchanged in the uterus; implantation is thus delayed from between two to ten months, finally occurring in December or early January. The majority of young are born after seven or eight weeks of true gestation. In the South of England births occur during the first three weeks of February. Further north, the peak time is late February and early March. Births in late January are not unusual and are also frequent in March. Young may possibly be born as late as July but births after mid April must be regarded as exceptional.

Not every set is used for breeding. Usually only those which have more than one entrance and have been in use for some time will be chosen. Not far in from one of the entrances of a chosen set, a breeding chamber is excavated. This is an enlargement of a side tunnel and measures one and a half to two feet in height and two to three feet in diameter. It is well lined with bedding composed of dead bracken, hay,

dry leaves, etc., which provides adequate insulation for the young against the cold. Occasional cases of breeding above ground occur in areas where low lying land is liable to flooding, or the soil is wholly unsuited to excavation. In one such case a breeding nest was located in a hawthorn hedge and consisted of a pile of hay three to four feet in diameter.

THE YOUNG

The most usual number of young in each litter is two; though litters of one and three are common, four are less common and a few authentic instances of five are known. At birth, young badgers are almost five inches long and dirty white in colour. It is not until the seventh day that the facial stripes can be detected and not until the tenth day that the eyes open. At first the sow does not leave the cubs. During their first three months, her senses of smell and hearing sharpen acutely and her movements display extreme caution.

The cubs first appear above ground at about eight weeks. Their first movements are extremely uncertain, but as confidence is gained the immediate area of the set is explored, though still in company with the sow. Soon the cubs begin to play, cautiously at first but later, vigorously and with abandon. Observations suggest that lactation lasts for about three months and that it has ceased in most animals by the end of May. By the fourteenth week weaning is over and the now hefty cubs begin independent searching for food away from the set. Also, they practice adult behaviour e.g. scenting, gathering bedding and even indulge in spasmodic digging. At this time the family usually changes sets; the new one is far from the old, which is left to sweeten.

By autumn the cubs will be well grown and, if the feeding has been good, may be as large as a small adult sow. It is at this time that the adults return to their old set to produce young the following year; and the young normally leave the community to establish sets of their own. Male cubs have nearly always gone by November though some young females may stay on. Throughout autumn the sows, which will have young the following year, engage in much fresh digging and clearing of the set, activity which becomes greatly diminished by November. During the inclement weather of the winter months all activity is at a minimum, especially so during very wet or cold periods.

DISTRIBUTION

The European badger (Meles meles), is generally distributed throughout Britain. In some parts, for example the S.W. counties, it is definitely numerous, although in other parts, such as the flat lands of

East Anglia and the Western and Northern Islands of Scotland it is correspondingly rare. They are present in Ireland and even numerous in some parts. Generally speaking badgers are most abundant in hilly country; but in mountainous areas they are not usually found above 1000 ft., above which height food becomes scarce.

THE SET

Badger sets may be found in a wide variety of places, though badgers have very strong preferences. Most sets are found beneath or in close proximity to trees. Small to medium-sized woods which border on to pasture are preferred. In large woods sets are normally found around the periphery or on the edges of clearings. Spinneys, copses and undisturbed areas of rough wooded ground may also contain sets. In regions of intense cultivation, where pressure from man is great, less characteristic sites may be utilized. In such areas, one may expect to find sets in railway and other embankments, abandoned mineral workings, hedgerow bottoms etc.; and more rarely in the banks of streams, with the entrances well above the water-line, and in the sides of ditches. In mountainous districts where trees are few, sets may be found deep beneath rocky outcrops occupying well nigh impregnable positions.

A typical set will be excavated into a slope or bank, which may be no more than a slight terrestrial irregularity but on the other hand may be very steep indeed. Into it will be dug one or more large holes. The number will depend upon the age of the set, the frequency with which it is used and the kind of soil chosen. Outside of each will be found a pile of loose earth which, whilst recognisable, is often small. On the other hand, the soil from an old established and regularly used set may form mounds of great proportions, weighing many hundredweights and dominating the immediate terrain. Mixed with the soil can be found remnants of discarded bedding. A close inspection of the softer ground may reveal tracks and even a few odd stray hairs which will confirm that the set is being, or has very recently been, used by badgers.

The badger paths will normally be very obvious, especially so in summer when they sometimes form the first sign of, and easiest means of approach to, a well hidden set. These paths can scarcely be mistaken for human footpaths, or tracks made by deer or rabbits; they are too narrow for human feet, show no pellet droppings and lead under, rather than round, low fences and similar obstacles. They connect entrances and radiate from the set to the community's regular drinking, feeding and playing places.

A careful examination of the margins of these tracks may disclose

a number of small, shallow holes, excavated in groups and well away from the entrances. These are the dung pits. They are three or four inches deep and almost as wide, and are used regularly by the community. No other part of the set is fouled. As they are filled, new ones are dug. Similar but smaller holes may be found scattered around the set. These are 'snuffle holes', made by the badgers burrowing with their snouts in search of buried food, such as bluebell bulbs. They should not be mistaken for rabbit scrapes.

One or more of the nearby trees may be partially or wholly devoid of their lower bark, where the badgers have scratched it away. This they do by raising themselves on to their hind legs and bringing their claws vertically downwards. This activity is most frequent shortly after the first emergence in the evening; and it is thought to be primarily a way of stretching the body after a day in cramped quarters underground.

Contrasted with the badger's personal and domestic hygiene is the insanitary squalor in which the fox is content to live. Foxes bring home their food to eat at their leisure, and the bones, feathers and other remains of past meals are scattered to putrify around the entrance to the earth. The distinctive padmarks of the fox, and possibly a few stray red hairs, may be found in the loose earth. If the fox is sleeping below, one may often detect the unmistakable foxy odour. Surprisingly perhaps, both animals may be found in the same set, sharing a common entrance, though occupying separate parts of the interior. In such cases it is usually the fox which moves in on the badger, who doubtless strongly resents the intrusion. If the fox stays the badger may transfer to another set.

PAST HISTORY

In Britain, for many centuries the badger has suffered persecution at the hand of man. It has been destroyed as a pest, hunted as an object of sport, trapped for the small commercial value of its pelt and even eaten as a delicacy. Yet the badger has never been in serious danger of extinction, although it has been drastically reduced in numbers or even temporarily exterminated from some areas. The badger is quick to recover its numbers when given the chance.

