



# BAT NEWS



Newsletter of the Warwickshire Bat Group

Issue 9 Summer 1998

## Warwickshire Bat Group – working for bats!

*Paul Elliott*

Welcome to the latest edition of Bat News. I hope that you will find it interesting reading about the group's activities and plans.



The summer promises to be a busy time. The Bat Group will be involved in the third year of the National Bat Monitoring Programme. The NBMP is being co-ordinated by the BCT and represents the first nation-wide attempt to gather reliable data on the status of British bat populations. It is an essential step forward for bat conservation because it will provide the true picture of what is happening to our bats. Without this information there is a limit to how much effective help we can give bats. Some aspects of the NBMP require no special expertise so anyone can become actively involved. For instance, if you know of a Pipistrelle roost (you may even have one in your house!) you can contribute by making tow exit counts as the bats leave on summer evenings. If you would like to help with the NBMP then contact the Bat Conservation Trust on 0171 627 2629.

There are other ways of helping bats. You will find a copy of the new Batline leaflet in with this newsletter. It contains much useful information that can be helpful when trying to dispel the misconceptions that some

people have about our furry friends. All of us can be alert to opportunities to put the truth across in conversations with friends, family, neighbours and colleagues. Since human ignorance is the biggest threat to bats, the more we can do to educate people, the better. This is something that all members of the Bat Group can help to do.

The second week of May is National Bat Week and we will be contributing to the event by holding a major Bat Walk. The theme of the week is "urban bats" and in keeping with this we are running a bat walk in Coventry's Memorial Park. The event has already received some media attention and if you can find somewhere to display the enclosed poster it may help to make it our biggest bat walk ever.

Other events and activities are detailed elsewhere in the newsletter. As always your participation in any of the events is welcome. The Bat Group is going from strength to strength at the moment, which can only be good news for the region's bats.

## The Bat Detective – Brian Briggs & David King

*Rob Hunter*

At last, the bat book that I (and I suspect a lot of you) have been waiting for! There may be lots of books with much more detail about the theory of using bat detectors. There are many more comprehensive guides to the characteristics of the different British species, physical and behavioural. In fact, if I was to try and make a list of the books about bats I want, it would be worse than trying to do that Desert Island Discs thing. (Younger readers might need to ask some old Radio 4 listener.)

But if I had to pick one book about getting out there and "doing it", then there's no contest. This is it!

The Bat Detective has, for me, the virtues of being straightforward, not assuming I know anything, and bringing together all the simple, obvious things I should know about fieldwork, but often don't. It provides some excellent methods to make more positive identifications when you can't (as is usually the case) get very close to your bats, or see them for any length of time. And best of all for me, it gives the clearest ideas on using a detector I've seen.

The accompanying CD of field recordings (all done on Bat Box III's, except for a few on a Petterson D140, and one on a Petterson D980) is the most comprehensive I've heard. It covers all our native species, often with examples of the same species recorded in different situations. The presentation of these gives even me the confidence to think that I might get quite good with practice. Oh, all right then, lots of practice!

What I can guarantee is it will fire your enthusiasm. (You might not go quite as potty as us. We sat down to a lovely candlelit dinner on my birthday and guess which CD I put on as background?)

Just put a Bat Box III in my hand and watch me go!

I got my copy of the Bat Detective for my birthday. You can get yours from: Stag Electronics, 4 Esprit Court, New Road, Shoreham by Sea, West Sussex, BN43 6RB. Tel/Fax: 07000 228269. Email: batbox3@aol.com. The book and accompanying CD are £15.50 plus £1.50 p&p.

## DOWN THE SMOKE!

Rod Müller

One of the benefits of working in London is being close to so many wonderful shops. Dillon's, a favourite of mine, in Gower Street and quite close to the university, is one of the largest booksellers in the capital.

During a recent lunch break, I went to Dillon's to explore the Natural History section and a bright young female assistant asked politely if she could help.

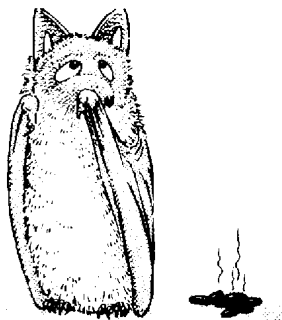
"Oh, yes" I replied "I can't seem to find a copy of The Identification of Arthropod Fragments in Bat Droppings"

There was a short stunned silence!

