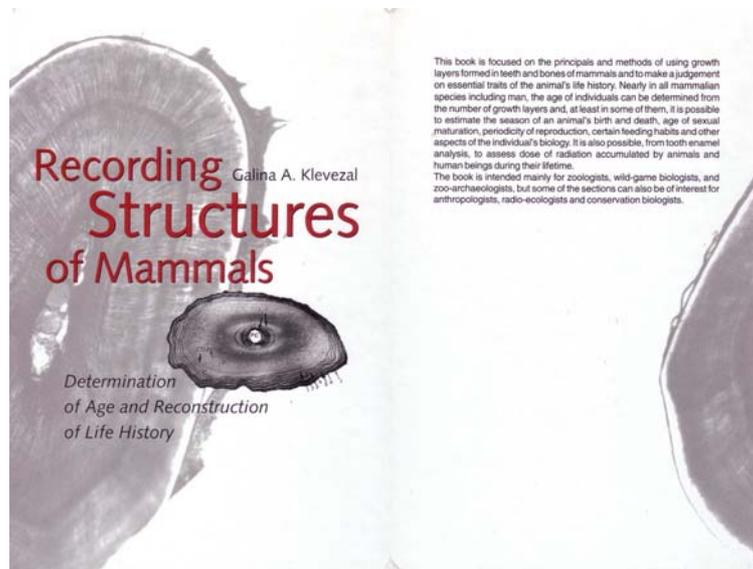


**Klevezal, G.A. 1996. Recording structures of mammals: determination of age and reconstruction of life history. – Rotterdam/Brookfield, A.A. Balkema**

Book review by B.L. Beatty



Galina Klevezal's one of a kind text on the use of incremental growth layers in the hard tissues of mammals is THE central source of information on the subject and an essential resource in understanding the subject. Despite the date of publication and its sometimes laborious writing style (but good for having been translated from Russian [translated by M.V. Mina and A.V. Oreshkin]), I believe that this belated review is worthwhile if it inspires some to take advantage of the opportunities that exist in elucidating the life histories and population biology of modern and fossil mammals.

The book is divided into two parts, a conclusion, and an appendix. The first section focuses on what the identity (ontogeny, biological basis, diversity, etc.) and identifying (labelling, microscopy) of recording structures, otherwise often known as incremental or growth lines/layers. The first chapter, 'Morphological characteristics of recording structures', defines the concept of recording structures and covers details regarding those found in dentine, cementum, enamel, and bone. This chapter does a fine job of explaining why some structures (especially dentine and cementum) function well as recording structures of some aspects of life history and why some (some soft tissues, and to a lesser extent, enamel) do not. Klevezal does well to focus on classifying recording structures by their 1) sensitivity, 2) period of registration, and 3) persistence of a record. The tradeoffs of these features and the variations known in different mammals are discussed in detail between dentine, enamel, cementum and bone, making this chapter an important basis of understanding that most palaeontologists would benefit from reading.

Chapter 2, 'Studies of recording structures by means of their vital labelling', explores the various stains used to make recording structures visible in light microscopy. Though this chapter is brief, it is written in more methodological detail than in many other papers on this subject, always pointing out the flaws and benefits in various methods from a very openly and critically point of view. If more methodologies were discussed with such honesty and critical review, more aspects of our science would be truly reproducible as they should be.

'Growth layers in the recording structures', Chapter 3, focuses on the primary use of recording structures as indicators of incremental growth. This review of the identification and types of growth layers provides an important discussion of the variety of layers potentially visible and which ones have meaning and which do not. I was surprised at first to read about the variety of layers that people interpret simply as growth layers. Klevezal illustrates that it is easy to confuse many structures simply because of section thickness, lighting, and other details of study methods (Figure 13, pg 35 is a particularly telling example).

Chapter 4, 'Diversity of annual layer patterns', highlights all potential variables that impact how annual layers form, including the obvious ones such as age and gender, as well as less conspicuous ones such as interspecific, interpopulation, hibernation, domestication (including lab animals) and latitude. The impact of latitude is especially important to recording structures in herbivores and is an important one to read.

The first chapter of part 2, 'The use of the recording structures in zoological investigations' is chapter 5, entitled 'General principles of application of recording structures for determining absolute age of mammals'. This practical chapter elucidates some valuable cautions to be made when choosing recording structures, planes

of section for specific tissues, and counting methods. This is arguably the chapter with the most utility for anyone in the midst of planning their experimental methodology.

'Age determination of mammals from temperate and subpolar zones' (chapter 6) highlights some of the author's speciality and the importance of latitude in the formation and utility of recording structures. The marine mammal data is especially interesting to my biased view, though workers studying bats, insectivores, rodents, carnivores, and ungulates will find discussions of interest here as well.

The last chapter, 'Possibilities of applying recording structures to decode records of an individual's life history' is perhaps the most useful one to the palaeobiologist with few specimens available for destructive sampling. Here, Kelvezal covers many potential life history variables that are determinable from recording structures (mainly dentine), including growth rates, sexual maturity, reproductive cycles, age of weaning, diet, mobility, local group membership, and season of death (especially useful for fossil material). A special note regarding the evergrowing incisors of rodents is also of added utility.

Lastly, after a brief conclusion there is an appendix, 'Guide to the methods of revealing growth layers'. This eight-page guide is concise but to the point, highlighting many of the most practical matters that are rarely elucidated in published papers on these subjects. In this more than any other chapter, Kelvezal's writing takes on the book's characteristic thorough, methodologically honest feel. Advice on sampling and storing material (which should be compared with current suggestions by the Society for the Preservation of Natural History Collections, <http://www.spnhc.org>), as well as methods of staining and revealing growth layers is all clearly laid-out.

As stated previously, this book is one of a kind in its coverage of the study on incremental growth structures in mammals, particularly in dentition. For this reason, it is certainly worth the effort to work through the sometimes difficult writing due to translation. Recent work (Hillson, 2005) has criticized some of the conclusions made by Kelvezal in light of new evidence, but overall the work is extremely sound. More importantly, all possible explanations for various histological observations are explicitly described in this book with an honest and visible set of assumptions and thought processes put forth unlike most other works. Its attention to reasoning out these details comes close to feeling as if Kelvezal was mentoring you on a project, exploring all the options.

Kelvezal, G.A. 1996. Recording structures of mammals: determination of age and reconstruction of life history. – Rotterdam/Brookfield, A.A. Balkema. 274 pp. ISBN 90-5410-621-2. Price £ 115.00 (hardcover).

### Cited literature

**Hillson, S. 2005.** Teeth. – Cambridge, Cambridge University Press.

B.L. Beatty  
Organismal Biology & Anatomy  
University of Chicago  
5801 South Ellis  
Chicago, IL 60637  
[blbeatty@uchicago.edu](mailto:blbeatty@uchicago.edu)  
and  
University of Kansas Natural History Museum  
1345 Jayhawk Blvd.  
Lawrence, KS 66045  
[blbeatty@ku.edu](mailto:blbeatty@ku.edu)