Traditionally, badgers were baited with dogs. This extremely cruel practise is probably now extinct but was once a favourite pastime with rich and poor alike. A badger was captured alive, and if possible unhurt, and turned into a room, yard or pit specially dug for the purpose. There, it was securely chained to a box, bar or other object. Dogs were then loosed on to the animal which retreated to a corner and attempted to

defend itself with its strong claws and powerful bite. Wagers were placed on the probable outcome of the affair by the owners of the dog and the badger, and bets were laid between spectators. Often the dogs received terrible injury from the teeth of the badger which itself usually did not reach old age. Many variations of this sport were known and even today a slightly less cruel version of that described is still practiced in some parts. Badger digging is more common and is still widely practiced. A set is located and dogs are put in to locate and distract the badger as it endeavours to strengthen its position by burrowing deeper. Bounties for killing badgers have been offered from time to time in some places in the British Isles where badgers are regarded as vermin. Nowadays, they are regarded by the Ministry of Agriculture as useful animals; but persecution is still widespread.

Some remarkable beliefs, which have still not died out completely, as to the theraputic properties of the fat and grease of the badger were once widespread. For example, the "Sporting Magazine" for 1800 offers the following panacea for all its ailing readers: "The flesh, blood and grease of the badger are very useful for oil and ointments, salves and powders, for shortness of breath, the cough of the lungs, for the stone, sprained sinews, collachs, etc. The skin being well dressed is very warm and comfortable for ancient people who are troubled with paralytic disorders".

The skins are now of small commercial value. The bristles for badger shaving brushes, one of its few uses, are mostly taken from imported skins. That the badger has never been worth hunting commercially, doubtless helps to explain why the animal is probably now as numerous as ever it has been in Britain.

THE BADGER IN CHARNWOOD FOREST

INTRODUCTION

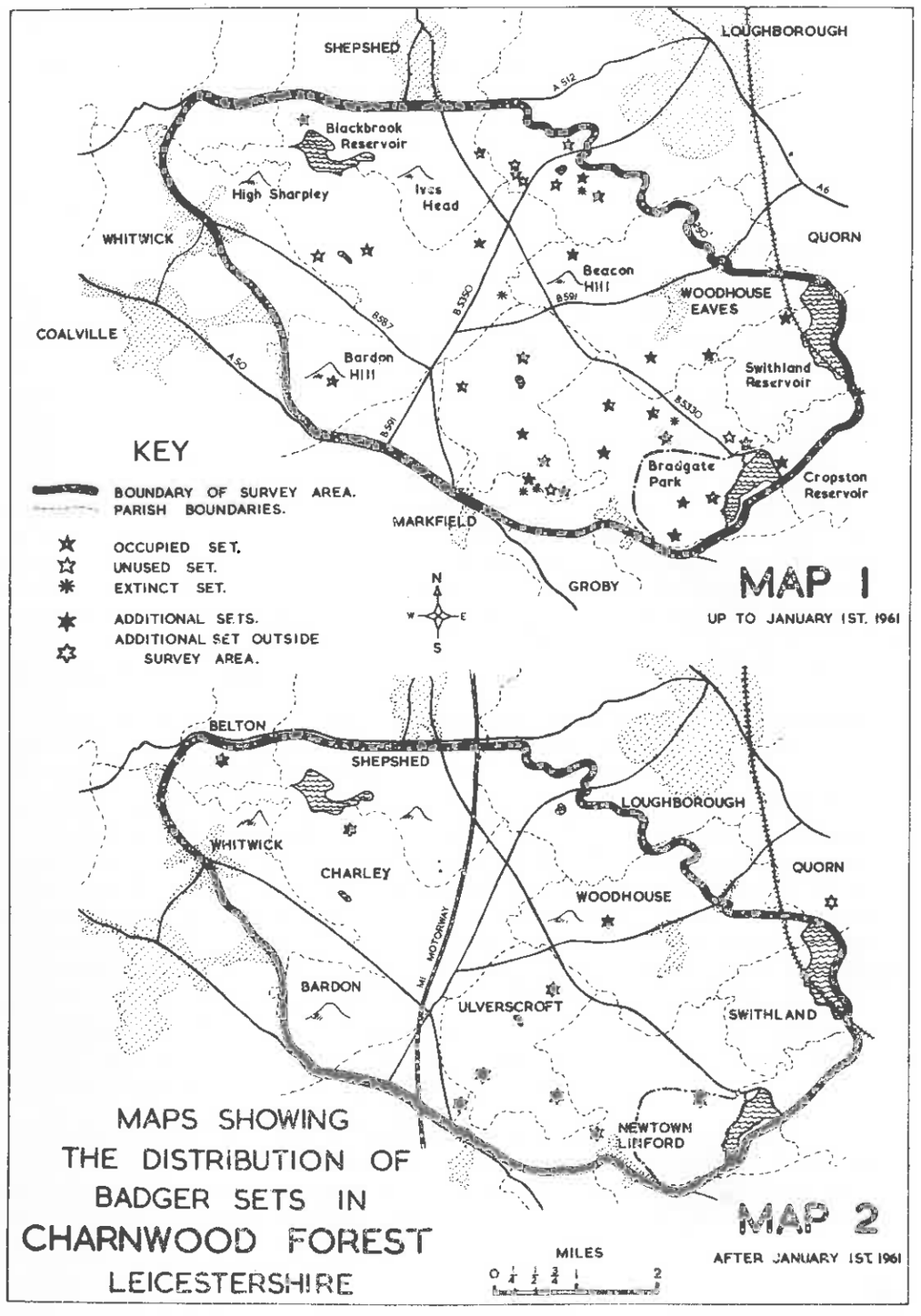
The idea of this survey was first conceived in the spring of 1957, when, after twelve months of regular and pleasurable badger-watching, the author decided he would like to know more about the habits and numbers of the badgers on the Forest. Preliminary work was begun at once, and after a slow start, when contacts were being established, a considerable amount of information began to accumulate. As time went by, one fact became obvious: that badgers were far more numerous in the area than most people had previously supposed.

In April 1960 a brief paper was compiled summarizing the information collected on 30 sets (Squires 1960). During the next ten months, nine new sets were found and much additional information concerning the activities of the badger was gained. In January 1961 the survey was expanded to cover the whole county. Thus this paper largely seeks to describe and account for the habitat, distribution and numbers of the badger on the Forest in January 1961.