"Do you know the author?" she enquired cautiously, "Oh yes, but I also know the ISBN" I offered,

So, with a slightly bemused expression on her face she checked the store database and seemed surprised but also rather pleased that it was listed.

"It's £5" she said brightly "A bargain. I'll have it please"



She processed my order and handing me the order slip, with the faintest of smirks, said, "where do you get bat droppings then?"

"Bats!" I replied "I could bring you some Brown Long-eared poo if you would like to see the real . . . . ."

"Ugh!" "No thanks" she gulped. Pity, I thought I sensed a small spark of interest, and then she continued,

"Why examine, ugh! Bat droppings?"

"To see what they eat" I replied

"Is that important?" she frowned a little,

"Oh, yes. It helps to define a preferred habitat for some species" I explained.

I eventually left Dillon's feeling buoyant. I think I made an impression there!

A month later and feeling flush with some expenses, I revisited Dillon's and was pleased to see the same attractive young person at the enquiry desk.

"Oh hello Mr Müller" she said smiling sweetly "what will it be this month?" And before I could flood her mind with exciting bat trivia, she added "perhaps, The Identification of Bat Genitalia?" and her coup de grace "and, I expect you will want the enlarged edition!"

Had I met my match? Umm!

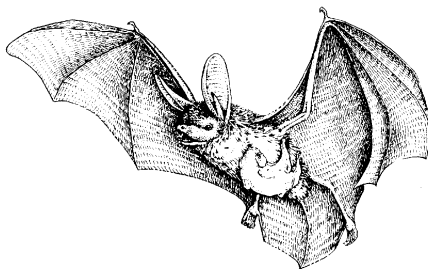
**\*DISCOVERING BRITISH BATS\*DISCOVERING BRITISH BATS\*DISCOVERING BRITISH BATS\*DISCOVERING BRITISH BATS\***

### An Exhibition for National Bat Week and Museums Week.

12<sup>th</sup> – 16<sup>th</sup> & 19<sup>th</sup> – 25<sup>th</sup> May

Daily 10am to 5pm (closed 1-2pm)

As part of National Bat Week the museum will be staging a temporary exhibition on these fascinating mammals. Learn about the different species that we have in this country, where they live and even how to attract them to your garden. Lots of free bat information to take away. On Saturday 16<sup>th</sup> May LIVE BATS will be in the Museum with David Endacott of Oxfordshire Bat Group.



The John Moore Countryside Museum  
41 Church Street  
Tewkesbury  
Gloucestershire  
GL20 5SN  
(01684) 297174

# Ultrasonic bat detectors: a beginners' guide

Paul Elliott

This article provides an introduction to ultrasonic bat detectors, describes how they work, and how they can be used in the field

## Introduction

One quarter of the world's mammal species are bats (Altringham, 1996) and even in Britain bats account for around one third of land mammal species (Corbet and Harris, 1991). Most of our native mammals are shy creatures that are difficult to observe and therefore study, but bats are different because they fly. The trouble is they fly at night, which is inconvenient for us, but with the advent of ultrasonic bat detectors it is now much easier to study them.

There is potential for older students, such as A-level biologists, to carry out investigations and projects on bats using bat detectors (Richardson, 1996) and for pupils of all ages to enjoy close encounters with the help of bat detectors. Field courses and other residential trips provide excellent opportunities for bat detection and study, but many pupils will also be keen to turn out in the evening after school. Bat conservation makes a good case study (Elliott, 1995) and the subject can be brought alive by arranging an exciting lesson after dark, so that children can observe bats in the wild.

Bat detectors are simple to use. This is a beginner's guide to getting the most out of a bat detector and how they can be used with and by students.

## What is ultrasound?

The human ear is sensitive to sound frequencies from approximately 40Hz (waves per second) to 20 000Hz (20kHz). All the noises that we are familiar with therefore fall below 20kHz, yet there is a world of sound above this frequency of which we are not normally aware: this is the realm of ultrasound. It may be a mysterious world to humans, but many animals have hearing that is sensitive to frequencies well above 20kHz and a few make use of such sounds. The masters of ultrasound are bats belonging to the Sub-Order Microchiroptera. These are the mostly small, mainly insectivorous bats found throughout the world, with the exception of the highest latitudes and the most remote islands. Their relatives, the flying foxes (Sub-Order Megachiroptera) of the Old World tropics and sub-tropics, do not, with one exception (the Egyptian Fruit Bat, *Rousettus aegyptiacus*) make use of ultrasound (Altringham, 1996; Fenton, 1992).

