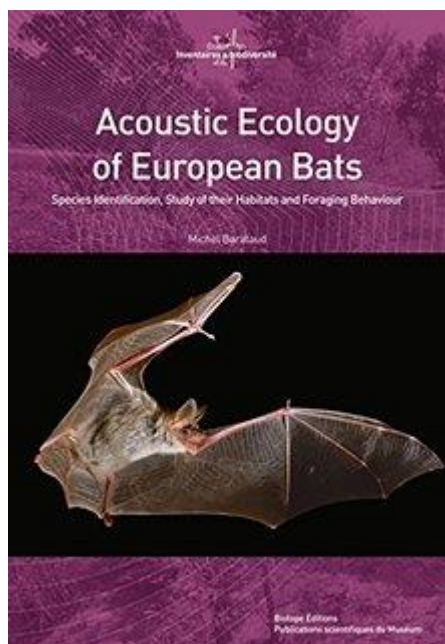


Book review: The Acoustic Ecology of European Bats by Michel Barataud

(Biotope Éditions, Publications scientifiques du Muséum)



This book is an immensely detailed guide to a number of key methods available for studying the calls of European bats and their acoustic ecology. It includes an excellent DVD containing heterodyne and time expansion recordings for a wide range of species, which are ideal for practising your listening and sonogram analysis skills.

In prime position at the start of the book is a very comprehensive glossary which alone makes this a valuable reference for anyone with a serious interest in the identification and study of bat calls. The first chapter outlines the fascinating history of our understanding of bat sonar, before describing the physics of sound and how bats produce and utilise sounds. There follows a chapter on bat detectors which provides a useful overview of how the different systems work, though surprisingly doesn't include a section

dedicated to direct sampling detectors which are now used by many bat workers, though this type of detector is referred to elsewhere in the book. The chapter on computer-based sound analysis provides in-depth instruction in using BatSound software and is full of useful tips, several of which can also be applied when using other sound analysis programs.

There then follows a chapter on the acoustic identification of bats. New bat detecting technology enables large amounts of data to be collected and processed with minimum effort but the risk is a loss of field skills. Here there is a welcome emphasis on the importance of listening to calls in the field and getting a fuller understanding of the ecological factors that influence bat behaviour and call characteristics. It begins with an excellent guide to species identification using heterodyne detectors, championed as "the ultimate field technique", followed by the longest and most complex section of the book, looking at the use of time expansion detectors based on what the author refers to as the "French" approach which emphasises the importance of listening to time expanded bat call sequences and assessing auditory criteria prior to computer analysis of the recorded sound.

This is where things get more challenging! Through many years of experience the author and his colleagues have learnt to confidently identify audible energy peaks in bat calls, which can be at the start of a call (an "explosive start") and/or the end (a "final whack"). An oddity of these audible characteristics is that they are rarely confirmed through sonogram analysis and the author comments that this has led to some contention over the validity of using these in species identification. Having tested this approach extensively through examining thousands of signals recorded from tagged bats in flight, he is confident that these audible peaks in energy are not simply an artefact of the recording process but are produced by the bat. Furthermore the presence/absence of these call characteristics is correlated with configurations of environment or in-flight behaviour and is often species-specific. The author argues that assessing these auditory clues should be the first step in categorising call type and is critical in the identification of many species, particularly those that are more challenging to identify such as *Myotis* species.

The results of many years of research into species identification based on auditory and sonogram analysis are presented in meticulous detail through the use of tables and numerous scatter diagrams which plot measurements of different pairs of call characteristics, revealing the distribution of values for groups of species initially categorised by auditory type. This produces data point clouds for each species with varying degrees of overlap with other species. The reader can then plot his or her own call analysis data on a scatter diagram for comparison with those in the book and assess the confidence level for species identification, i.e. do the plotted values fall within an area of the data point cloud in which a single species is represented, or within an area of multiple species overlap. This is a really useful resource but to make it work you first need to be able to recognise the presence/absence of an explosive start or final whack when listening to time expanded recordings (assuming you're not among the sceptics regarding the validity of these auditory clues for species identification). This is not easy as even time expanded calls are of very short duration so it can sometimes require an exceptionally well trained ear to discern whether the energy peak is at the start or end of the call. The accompanying DVD includes many audio recordings enabling you to train your ears but the presence/absence of these energy peaks is not always easy to discern. Some of the recordings include examples of saturated signals in order to demonstrate the false impression of energy peaks that may occur as artefacts of having the recording level set too high. However, quite a few of the "normal" files also include saturated signals making them less useful as reference recordings. With the prolonged practice recommended by the author (or with particularly acute hearing) the reader may well be able to confidently categorise auditory type as the first step in this approach to species identification, but caution is needed as it's quite easy to get this initial step wrong, leading to misidentification. However, it's certainly an intriguing topic and the results of the extensive research that has gone into it make for interesting (if not easily digestible) reading. It made me listen to my own recordings (time expansion and direct sampling converted to time expansion) with fresh ears and some rewards (my Natterer's bat recordings do tend to have a distinctive click on each call suggestive of a final whack). A brief guide to identification of social calls concludes this chapter.

The last few chapters look at recommended techniques for different types of survey and study; some fascinating but as yet untested hypotheses on the acoustic ecology of barbastelle, greater noctule and other species; useful answers to frequently asked questions; and final reflections on the methods outlined in the book and future developments.

While this book may seem rather daunting to the beginner and the "French" approach may not be embraced by all, I would recommend it to anyone with an interest in identifying and studying bat calls. Focus first on the chapters outlining techniques you already have some familiarity with or are making your first steps in (e.g. heterodyne or sound analysis) and you should find this an invaluable reference, particularly used in combination with the call libraries on the DVD. Fully mastering the more challenging techniques outlined by the author takes much patience and perseverance but even if you don't quite get there you will be introduced to some thought-provoking concepts relating to the complex and endlessly fascinating topic of the acoustic ecology of bats.

Philip Briggs