THE REGION OF THE SURVEY

The natural features of the region known as Charnwood Forest need little introduction to Leicestershire people, and its unique character is known nationally. Completely different from the surrounding countryside, it forms an island of high land rising out of the valleys of the rivers Soar and Trent. It derives its natural characteristics from igneous and volcanic rocks, and sediments which line the valley floors. In this region are the last remnants of the natural landscape of the county: rolling country with narrow gorges, bare rocky peaks and steep slopes over which gorse and bracken predominate.

The limits of the area of survey were determined quite arbitrarily but were made to omit the larger areas of human settlement and their products, though for convenience, small areas which are not usually considered geologically part of the Forest proper were included. The whole area composes a solid block of approximately 30 square miles (see map). It extends northwards to Shepshed, and to Coalville in the west, Markfield is the most southerly point whilst the south west portion incorporates the whole of Bradgate Park as well as the Reservoirs of Cropston and Swithland. Woodhouse village and Nanpantan mark the most easterly and north easterly points. In all, some thirteen parishes are wholly or partly included.



HISTORICAL BACKGROUND

As with other Leicestershire mammals, written records of the badger in the county are very few; those relating directly to the animal on the Forest are even fewer. The following remarks therefore refer to Leicestershire as a whole, though it should be borne in mind that the county stronghold of the badger is, and probably always has been, the Charnwood Forest.

One of the first reliable records comes from the 19th century Leicestershire naturalist James Harley who finds the animal rare. Writing between 1840 and 1855 (Harley 1855) he states "Formerly well distributed over the county, abounding in most large woods, especially those verging on the Forest of Charnwood. The woods of Gopsall and Oakley also bear marks of its retreat, even till within a very recent date. Used also to occur at Mere Hill Wood near Loughborough. Not common". This was the age of intensive game rearing when keepers were numerous and highly intolerant of any "vermin" on their preserves. By 1884 the intensive keepering was still obviously taking a great toll and keeping numbers low, for it is described as "certainly not common in the county..." (Motts 1884), though a slight increase was reported. Montague Browne (1889) describes it as "Resident and generally distributed" also noting an apparent increase. The same volume shows a fair number of captures between the years 1845 and 1889, most of the specimens being presented to the Leicester Museum.

The steady increase seems to have been maintained for the next two decades, for by 1905 the animal was described as "still common" (Nuttall. 1905), though writing more cautiously two years later, he explains that they (the badgers) "... only hold their own because they have been protected to a certain extent ..." (Nuttall. 1907). Undoubtedly 'badgering' was then a popular and widely practised sport. By 1920, badgers were "not uncommonly seen, and several cases have been recorded of this animal dwelling in amity with the fox ..." (Pingriff. 1920), and were no longer considered rare. Thirteen years later in 1933 the position was much the same; "The badger is still fairly common throughout the county, particularly on the eastern side". (Lowe 1933). In the following years, the badger flourished as far as persecution from man would allow and in 1948 it was stated that it was "fairly frequently met with" (Neal. 1948) and, in 1952, "still fairly common" (Hadfield 1952).

From the above remarks it seems clear that no thorough and systematic survey of the badger population, anywhere in Leicestershire, has hitherto ever been attempted. In the light of recent work (which is proving the animal to be anything but uncommon in this county) all previous records must be treated with reservation.

METHODS OF THE SURVEY

After fixing provisional boundaries, as many sets as possible were located. This was done in a number of ways. The rolling, wooded nature of the area precluded a systematic field by field search, therefore a network of contacts was established. This was composed of such people as game-keepers, forestry workers, farmers, etc., who had intimate knowledge of the different parts of Charnwood in which they worked and who were willing and able to supply information about the location of sets and the activities of the badgers. This approach obviously saved a great deal of fruitless searching. Nevertheless, as each set was visited personally, at least once, the amount of travelling on foot and by bicycle still proved to be considerable. In actual fact, almost all of the sets were visited many times during the five years (1956--1961), so that records were constantly being revised. As far as was practical, each section of the survey area was covered with equal thoroughness, though it was with the sets nearest his home that the author became most intimately acquainted. As each new set was found, full environmental details were recorded along with notes on local information about badgers supplied by contacts.

Each set was placed into one of the following three groups:

1. Sets showing signs of current occupation.
2. Sets showing signs of obvious occupation in the immediate past but giving satisfactory signs of being unused at the time of the visit.
3. Extinct sets. i.e., totally deserted or permanently closed up.

Typical fox earths which badgers seldom frequented were ignored.

The distribution of sets by parishes is shown below (also see map).

PARISH	SETS				
	Occupied	Unoccupied	Extinct	Total	Appendix
Newton Linford	9	1	3	13	+ 2
Loughborough (including Nanpantan)	5	2	1	8	-
Ulverscroft	5	1	-	6	+ 3
Charley	2	1	1	4	+ 1
Woodhouse	3	-	-	3	+ 1
Shepshed	2	-	-	2	-
Bardon	1	-	-	1	-
Swithland	1	-	-	1	-
Thurcaston	1	-	-	1	-
Belton	-	-	-	-	+ 1
Coalville	-	-	-	-	-
Quorn	-	-	-	-	+ 1
Markfield	-	-	-	-	+ 1
TOTAL	29	5	5	39	+10

HABITAT AND DISTRIBUTION

The survey revealed some very interesting features regarding the animal's choice of habitat for the establishment of its set on the Charnwood Forest. Generally speaking, there was a fair diversity in the type of set location. Woods and spinneys are of course much favoured by the badger, but situations of sets away from these places were found on Longcliffe Golf Course, the Charnwood Quarry and in the bank of the overflow at Cropston Reservoir. A close scrutiny of the larger sets showed some very noticeable similarities. These are summarized below:-

a) The presence of trees around the sites seemed to be an important factor. Well over half (25) of the sets were sited either in, or on the edge of woodland or in a copse or spinney. The type of woodland varied, although it was apparent that sets located in conifers were always on the edge of the wood or in a clearing. About one quarter of the total were found on 'rough ground', i.e. land not given over to agriculture and which had simply been left completely untended often with a cover of bracken or shrubs. Only a few sets could accurately be described as being on treeless sites with no cover above the field layer, examples of these being found in the centre of a pasture field near Charley Chapel and another in the bank of the deep railway cutting near Swithland.

b) The majority of sets were excavated on a slope or bank. The reason for this is not fully apparent, but possibly the process of excavating and disposing of the soil from the mouths of the tunnels is easier on a gradient.