## Bats and ultrasonic echolocation

For centuries people have marvelled at the ability of bats to navigate confidently in complete darkness. Whereas many nocturnal animals have large, superbly sensitive eyes, those of most bats are rather small. How could they possibly navigate by sight? In the 18th century Lazzaro Spallanzani, Bishop of Padua, first blindfolded bats and then blinded them before setting them to fly in a room strung with wires. The bats flew confidently around the room, proving that sight was not necessary for navigation in the dark. It was not until the late 1930s that Donald Griffin (1958) discovered that bats produce ultrasonic calls and echolocate.

Bats generate ultrasounds in the larynx and these are then emitted through the mouth or nostrils. The high frequency sounds rapidly attenuate as they travel, so unusually large pinnae are used to help collect echoes coming back from

surfaces and potential prey. The echoes are analysed in the brain to build a sound picture of the immediate surroundings (Altringham, 1996). Using this system, bats are able to navigate and hunt even in complete darkness.

Bats use ultrasound for echolocation because of its short wavelengths. A strong echo will only return from an object that is at least as large as the wavelength of the sound hitting it. So, the higher the frequency, the more detailed the sound picture the bat can form. Detectors that give an insight into the ultrasounds produced by bats are now readily available (see Appendix for details).

## Ultrasonic bat detectors

Detectors convert the ultrasonic calls of bats into sounds that are clearly audible to humans. They have been developed over the last 40 years and the models available today are, easy to use and light-weight (see Figure 1).



Figure 1 A typical ultrasonic bat detector.

Most are hand-held, but one popular model is worn as a set of headphones. A detailed account of how bat detectors work is given by Catto (1994), but basically all bat detectors have four components:

- an ultrasonic microphone;
- an electrical circuit that converts the input to a lower pitch;
- a speaker;
- a battery.

The nature of the electrical circuit depends upon the model. There are three ways in which the ultrasonic input from bat calls can be converted into output that is audible to humans:

### i) Heterodyning

The frequency to which the detector is set is subtracted from the incoming frequency. If a bat is producing calls that peak at 55kHz and the detector is tuned to approximately 50kHz, then an audible output of around 5kHz will result. Tuneable detectors produce sounds with good tonal qualities which help with species identification, but it is impossible to monitor different frequencies simultaneously. Less common are broadband detectors which monitor a range of frequencies simultaneously. These detectors are therefore useful for detecting bats in general, but less useful for identifying species. There are some cheap kits available and the construction of one could prove a useful project in itself.

## ii) Frequency division

Incoming sound waves are converted to square waves. A digital frequency counter counts incoming waves and produces one wave for every ten (say) counted. This has the effect of dividing the original frequency by a factor of ten, for example, 50kHz becomes 5kHz. There are no tonal qualities to help with identification though.

## iii) Time expansion

The signal is stored digitally and replayed at a slower speed. This reduces the frequency of the sound to audible levels. It is ideal for research using computer analysis and sonograms. Time expansion models are generally very expensive.

Bat detectors are useful tools for professional researchers and amateur bat enthusiasts. Surprisingly, their greatest virtue is that they help to make bats more visible. All bat detectors are directional and also the nearer a bat is to the detector, the louder it sounds. So a fleeting, shadowy silhouette against the sky becomes much easier to spot and follow when the sparse visual cues are supplemented by these auditory ones. Detectors can be used to measure the amount of bat activity in an area by recording the number of bat 'passes' heard and, in suitable situations, can be used to gain an accurate count of individual bats. This is particularly the case if they are used as bats leave a roost, or head along a commuting route such as a canal or hedgerow to a favourite feeding site.



With a detector it is easy to survey areas to see if there are any bats present, although care must be exercised in drawing conclusions. Some feeding sites will only be utilised if the weather conditions are right or at particular times of the year. An absence of bats on one particular night should not be regarded as conclusive evidence that they do not use that site.

Detectors assist in the study of behaviour. Not only do they make it easier to see bats, but clues can be gained from their calls about the behaviours that they are engaged in. For example, as bats close in on aerial insect prey, the number of calls per second rapidly increase and this produces a sound on the detector known as a 'feeding buzz'. This makes it possible to gather data on the rate at which bats attempt to capture prey.

