

BOOK REVIEW

Mark D. BATEMAN (ed.), 2019. **Handbook of Luminescence Dating**. Whittles Publishing, Dunbeath, 416 p. & over 130 colour figures. Hardcover. ISBN 978-184995-395-5. 90.00 £.

Mark Bateman's "Handbook of Luminescence dating" is a guide for archaeologists, Quaternary scientists and geologists that plan to use luminescence dating in their research. The book is specifically addressing non-experts in luminescence dating, since it aims to be "accessible to anyone who might want to have something dated or is learning to use the technique first hand", as stated in the preface by the editor himself. This promise is not exaggerated. The handbook is a welcome introduction to the method for scientists working in all kinds of environments, from archaeological excavations over Aeolian and glacial landscapes to tectonic settings. Different from other textbooks on luminescence dating currently available, it does not only provide the theoretical background of the technique but also systematically supplies readers with helpful practical suggestions and instructions on sample selection in the field, analytical strategies and interpretation of luminescence ages in their specific fields of research. The book is a compilation of 12 chapters authored by 17 of the foremost experts in luminescence dating. All of the chapters are illustrated with a large number of instructive photographs, diagrams and schematic figures, and come with a rich and up to date reference list that includes both classical work and the latest developments. Cross-references between the chapters and an index of key expressions at the end of the book allow for comfortable navigation to specific topics.

Chapters 1 to 3 provide general information required for every scientist that considers to apply luminescence dating or to work with luminescence ages, independently of the environment or setting it shall be applied. Chapter 1 by Shannon Mahan and Regina DeWitt is an introduction into the theoretical principles of luminescence dating, its most important historical milestones, and common measurement devices and techniques that can be used to determine palaeodose and dose rate, the constituents of the luminescence age equation. This may sound like a necessary but rather tedious topic, but here it is presented in a concise and appealing manner at the same time. In chapter 2, Mark Bateman summarizes practical considerations for the collection of luminescence samples and the publication of luminescence data received from a dating laboratory. For every researcher that is going to collect luminescence samples and work with the results for the first time this is a highly recommended guideline to optimize the outcomes of dating – but also more experienced scientists might be surprised to find useful suggestion. How these luminescence ages can finally be implemented into local and regional chronological frameworks or age models is outlined in chapter 3. Based on a number of well-chosen hypothetical and real case studies Laine Clark-Balzan informs about the benefits and challenges associated with using luminescence data in such Bayesian approaches.

In chapters 4 to 10 the potential and challenges specific to luminescence dating in certain environments and settings are addressed. With chapters on Aeolian landforms (by Kathryn Fitzsimmons), loess (by Thomas Stevens), glacial and periglacial environments (by Mark Bateman), fluvial and marine archives (by Markus Fuchs and Alastair Cunningham et al.) and tectonic and archaeological settings (by Edward Rhodes and Richard Walker, and by Ian Bailiff) the book covers the entire spectrum of environmental settings commonly used in Quaternary research. Each chapter contains (i) a brief introduction of the processes, landforms and sediments typical for the respective environment; (ii) the main challenges that have to be expected when applying luminescence dating in this specific environment; (iii) strategies to deal with these challenges, from hints for sample collection to

suggestions for data analysis and interpretation; and (iv) detailed – sometimes a bit lengthy – information on a number of successful case studies that demonstrate the potential of luminescence dating to answer different research questions.

Chapters 11 and 12 deal with more recent developments in luminescence dating. The former (by Georgina King et al.) provides an excellent introduction into rock surface burial and exposure dating. By offering the potential to determine durations of exposure and burial phases of rock surfaces, this relatively recent technique significantly broadens the spectrum of samples, settings and research questions luminescence dating – which is conventionally restricted to burial dating of silt to sand sized sediments – can be applied to. Further exciting directions of (future) luminescence research are illustrated by Jakob Wallinga in chapter 12. Developments that may significantly improve the applicability of conventional luminescence dating are on-site screening techniques to optimise sampling strategies, and spatially resolved palaeodose and dose rate determination in sediments with a complex bleaching history and dosimetry. Beyond dating, luminescence signals can also inform about geomorphic processes such as distance and mode of sediment transport, soil reworking and rock uplift in mountains.

In conclusion, "Handbook of Luminescence Dating" is not only an introduction for Quaternary scientists, archaeologists and geologists into luminescence dating. Primarily, the book is a guideline that accompanies researchers during the entire process of establishing a luminescence chronology, starting with sample collection and ending with reporting of luminescence ages.

Dominik BRILL
University of Cologne

Peter MÜLLER & Gerhard HAHN, 2018. **Die Trilobiten der Erdbach-Kalke von Erdbach (Hessen) und die der „Phillipsien-Bank“ im Raum Warstein (Nordrhein-Westfalen), sowie eine Revision der Cystispirinae (mittleres Mississippium)**. Abhandlungen der Senckenberg Gesellschaft für Naturforschung, 574, 237 p., 145 figs, 21 pls, appendix (98 tab.). Paperback. ISBN 978-3-510-61413-4. € 49.80.

Proetides (ordinal) are one of my favourite groups of trilobites. They have been eloquently typified as "disorderly" and continue to be a topic of debate when it comes to the classifications of both higher and lower rank taxa. The Carboniferous period has been considered the beginning of the end for trilobites in the aftermath of the Devonian extinctions. The surviving proetacean families, however, showed considerable diversification in the shallow-water platform seas of the Carboniferous as for instance, is shown in this monograph by specialists Müller and Hahn.

The paper describes and revises the Carboniferous "Kulm" trilobites of the classic Erdbach-Kalk outcrops in Hessen that were previously studied by Holzappel and Richter & Richter, two new outcrops in the same area and three outcrops in Westfalen, Germany. It commences with an introduction explaining the main goals and history of research, followed by the descriptions of the localities and their trilobite associations, comparisons to other countries and an explanation of the morphological terms used. These chapters are concise but adequate.

On page 16 the taxonomic part commences and this is really what the paper is about: a classic comprehensive description and revision of the trilobites. The authors studied truly numerous well-preserved trilobite specimens which were incorporated in their work through high quality photographs and numerous drawings,

complemented with an index of their material (as an appendix). Four new genera and 26 new (sub)species are described as well as a new tribe. Of particular interest are not only the specimens with the mineralised cuticle preserved, but also the exquisitely executed silicone casts of external moulds. The classic works on these trilobites were based, for an important part, on internal moulds. According to modern standards, perhaps with the exception of some groups of comparatively large trilobites (e.g. homalonotids), this is no longer considered to be sufficient for the erections of new taxa. As such, this beautifully illustrated work is an important and worthwhile contribution to specialists.

Allart VAN VIERSEN
Natuurhistorisch Museum Maastricht