c) Most sets were surrounded by what may be termed a typical associated flora. This consists of a field layer dominated by Bracken (Pteridium aquilinum) with a little grass and often Brambles (Rubus spp.) and Nettles (Urtica dioica). More rarely Rose Bay Willow-Herb (Chamaenerion angustifolium), Bluebells (Endymion non-scriptus) and other herbs were present. The shrub layer was composed typically of Hawthorn (Crataegus spp.). Rhododendron (Rhododendron ponticum) and Elder (Sambucus nigra). Elders were present or dominant at half of the sets and in several cases grew in such profusion around the entrances, that they were difficult to penetrate. Similarly sets located in rhododendron bushes were extremely difficult to reach since the bushes grew very strongly and close together. The following table summarizes the typical set floras:-

PLANT	%. OF SETS AT WHICH PRESENT	COMMENTS
Elder	50	Usually dominant in shrub layer. Often growing in dense patches. Ground flora nearly always very poor or absent.
Rhododendron	12	Where present the only vegetation.
Hawthorn	11	Present when Elder absent.
Bracken	66	Usually dominant in field layer. Sometimes very tall and dense.
Grass	71	Usually present but often very sparse.
Mixed Ground Flora eg. Bluebell, Wood Anemone	49	Usually crowded out completely by bracken.

d) Of the soils chosen for excavation, those of a light nature predominated. Only five sets were on heavier ground, two of these being on clay. Excavation being easy, the badgers utilized the sides of several long disused sand pits and from these really enormous quantities of debris were ejected. Occasionally sand with pebbles was excavated. Undoubtedly the oldest sets were on the lightest soil.

e) Although information was rather indefinite, it seemed that the necessity for the close proximity of drinking water was not a vital factor in the establishing of sets. At only one third of the sites was there found a supply of fresh water within two hundred yards of the set. Many sets were situated a long way from the nearest water and it was clear that many badgers were forced to travel considerable distances each night in order to drink.

f) The difference in height above sea level between some of the sets was quite considerable. The lowest was found to be at about 225 feet (Swithland railway cutting). In a region of rugged relief, the sets were well distributed throughout the contours, although 13 occurred between the 400 and 500 foot contours. The highest set, being possibly the highest in the county, was at about 800 feet near Copt Oak Farm. The following table shows the distribution of the heights of the sets.

Height in feet above sea level	200 to 299	300 to 399	400 to 499	500 to 599	600 to 699	700 to 799	800 to 899
Number of sets	6	8	13	7	2	2	1

g) The age of the sets is largely a mystery. Centuries old badger sets are known in some parts of the country, but none of those in Charnwood was of very great antiquity. Information regarding age was available for only 18 of the 39 sets and of these only 14 could be dated with any degree of certainty. The set at The Brand, near Swithland, is known to be at least 100 years old* and also appeared to be the largest, with at least 25 entrances (most of which are in current use) and covering a large area. Doubtless the vigorous protection afforded the animals by their 'host', the late Sir Robert Martin, was the primary reason why the colony had thrived over the years. The second oldest set, also of considerable size, is at Cropston, situated in the bank of the reservoir's overflow channel. This had been started when the bank was first thrown up about 1870 and has been occupied continuously ever since. Thus, it was about 90 year old. At Blackbrook, the set dated from approximately the beginning of the present century, whilst the one in the disused orchard of Charley Knoll Farm has existed for the past 32 years.

By summarizing the above details we may describe a typical Charnwood badger set in the following way. It is probably located on the edge of a wood or enclosed in a spinney bordered by fields. It is excavated into the side of a bank or slope where the soil is light, or even sandy. Around the entrance, or in its immediate proximity grow elders with bracken in attendance. The ground flora (where this can compete with the usually very dense bracken) is composed of grass with a few other species of flowering plants. Its age is obscure though, unless it is of great proportions, it is unlikely to be very old.

NUMBERS AND DENSITY

Whilst latterly engaged on a more ambitious scheme of investigating the status of the badger in the remainder of the county, the author was interested to discover just how numerous badgers were in Charnwood

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* A description of how badgers were first introduced into this set from Gloucestershire is given by Montague Browne in this Book 'The Vertebrate Animals of Leicestershire and Rutland' 1889.

alone. Many naturalists have endeavoured to count accurately the badger population of a given area, but all have come to the conclusion that an exact census of numbers is quite impossible.

The obstacles to such a scheme are formidable indeed. Firstly, badgers seldom inhabit a given set for the full twelve months of the year, but often take up residence in an alternative set leaving the old one empty, probably in order for it to sweeten thoroughly. Secondly, more than one pair (or family) may be living in a given set if it is a large one with many entrances. At The Brand, up to eight animals have been seen to emerge from the set at one time. Thirdly, families split up in autumn when the cubs, born six months previously, leave home and seek out quarters of their own. Finally, badgers are very sociable animals, paying frequent visits and travelling long distances to other local sets. In the breeding season, unpaired males apparently travel long distances in search of a mate.*

Many methods of estimating badger populations have been described. Theoretically, the best way is for a number of observers to, between them, watch a number of sets simultaneously on several selected nights in ideal weather. Each observer counts the number of animals seen each night. The averages of the nightly totals for all observers are added together to give the grand total. This method was considered totally unsuitable for the Charnwood area owing to the large number of sets. An estimation on the following lines was made:

1. The large sets almost certainly contained more than one pair, the smaller ones probably contained a minimum of one pair, whilst the unused and extinct sets of course had no population. A rough balance between the number of large sets and unused extinct sets was noted. Allowance was also made for the possibility that some of the less visited sets may have fallen into disuse, and new sets established.
2. It was very probable that not all of the sets in the survey area had been located, and taken into account.
3. Fox earths, which badgers seldom frequented were ignored.
4. The numbers fluctuated somewhat due to hunting and digging, which is carried out all through the year.

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* Mr Charles Deeming of Quorn stated that on at least one occasion his pet female badger, kept in a stable adjoining the house, was visited at night by a wandering boar, which left ample evidence on the outside of the bolted door of his attempts to reach the female. The only known badger set in the district is over one mile distant on the opposite side of the village.