## Studying bats

Flying bats are easy to find if you look in the right sort of places, at the right time of year, and in reasonable weather conditions. Before considering these aspects, the importance of safety must be emphasised.

## Safety

If you are planning to study bats, whether on your own, with other adults or with a group of students, there are a number of safety issues to be considered. Some of these apply to any fieldwork, but others are particularly relevant to working after dark.

Here are some basic tips:

1. Decide where you are going to work and carry out reconnaissance in daylight as well as after dark.
2. Look for hazards - e.g. water, rusting metal, barbed wire, holes in the ground.
3. Let someone know where you are going, when, and for how long. Be fairly generous in your estimation of how long you will be though, because it's easy to get engrossed.
4. Wear good footwear. Walking boots are ideal, because you are less likely to turn an ankle in an unseen rut.
5. Even during warm summer evenings people can get cold and miserable standing around after dark, so make sure they are wearing several layers.
6. Take some food and a warm drink, especially if you are going to be working during your normal sleeping hours. Walking around at night uses a lot more energy than being in bed or watching television!
7. Keep your group together and ensure that you have an appropriate staff:student ratio.
8. Make sure that you have plenty of torches, spare bulbs, and batteries. Head torches leave your hands free.
9. A mobile phone is useful if you are going to be straying very far from civilisation.
10. Consider telling the police of your activities in advance. People get suspicious if they see strange lights and even stranger people down in the woods at night!
11. Check whether you need permission to work where you want to.

## When should you detect bats?

Bats in Britain hibernate, because there are too few aerial insects available for them to feed on during the winter months. Exactly when they start to hibernate and when they become fully active again depends upon the weather. On average, hibernation lasts from the end of October to the middle of March (Ransome, 1990). Most bats will have brief periods of activity interrupting hibernation, but the winter months are not a reliable time to find bats on the wing.

In June and July the females give birth and this is a good time to study bats. The nights are short and warm and insects are abundant. Females are particularly busy feeding to supply their single foetus with nutrients and then to produce milk for suckling the newborn pup. Females come together to form maternity roosts and these can number several hundred individuals, so roosts are most likely to be located at this time. Roosts may be in tree holes, buildings, bridges or other structures. Bats and their roosts are legally protected in Britain and many other countries and it is not normally legal to enter a roost or disturb roosting bats, but there is no problem standing outside the roost with a detector.

Bats are crepuscular in their activity, with most feeding being done around dusk and dawn when the majority of night-flying insects are active. These are therefore the ideal times to watch bats. The middle of the night usually reveals less bat activity and is darker so they are harder to see. If you can stand operating at dawn, this is when the best views are available as many bats seem reluctant to call it a night and return to their roost, especially when food is abundant.

Bats are most active on warm, humid, windless nights. They will tolerate a little rain, but appear to hate really windy conditions; presumably because it plays havoc with echolocation and flight dynamics. Bats may be less active on moonlit nights because they are more vulnerable to predation by owls, but the light can make it easier to observe them. Even very powerful torches do not appear to disturb bats on the wing, and used in conjunction with a detector, can facilitate good views.

### Where should you detect bats?

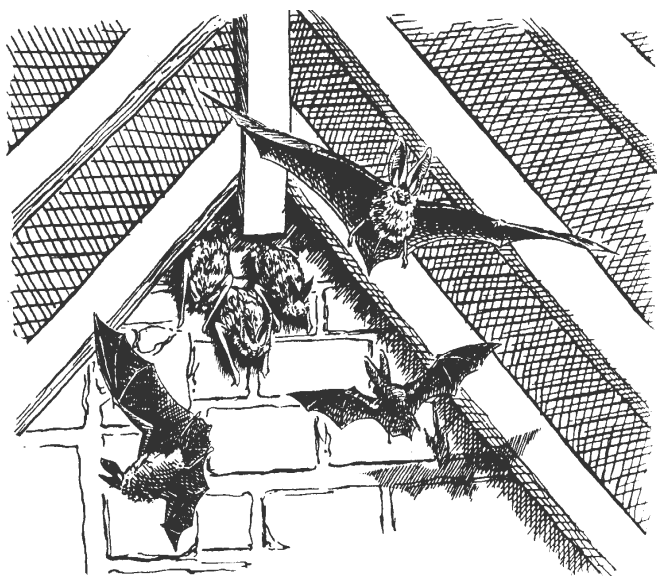
You are most likely to encounter flying bats in places where:

- night-flying insects are abundant (e.g. over water);
- suitable roost sites are nearby (mainly trees and buildings in Britain);
- there is some shelter from wind (e.g. trees, hedgerows).