To each of the 39 sets under observation in 1961 was allotted a total average population of one pair. This assumption gave a total population of 39 pairs providing a density of about $2\frac{1}{2}$ animals per square mile. This compares well with a survey carried out by Neal (1948) in the Rendcomb district of Gloucestershire where badgers are considered common and where a rough density of 3 animals per square mile was arrived at. When compared with the density of the rest of England (as calculated by Neal and now under revision by the Mammal Society), the status in Charnwood seems to be at some midpoint between the abundance in the counties of the South West and the extreme scarcity in East Anglia. The figures also show that the badger is now more common than was currently supposed and certainly more numerous than it was 100 years ago. The high density of Charnwood badgers is not, however, found elsewhere in Leicestershire.

What are the factors contributing towards such relatively high numbers of badgers on the Forest, and why should the surrounding area of N.W. Leicestershire be much less heavily populated? Apart from the error of previous underestimation, the following points seem to offer a good explanation.

a) Charnwood Forest, the only area of the county with a rugged relief and the last area to which intensive farming can be applied still provides plenty of the ideal habitat for the animal. Copses and spinneys abound and there are still a few sizable woods remaining. Only three quarters of the land is given over to agriculture, mostly the valley floors and lower slopes. The higher land is left to the bracken and brambles, for the rocky nature of much of it makes cultivation impossible. Contrasted with this are the flat alluvial valleys of the Rivers Soar and Trent from which the Forest rises like an island. Here, the rich low lying land is intensively farmed and supports a rapidly increasing human population. Much of it floods regularly in winter and the badger population of this region is very low.

b) In an area like the Forest there is an abundance of food, both animal and vegetable, which will support a large number of individual badgers.

c) Although the amount of human interference is at times considerable (especially during the fox-hunting season), the badgers have many 'stronghold' sets to which they can retire and from which, due to their rocky nature, they cannot be successfully extracted. Thus, during times of maximum persecution, there always remain nuclei of badgers ready to make good any defficiency of population incurred. The badgers are numerous in spite of human

interference and where they are protected (as at The Brand) they flourish exceedingly well.

It is clear that Charnwood Forest acts as a kind of 'reservoir' to much of the surrounding area, for although it is an ideal habitat, it can of course only support a certain population. When this is exceeded and competition for food is severe, animals must move out.

THE BADGER AND MAN

The usual cursory method employed by man for classifying any wild animal with which he comes into close contact, is whether it is harmful or beneficial to his interests. In this respect, the badger is no exception and on the Forest it is regarded with mixed feelings. Its persecutors treat it as a pest, partly on account of a few serious, though isolated, cases of depredations on domestic livestock, but more often on account of a woeful ignorance of its ways and habits. A great deal of nonsense has been, and regrettably still is, talked about the badger as serious vermin warranting control. The following remarks apply specifically to the badger population on the Forest.

The chief charge, mostly from farmers, is that badgers occasionally take poultry and other livestock; but only four genuine cases came to light during the period of the survey in which poultry had been taken by badgers. In one case, near Sand Hills Lodge, seventy birds were killed before the badger was shot actually inside the pen. Pheasant eggs are occasionally taken, though losses of these are small. One farmer claimed, whilst offering no proof, that a badger had forced an entry through the roof of his pig stye and killed a litter of young pigs.

Several instances of the obstruction of forestry work by badgers came to notice. Wire-netting fences placed across regularly used badger paths were grubbed up night after night where the animals forced their way through. Young trees up to eighteen inches high were rooted up and the holes used as dung pits. Sufficient damage was caused to warrant the replanting of several hundred young trees, and attempts at extermination became necessary. Loss of trees due to damage of the bark by badgers was negligible. Three instances of badgers rolling down standing corn were recorded but in each case the area affected was less than one quarter of an acre.

The extensive tunnels of at least two sets caused damage to roadways. At Charley, shallow tunnels extending beneath the road finally caused the latter's subsidence. So much soil was excavated from the set in the bank of Swithland Railway cutting that it too was in danger of collapsing on to the line. In both cases the badgers were gassed, but this only temporarily

halted their activities. Both sets were later reoccupied.

In the interests of fox-hunting, an attempt to check the numbers of badgers (outside of the hunting season) is made from time to time by employees of the Quorn Hunt. Badgers are apparently considered irreconcilable to a good supply of foxes!

It became clear that the acquisition of badger skins for sale is not of prime importance in badger hunting. Prices are rather poor and hardly justify the effort involved in the skinning and preparation for sale.

The four major causes of death would seem to be as follows:

1. Road Deaths. An increasing number of badgers are killed on the Forest roads each year in collision with motor vehicles. Only one case of a badger being killed in this way, during daylight, has been noted. It can often be shown that accidents happened where a well established and regularly used badger track crossed a busy road. Such a spot is on a sharp bend near Roecliffe where badgers from The Brand met with disaster as they made their way to their feeding grounds in the wood opposite.

2. Other Accidents. Several cases of 'death by misadventure' were recorded. In one instance, the badger had fallen into a water tank at Cropston Reservoir and had drowned. In another, the animal had broken into a shed and had taken poison bait put down for rats. A few badgers, presumably from the set excavated in the side of the railway cutting at Swithland, were killed by trains on the railway track.

3. Direct Human Interference. Man is undoubtedly the badger's only serious enemy. Attempts to control the animal are made in the following ways:

a) Digging. Little or no excuse is needed for a day's badger digging, although this is usually a strenuous operation. Invariably adult badgers perish, but cubs are usually released elsewhere. Most sets are stopped regularly by the Quorn Hunt during the winter but the effect upon the badgers is negligible. No badger-digging clubs operate as such on the Forest, although independent groups sometimes organize a dig. Some sets, as explained above, were seldom touched because of their rocky nature, which calls for explosives.

b) Gassing. This method is used irregularly by farmers. The undoubtedly great depth of some of the sets makes this method rather ineffective as the gas is rapidly diluted and dissipated in the network of deep tunnels. It was noticeable that a set which had been thoroughly gassed was sometimes reopened by other badgers

and reinhabited within a remarkably short space of time.

c) Poisoning. Poison is seldom laid specifically for badgers.

d) Destroying the Habitat. This method very often succeeds where the other methods fail.

4. Indirect Human Interference. The rapid growth of towns and villages swallows up much suitable land and the sets are often built over or incorporated into gardens. Sets near to inhabited buildings are usually quickly deserted unless the occupants are afforded the necessary peace and quiet they previously enjoyed. The fouling of sets by the depositing of large quantities of domestic rubbish will not necessarily drive out the badgers, neither will the mere proximity of human habitation. A section of the London to Yorkshire Motorway is being constructed through the eastern half of the Forest. Preliminary plans of the route that the road will take, indicate that only a few of the sets will be obliterated or seriously affected. It will be interesting to note how the stoical badger will adapt its ways to the intrusion upon its hereditary stronghold of a modern high-speed motorway.

STUDYING BADGERS

Surprisingly few people, even amongst naturalists, can claim more than a fleeting glimpse of a wild badger. Such a chance meeting, perhaps during a walk through the woods at dusk, may lead even those who have seen these animals to believe that they are rather rare. Yet badgers are certainly not rare in most parts of Britain, and with a little preparation and patience are not difficult to watch.

For the majority of people living outside large cities, it is usually unnecessary to have to travel more than a few miles to a suitable set.

FINDING BADGER SETS

Obviously, the first step to badger watching is to locate a suitable set. Each watcher will approach this problem a different way depending on their knowledge of the district, the nature of the local terrain and the time which they are prepared to devote to this pursuit.

Most local Natural History Societies have information available concerning the badgers in their district and the beginner, or visitor to a new locality, can usually save themselves a lot of time by contacting their

local Society. Where no such organization exists, it is as well to enlist the help of people who, either during the course of their work or other activities, come into contact with badgers. Gamekeepers, pest control officers, farmers and forestry workers will probably know of one or more sets nearby.

The favoured habitats such as rough, wooded ground as described in the first chapter should be searched systematically. Winter is the best time, for the bracken and other ground flora is low and sets are most obvious. Elder bushes are often present around set entrances and should be investigated.

Difficulties can arise in determining whether holes which are found are occupied and whether or not they belong to a badger. There is little profit in sitting for hours at an unoccupied hole!

A deserted hole will usually be partially or entirely blocked with dead grass and blown leaves. Cobwebs do not tell much unless they are old and dirty when one such cobweb over the entrance would indicate that the hole is out of use. Any earth previously excavated from the hole will have a hard, firm appearance and in time the holes will gradually fill up with soil. Seeds will germinate in the disturbed soil and young vegetation will cover any remaining signs of the animal's activity. In short, the place will have an air of desertion.

The occupied hole, on the other hand, should show signs of animal activity such as debris cleared from entrances, freshly excavated soil, droppings, scrapings, tracks and trampled vegetation.

On a very cold day following a heavy night frost, faint but detectable whisps of vapour can be observed coming from the entrances of occupied holes. This is the exspiration of the sleeping inmates condensing in the cold air. Vapour may be detected coming from ventilation holes in the roofs of tunnels running close to the surface. The escaping warmth will cause hoar frost, immediately above the entrance, to melt and drip slowly.

The problem of determining whether the owner of the hole is rabbit, fox or badger is but one of elimination. Small to medium holes and the presence of unmistakable pellet-like droppings indicate a rabbit warren.

The well known habits of the fox, referred to in chapter one, make a fox earth quite distinctive if only by its smell. It is not uncommon, however, for a fox to take up residence with badgers though the badgers usually move out after a short time and leave the fox in possession of the hole. For this reason a careful examination is necessary in order to pick out the badger signs.

One of the most obvious features of a badger set is the series of well worn tracks leading to and from the entrances, in all directions. Too narrow for human footpaths, they pass uninterrupted under fences and low branches of small trees and form neat tunnels through the middle of dense clumps of bracken. They are too wide for rabbit paths and do not show a profusion of pellets. Where the paths pass under a barbed wire fence, the lowest strand of wire may have caught up a few grey hairs from a badger as it brushed underneath.

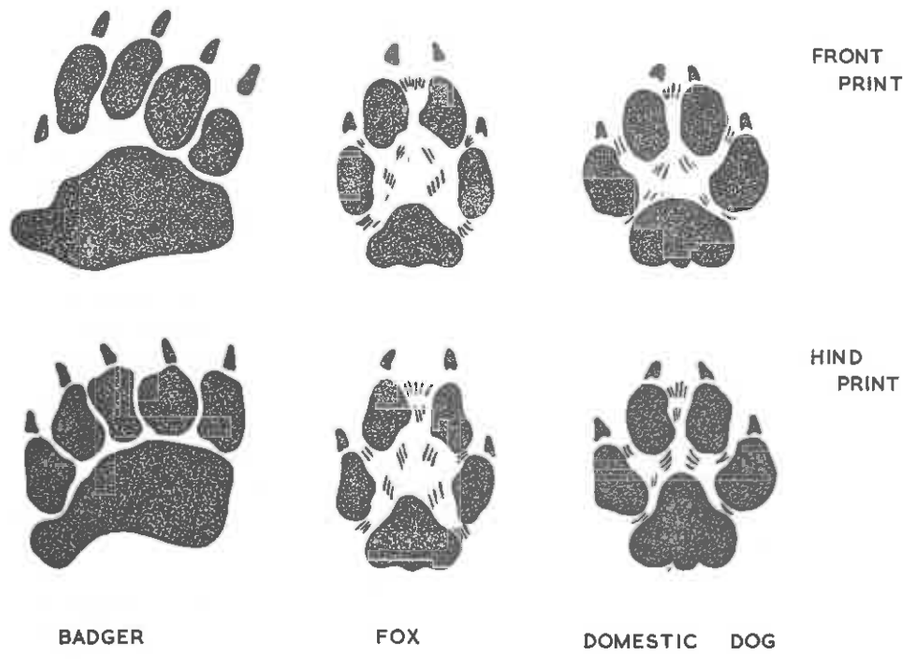
Along these badger tracks will be found a number of 'snuffle holes', they are usually smaller than the scrapes made by rabbits and, again, do not contain pellets. Not to be confused with the snuffle holes are the dung pits, somewhat larger than the former, they are purposely dug by the badgers for the regular deposition of dung. They are nearly always sited well away from the entrances, usually in a group and often under bushes. The age and size of the contents of these dung pits will give some indication of when the pits were last used and, in spring, whether the cubs are above ground and using them.

Large piles of freshly excavated earth and remains of discarded bedding such as dead bracken, dry grass and leaves, thrown out by the badger each night suggests very strongly that "brock" is at home. The fox does not take this trouble with bedding.

Further evidence can be gained to identify the inmates of the holes by an examination of the soft soil at entrances for spoors. The broad flat foot print of the badger will not easily be mistaken for the delicate print of the fox. A comparison between the spoors of badger, fox and dog is illustrated. Prints may also be found in the mud around drinking places.