The following are often good places for bats and likely to provide the novice bat-watcher with a rewarding experience:

#### i) Outside roost sites

If you know of a bat roost and the owner is amenable, they why not wait outside to watch the bats emerge? You stand a good chance of seeing plenty of bats and should be able to count them out because they usually leave one at a time, although it may take a large colony an hour or more to leave. There is also the advantage that in mid-summer most species leave before it is properly dark so you may get a good view. Watching bats return to a roost at dawn is even better. They often swarm around outside the roost before entering and it may be virtually daylight before the last bat disappears inside. Bats do not only roost in old buildings and tree holes. The Pipistrelle bat (*Pipistrellus pipistrellus*) is quite happy in modern buildings, including flat-roofed 60s-built school blocks. I know of a number of schools with their own bat roosts; but how many have so far gone undetected?



#### ii) Over bodies of water

Many species of bat take the opportunity to feed on the abundant insects associated with water. The Daubenton's bat (*Myotis daubentonii*) feeds almost exclusively over still or gently flowing water and is easy to identify and observe (see Richardson, 1996). This bat flies low and at a constant height, its wing tips almost entering the water on the downbeat. Many of its prey are lifted off the surface of the water by its large back feet which are employed like fishing gaffs. It also maintains a regular flight path, making it easy to illuminate. Canals in Britain are especially good places to watch them because they are narrow, fairly straight, and usually have a tow-path. They are also deep and steep sided so safety is paramount.

#### iii) Woodlands

Broadleaf woodlands may be better bat habitats than conifer plantations because they not only support many insects, but generally provide more roost holes. It is best to try detecting in clearings, rides, and woodland edges because they give bats a less cluttered flight path and are easier for humans to walk through. Most British species will hunt in woodlands. If conditions are windy, the middle of a wood or the sheltered side of a wood is a good place to look for bats.

#### iv) Illuminated areas

Bats are often attracted to lights. Research has shown (Rydel, 1992) however, that bats only seek out white lights, because these are the ones that attract insects. So look out for bat-watching opportunities where there are tree-lined roads lit with white lights, floodlit buildings, or security lights. Bats are also attracted to moth traps, swooping in to take insects before they enter the trap, much to the consternation of lepidopterists. Of course, the presence of lighting has the added bonus of making it easier to see bats, although this advantage is countered by the fact that your eyes do not become properly accustomed to the ambient darkness.

### Bat detector techniques

Despite the fact that there are only around 15 species of bat found in Britain (Corbet and Harris, 1991), it is not easy to identify all of them. Some can be identified from their call alone, but with most flying bats you have to consider not only their call, but also their flight pattern, silhouette, behaviour, and location to reach a satisfactory identification: what birders call the 'jiz'. Some species cannot be separated in flight, indeed, some are so close (e.g. Brandt's, *Myotis brandtii* and Whiskered, *M. mystacinus*) that even in the hand experts have trouble agreeing! Some species are seldom detected because they produce such quiet calls (e.g. Long-eared, *Plecotus* spp., Natterer's, *Myotis nattereri*), and rely more on their superb hearing to detect insects and other arthropods sitting on vegetation, before hovering in to glean them off leaves.

## Species to get started with

This is all rather discouraging, but do not despair, there are some species that are relatively easy to identify in flight. The easiest species are:

### Noctule (*Nyctalus noctula*)

Most people can hear some of this species' relatively low frequency and very loud call. On a detector it makes a metallic 'Chink-chink' or 'Chip-chop'. Best at 20kHz.



Figure 2 Noctule bat (*Nyctalus noctula*). Britain's largest bat species, its early emergence, high flight, and loud, relatively low frequency calls make it an exciting bat to detect.

They are very loud and a noctule nearby will make the detector in the palm of your hand feel as if someone is throwing stones at it. This is a big, tree roosting bat that flies high and emerges before dusk. On warm summer evenings they may be seen competing with swifts and swallows shortly before the birds give up hunting for the night.