'Play grounds' are another feature of the occupied badger set. These are areas near the holes in which the animals roll and play. Play, especially between cubs is a vigorous activity and in the process areas of vegetation are flattened. Such damage may be no more than a few square yards but may extend to a quarter of an acre or more.

Badgers have favourite scratching trees near their sets. Usually there is one particular tree which is used night after night. The claw marks, up to a height of about three feet from the ground, may be so deep and numerous as to remove the bark from the lower part of the tree.



FOOTPRINTS
half full size

PREPARING THE GROUND

A little preparation at the site before settling down to watch will be necessary.

A visit to the set in daylight, to study its layout should be made a few days before night observations begin. As a result of this visit, a rough plan should be drawn, especially if the area is an unfamiliar one. This plan would indicate all holes in use and would show where the tracks ran. If the set is a large one, there may be hidden or isolated entrances away from the rest, from which badgers could emerge unseen or unexpectedly.

Vantage points should be selected on different sides of the set where views can be obtained of as many holes as possible. This will enable a quick decision to be made on the choice of a new vantage point if the wind changes. A wind direction indicator can be improvised by hanging a small piece of white rag from a length of thread tied to the lower branch of a tree. Several of these indicators will show at a glance where

the wind is coming from. It is as well to choose vantage points which will afford the maximum comfort to the watcher, as it will be necessary to sit perfectly still for long periods. Any sizable and suitably placed tree may be utilized, since a position above ground level reduces the chance of tell-tale scent reaching the animals. If it is possible, use the trunk of the tree as a backrest and a lower branch as a footrest. When choosing vantage points at ground level be careful not to sit in a badger path or near a scratching tree. Camouflage is not essential, it is scent and noise which are the badger watcher's main problems. Dry ditches, hedgebottoms, stone walls and other local features may be used to advantage.

To begin with do not get too close to the set; start watching from about 20 yards or more and as experience of the badger's movements is gained, vantage points nearer to the set can be used.

Markers can be placed at set entrances which show signs of frequent use, light coloured stones and whitewashed pieces of rock are valuable after dark but have the disadvantage of appearing, to the eager eye, to be the snouts of emerging badgers. Better still are short marker sticks with whitewashed tops, placed in the entrances. These are pushed aside by the emerging badger and can be observed waving about before the badger comes into view. It is important here not to get human scent on the bottoms of the markers.

In order not to disturb the community more than necessary, an approach path should be planned with care. Remove any objects which you may stumble over or blunder into in the dark. Make note of, and avoid such obstacles as, a weak or creaking stile or loose stones on walls. An approach path should be cleared of dry leaves and dead twigs which could betray your presence when you move. Do not cause too much disturbance around the set or you may spoil your chances for the following evening. Finally, do not disturb the holes on the same day you intend to make an evening watch. Human scent is very strong and will linger for many hours. This will delay the badger's emergence if it does not prevent emergence altogether.

WATCHING THE SET

The beginner need only take a few simple precautions to ensure success. With knowledge gained from experience, techniques such as hand feeding and accurate prediction of emergence times can be developed.

Observations may be continued all year but spring and early summer offer the most rewarding hours of badger watching, for there is the

added attraction of seeing cubs; also the weather is more favourable. In the spring, the vegetation around the set is usually fairly low, offering a good view of the entrances. At other times, this vegetation, especially if it is bracken, will allow only a restricted view. On warm summer evenings the badgers may emerge in full daylight and have in fact been observed out in the middle of the day. As a rule they come out of an undisturbed set at dusk, first sniffing, then stretching, scratching and playing around the entrances before moving off to forage for food. On cold evenings and those following days of prolonged rain, emergence may be delayed and sometimes put off altogether. Bright moonlight gives the watcher a welcome source of illumination but seems to upset the badgers in some way.

The watcher should aim to be in position well before the badgers are due above ground, which is usually about an hour after sunset. Badgers may also be observed in the early morning as they return from their foraging. Extreme caution should be execised on approaching the set, especially at times when the animals are expected to be above ground. Badger watching should never be made a party outing; the more people there are around the set, the more chance there is of detection by the animals.

The choice of suitable clothing is important; this needs to be warm, waterproof and 'silent'. Mackintoshes and capes which crackle with each slight movement are best left at home; gabardine waterproofs are much more desirable. Warm clothing must be worn, for after sunset the chill strikes keenly, even on summer evenings. There is no need to black your face or wear dark clothes! Badgers take little notice of immobile objects which they cannot smell or hear. If binoculars are taken, these should be low powered with a wide field,, such as 7x50. These will give best results in poor light. A torch with a silent catch and a powerful red beam will be ignored by the badgers and will provide valuable illumination on a dark night. A watch, preferably with a luminous dial, a note book and a pencil are required to record emergence times and general observations. To those who suffer from insect bites — a word of warning; on fine summer evenings the midges, gnats and mosquitoes will be out in force. There are several very good insect repellent creams* on the market and a liberal application may save much inconvenience later in the evening.

On arriving at the set, note the wind direction from the rag markers,

* 'MYLOL', 'FLYPEL' etc.

then take up one of the vantage points downwind from the set. This is most important. Now you have to sit and wait; remain still and quiet and leave the rest to the badgers! Before trying to sketch or photograph the badgers, be sure you know 'your' animals; be able to predict their movements with some degree of accuracy. There is no short cut to success, observations at the set, patience and determination will bring their reward.

When you feel you know the animals, try feeding them with cake and raisins. The latter will be taken eagerly if laid near the entrance with a gloved hand. Syrup or honey smeared on the surface of a nearby rock and meaty bones staked down with a piece of string will provide much entertainment, especially if there are cubs around. But always avoid contamination of food with human scent. Gradually and with great patience, cubs can be tempted to take food out of the hand by laying the titbits a little nearer to you each visit.

When leaving, choose a moment when you may creep away without detection. Move quietly downwind and with the minimum of fuss. Don't leave in disgust if the badgers do not turn up after the first thirty minutes on your first night — give them a couple of hours, and don't let a run of blank nights dampen your enthusiasm. When you see your first badger you will know it was worth the trouble.

RECORDS AND OBSERVATIONS

For the first few visits, the thrill of seeing live wild badgers in their natural surroundings may be reward enough for all the time and trouble involved. The pleasure is great indeed, but to it is added considerable scientific value if accurate notes are made of observations.