### Daubenton's (*Myotis daubentonii*)



A loud, 'machine-gun' like call. Best at 45kHz. Usually flying just above water, straight or in wide, repeated loops.

It emerges from its roost an hour or more after dusk.

Figure 3 Daubenton's bat (*Myotis daubentonii*). An easy bat to identify: Daubenton's bat typically feeds just above the surface of water and produces a loud, machine-gun like sound on a bat

### Pipistrelle (*Pipistrellus pipistrellus*)

A rich, tonal call with 'smacks' and 'plip-plop' noises. Best at 45 or 55kHz. The smallest European bat with a characteristic fluttering flight. Frequently changes height and direction but often proves to be following a repetitive hunting route. Britain's commonest bat and the one most likely to be seen in suburban gardens. Interestingly, it is now thought to be two different species, one with a call peaking at 45kHz and the other at 55kHz (Barratt et al., 1997). Determining which type is present or most abundant in your locality would make an interesting investigation.

### Horseshoes

(Greater, *Rhinolophus ferrumequinum*  
Lesser, *R. hipposideros*)

Extremely high pitched calls of constant frequency. The 'soft' sounds produced are quite unlike the other species. Greater best at 83kHz, Lesser at 113kHz. They often fly very low and keep close to buildings and vegetation. Both are rare bats found only in south-west Britain.



Once you have developed some ability to distinguish between different species of bats, there are opportunities for interesting comparative studies. All bats in

Europe are nocturnal insect eaters, so how do they avoid direct competition? How are the ecological niches divided to provide all species with a livelihood? By surveying a particular habitat with a bat detector, it is possible to build up a picture of which species utilise each sub-habitat (Ahlén, 1981; de Jong, 1994). A nationally organised study involving hundreds of volunteers helped to provide some data on the importance of different habitats in Britain (Walsh, Harris, and Hutson, 1995), but there is still plenty of scope for innovative, yet simple work in this field. For instance, by walking a 1 km transect and recording the number of bats heard passing and comparing this with habitat features, it is possible to generate testable quantitative data on habitat preferences.

Detectors can be used to help find roost sites (de Jong and Ahlén, 1991). Since a number of bats may leave a roost at intervals over a period of many minutes, it is possible to locate the roost by walking in the direction that bats appear to have come from. If you have all night and a team with several detectors it may be possible to turn up several different roosts. First, spread your team out in the study area and get them to record the direction of the first bats they see at dusk and the times. Then have a conference and look at a map to see what patterns emerge. The people who record the earliest bats will be the ones closest to roosts. Reposition your team to try and follow bats back to their roost(s) at dawn.

The feeding behaviour of bats can be usefully studied. Detectors make it possible to identify important feeding sites by listening for the tell-tale feeding buzzes. This can be followed up by trapping and identifying the insects available, or if you know where the roost is, by dissecting and analysing the content of droppings. Analysis of bat droppings works on the same principle as owl pellet analysis, but on a smaller scale (McAney et al., 1991).



There are current local and national surveys for students to get involved in.

The Bat Conservation Trust is co-ordinating the National Bat Monitoring Programme which aims to trial and refine field techniques to be used for the long-term monitoring of bat populations. Detector surveying is one of the key techniques that will be used and they welcome new volunteers. Almost all counties in Britain have an active bat group which is likely to be involved in survey work. These groups can be contacted through the Bat Conservation Trust.

## Suppliers

A number of manufacturers produce bat detectors. Most of the cheaper ones are of the heterodyne type. The cheapest option is to buy a kit and construct the detector yourself, which is fairly straightforward if you are competent with a small soldering iron. [Ed – this does depend on the kit. The one that Maplin used to make involved some very tricky soldering. Check it out first or find an experienced friend].

The cheapest is probably the Magenta II at £25, while assembled detectors from other manufacturers will cost between £80 and £150 for basic models. Specifications do vary, so shop around.

The Bat Conservation Trust produces a useful summary guide to the basic models. If you have unlimited cash (!) the top models cost in excess of £2000.

## Manufacturers' Addresses:

Stag Electronics, 4 Esprit Court, New Road, Shoreham-by-Sea, West Sussex BN43 6RB. Tel: 01273-455408.

Daedalus, Unit G8, Greenheath Business Centre, Three Colts Lane, London E2 6BJ. Tel: 0171-247 7793.