Field observations should be brief and to the point and rough field notes should be copied out into a log book as soon as possible afterwards. Important information such as date, weather, time of sunset and locality is placed at the top of the page and makes correlation with observations on other evenings easier. Regular visits to the set during daylight will provide much useful information. Digging activity and signs of bedding changes will give some indication of the badger's underground activities, and a careful check of the dung pits will help to show how many badgers are using them and what they have been eating.

In a recent paper, Ernest Neal (1963) has outlined some of the points which still need to be discovered or confirmed. Much is still to be learnt concerning the vocal sounds made by badgers. Is the eerie scream made by both sexes and what is its significance? A good tape recording

of the scream is badly needed so that it can be played back to badgers to check their reactions. The significance of the badger's territory is not yet fully understood. What in fact can be termed "territory" and is it recognisable outside of the breeding season? Useful work can be carried out on seasonal behaviour, movement patterns of families and individuals from one set to another, quantitative measurements of food eaten by badgers and diet variations, mating, mapping of sets, eviction methods and the variations of habits and habitats of badgers near human habitation.

The Loughborough Naturalists' Club, and particularly the Mammal Society of the British Isles are anxious to hear about any observations from badger watchers.

SUNSET G.M.T. 8-38a.m.	LOCATION OF SET. Longcliffe Quarry.	MAP REF. SK 491173	DATE 4th May 1959.
	WEATHER: Fine sunny evening followed unsettled day. Light showers in early afternoon. Warm and clear. Light S. wind. little moon.		
	Arrived 8-15 p.m. Took up position sitting on ground at base of oak.		
8-41	Boar emerged cautiously, SCRATCHED vigorously and retired down the same hole again		
8-43	Boar reappeared from the same hole. Ambled to the big elder and proceeded to stretch himself. Raised himself six or seven times. The whole tree shook as he did so. Returned to original hole and peered down it. A distinct "purring" sound was audible from him. He waited there about half a minute then moved noisily off down the path towards the bridge and out of sight.		
8-58	Sow half emerged but retreated almost at once.		
9-03	Second timid emergence but retreated as before.		
9-06	Sow emerged fully this time very slowly and cautiously. Scratched. Noise (faint) of scratching from same hole.		
9-07	Cubs "bounced" out of hole with much noise. Joined sow on path. Sow moves to tree and stretches. Cubs playing around entrance, very excited.		
9-10	Distant gun shot caused cubs to "stampede" down hole. Sow listens for a few seconds, then continues to stretch.		
9-13	Cubs out from entrance screened by large blackberry. No caution: begin to play at once. Yelping and snapping; whole bush shakes.		
9-17	Boar appears and joins sow. Both disappear down hole.		
	OBSERVERS: A.E. Squires; R.J. Moore.		

Specimen page from a permanent record book

APPENDIX

GENERAL

Since the completion of the manuscript of the main work at the end of 1960, further information concerning the badger in Charnwood Forest has been collected up to September 1963. This is summarized below. The author is greatly indebted to members of the Loughborough Naturalists' Club who have co-operated in this work. In so doing they have caused the survey to become less of one man's work and more of a club effort.

Recent information from club members has revealed a further nine sets of various size and age, hitherto unrecorded for the area of the original survey. These are shown on Map 2 opposite page 10 and are distributed in the parishes of Belton, Charley, Markfield, Newton Linford, Quorn, Ulverscroft and Woodhouse. Topographical information indicates that these sets show no general divergence from the sets already described from the district.

The numbers of badgers killed on the roads by motor vehicles continues to increase; this may be explained by the recent build up of traffic on the Forest roads. Correspondingly, badger digging seems to be declining as a factor controlling the numbers. Recent months have seen a continuing pressure on the wild life of the Forest area by man. Individual building projects, for example, continue to increase in number. More important, preliminary work on the motorway extension through Leicestershire, which cuts through the centre of Charnwood Forest, is well underway. Though the new road will remove several habitats of repute outside the Forest area, it should not greatly affect the Charnwood badgers. Only one of the recorded sets lies in the path of the advancing road and interference with any of the others seems unlikely.

It is of interest to note that a badger was shot by a farmer at High Tor near Coalville during February 1963. The animal had been responsible for killing about twenty hens over a period of about a month and is one of the very few cases of its kind in recent years. It is thought that the prolonged severity of the weather forced the animal to seek an alternative source of food. On the other hand, at least one farmer has encouraged badgers on his land, especially since they cleared four wasps nests from a hedgerow in one night.

A NEW APPROACH

Early in the summer of 1963, the author spent an interesting and pleasurable evening badger watching with Mr T.J.Whall of Newtown Linford. Mr Whall's approach can well be described as 'badger watching with a difference' !. His technique, developed over a period of some years achieves remarkable results, whereby the animals can be 'called out' as required. Perseverence in placing specially prepared food near the set at the same time each night is the key to Mr Whall's success. At least two generations of badgers have been fed in this way. The badgers readily feed from a spoon held in the hand and illuminated by a powerful torch.

A new approach

Mr Whall's familiarity with these badgers has allowed him to experiment in several directions. He has noted, for example, that food is often taken down the hole for consumption, a habit contrary to that

described by most other naturalists. Meaty bones, tied to lengths of string have been taken at least twelve feet down the hole. Experiments with light have shown that these badgers are unaffected by the brightest of artificial lights. Powerful hand lamps and flash bulbs have little or no effect upon the animal's behaviour, though sudden noise or scent sends them to ground.

The possibilities for future work are very exciting and the author looks forward to the time when a complete report on Mr Whall's many new discoveries and novel techniques will be available.

THE NATIONAL BADGER SURVEY

Since the publication of Ernest Neal's monograph — 'The Badger' — in 1948, many field naturalists have turned their attention to this animal.

Now a National Badger Survey, enquiring into the status of the species has been launched by the Mammal Society of the British Isles. The principal aims are to map the distribution of badger sets, to determine habitat preferences, to evaluate the changes occurring in the animal's status and to determine the seasonal movements and density of local populations.

The survey is being carried out on a county basis, with county recorders responsible for gathering together information on the badgers of their county. In Leicestershire the county recorder is:-

Mr I.M.Evans,
Keeper of Biology,
Leicester Museum,
New Walk,
Leicester.

Mr Evans will be pleased to receive any news about badgers, details of sets or even corpses of badgers, providing they are in good condition. Material can be handed in at the Museum, but please leave your name and address so acknowledgement can be made.

There are seldom enough naturalists to cover the large areas of countryside involved in this survey and Leicestershire is no exception. There is a great deal of scope for both the experienced badger watcher and the beginner.

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