Pettersson Elektrónik AB, Tallbacksvagen 51, S-756 45, Uppsala, Sweden. Internet:  
<http://www.bahnhof.se/~pettersson/>

Magenta Electronics Ltd, 135 Hunter Street, Burton-on-Trent, Staffordshire DE14 2ST Tel: 01283-565435.

Maplin Electronics plc, P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel: 01702-554161.

Ultra Sound Advice, 23 Aberdeen Road, London N5 2UG. Tel 0171-359 1718.

Skye instruments Ltd Unit 32, Ddole Industrial Estate, Llandrindod Wells, Powys LDI 61E Tel: 01597-824811.

Tranquility. David J. Bale, 3 Suffolk Street, Cheltenham, Gloucestershire GL50 2DH. Tel: 01242-570123.



## BAT CONSERVATION TRUST

The BCT is the best source of information about bats in Britain and will be able to give you details of local contacts:  
The Bat Conservation Trust, 15 Cloisters House, 8 Battersea Park Road, London SW8 4BG. Tel: 0171-627 2629.  
Web site: <http://www.bats.org.uk>

## BAT HELPLINE

A national bat helpline is available for anyone needing immediate advice, e.g. on injured or disorientated bats.

Tel: 0171 627 8822.



## Books and Recordings

A number of recordings are available to help people become familiar with the ultrasonic calls of British species:

"The Bat Tape" has recordings of ten British species as heard on a Mini bat detector (from Bat Groups of Britain, 10 Bedford Cottages, Great Brington, Northamptonshire NN7 4JE).

"British Bats" is a tape with 20 extracts recorded with a Bat Box III and available from the manufacturers, Stag Electronics.

"The Inaudible World" is a double CD with 27 European bats (also from Stag Electronics).

Among books, "Which Bat Is It?" by Robert Stebbings (Mammal Society, London, 1986, ISBN O 906282 055) includes a useful summary on ultrasonic identification features, that should help a beginner with fieldwork.

For more detailed accounts try "Identification of Bats in Flight" by Ahlén (Swedish Society for the Conservation of Nature, Stockholm, 1981, ISBN 91 558 50421) or "Catto's Bat Detector Manual" (Bat Conservation Trust, London, 1994).

An accessible, often humorous yet practical introduction to the world of bats is found in "Bats" by Phil Richardson Whittet Books, London, 1985, ISBN O 905 483413). This book is a suitable starting point for anyone, including children.

Another book called "Bats" written by M. Brock Fenton (Facts on File, Oxford and New York, 1992, ISBN O 8160279 3) provides a more detailed introduction to bats and includes a mass of excellent colour photographs.

Consider "Bats: Biology and Behaviour" by John Altringham (Oxford University Press, 1996, ISBN O 19 854075 2) if you want a more academic yet very readable source of biological information. This includes an excellent section on the physics and biology of ultrasound.

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## The Author

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## Diary

- May 10<sup>th</sup> Burbage Common Open Day (between Hinckley & Earl Shilton) bat group stall – 11am to 5pm
- May 12<sup>th</sup> Bat Walk, Tocil Wood, Warwick University, in association with Warks Wildlife Trust. £1 8pm (meet in Rootes Residence Car Park)
- May 12<sup>th</sup> – 16<sup>th</sup> “Discovering British Bats” at The John Moore Countryside Museum (see advert on page 2)
- May 16<sup>th</sup> Bat Walk @ Coventry Memorial Park, Kenilworth Road 7.45pm (meet in Park & Ride Car Park) Free! Batty Face Painting!
- May 19<sup>th</sup> – 25<sup>th</sup> “Discovering British Bats” at The John Moore Countryside Museum (see advert on page 2)
- May 23<sup>rd</sup> “Twilight Ramble” at Coombe Abbey Country Park nr Coventry 7.30pm (Adults £1) (Children/Passport to Leisure and Learning 50p) Advance booking needed - (01203) 453720
- June 14<sup>th</sup> BTCV Day – “Bats in Woodland” Further details from: Gillian Luscombe (01926) 430574

## Advance Notices

- Aug 19<sup>th</sup> “Bats & Barbecue Night” at Kingsbury Water Park 7.30pm (meet in Broomey Croft Car Park) Advance booking needed – (01827) 872660
- Sept 4<sup>th</sup> – 6<sup>th</sup> National Bat Conference at University of Wales, Swansea. Booking forms from: Andrew McLeish – (01686) 670643

