Editorial: The value of formal subseries

John A. Van Couvering[1], Brian McGowran[2] and William A. Berggren[3]
[1]*Micropaleontology Press, Rosenthal Library, Queens College CUNY, New York NY 11367*
email: vanc@micropress.org
[2]*School of Physical Sciences, The University of Adelaide, SA 5005, Australia*
[3]*Department of Earth and Planetary Sciences, Rutgers University, Piscataway, NJ 08854 and*
Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543

In the hierarchy of chronostratigraphic terminology, in which formal terms are capitalized, the use of "upper" and "late" as applied to integral subdivisions has long confused the profession, as well as its editors. Can units whose names include adjectives be formal, or not? Can informal and formal terms with different meaning use the same words, and be distinguished only by capitalization? This century-old issue, which is addressed in *Cenozoic chronostratigraphic terminology: in defense of the Subseries* by Marie-Pierre Aubry(*) scheduled for volume 13, no. 1 (2016) of this journal, has suddenly become the subject of attention and possible immediate action by the International Commission on Stratigraphy following a controversial meeting earlier this year. Far from being a trivial matter of typography, the status of subseries in the formally defined hierarchy has turned out to have far reaching implications.

The five levels of hierarchy presently recognized in the geological time scale, in descending order, are the time terms Eon, Era, Period, Epoch and Age. The equivalent *chronostratigraphic* terms Series and Stage are used for the strata that record history during the Epoch and Age, respectively. Such matters of nomenclature and hierarchy are not progressed like knowledge itself, namely in a brisk scientific back-and-forth of theory and evidence in the phenomenon category of "stratigraphy". They are progressed rather by votes in committees and the observance of the necessary codes of procedure and communication in the compliance framework of "stratigraphy". It all sounds rather pedantic and trivial out of context, but it is more than that, and true to academic tradition, codes and rules can excite more dissension than the science itself.

Thus, a recent controversy has arisen between two traditions within the Cenozoic stratigraphic community over the formalizing of subseries as hierarchical category within series. The oceanic or deep-sea tradition has traditionally been flexible about the usage of "upper" and "Upper" Eocene whereas the much older neritic and terrestrial research traditions are more meticulous about the formal "Upper". When these views were aired briefly at the recent meeting STRATI II in Graz, Austria (July 2015), a large majority raised hands in support of formalizing a hierarchically defined "Subseries", whereas several members of the Subcommission on Neogene Stratigraphy (SNS) expressed preference for officially defining all "subseries" as informal terms.

In the paper in press, Aubry presents a broad historical overview of this controversy, in the framework of the cogent remark by Canales (2015, p. 3) in regard to the debate between Einstein (the scientist) and Bergson (the philosopher) on the nature of time, that "..to act on the future one needs to start by changing the past". We regard the recommendations in Aubry's paper, based on a new evaluation of the past, as both valid and important, and we recap them here for the benefit of colleagues who may feel involved, in one way or another.

The *Code* (NACSN 2005) and the *Guide* (Hedberg 1976, Salvador, 1994; Murphy and Salvador, 1999) recommend the fewer hierarchical divisions the better, and while we concur in general it is nonetheless obvious that "Subseries" differs from other sub- and super-entities in their consistent wide use since Lyell's time, and in their inclusion in time scales published from 1964 onwards. Formalizing this already-functional concept as a sixth hierarchical level is hardly a mnemonic crisis.

Prior to 1986, the stages were normally adjusted to fit the subseries, even when the latter were not further defined, in order to provide a much needed level of resolution between the wide reach of series and the narrow and sometimes inapplicable limits of stages. The introduction of the GSSP changed this top-down practice to bottom-up, and much successful and welcome effort has since been devoted to the establishment of GSSPs. With this automatic redefinition, the long-established recognition of the subseries as a group of stages creates a *de facto* unit within the formal hierarchy, with the same meaning and usefulness as before, and with new precision.

In sum, a stratigraphic interval between two stage GSSPs is chronostratigraphic in essence, and when subseries are defined in terms of stages, that is how they should be recognized. To orphan the subseries from stage GSSPs, requiring them to be treated only as subjective concepts of vague and imprecise meaning independent of the chronostratigraphic hierarchy – and for no reason other than the words that are used to identify them — is to disregard this reality, as well as the wide literature where their meaning is neither vague nor misunderstood.

*Co-author W. A. Berggren is married to Dr Aubry. His opinion, as far as is possible, is his own.

REFERENCES

CANALES, JIMENA, 2015. *The Physicist and the Philosopher: Einstein, Bergson and the debate that changed our understanding of time*. Princeton: Princeton University Press, 479 pp.

HEDBERG, H. D., Editor, 1976. *International Stratigraphic Guide*. New York: John Wiley and Sons, 200 pp.

MURPHY, M. A. and SALVADOR, A., 1999. International stratigraphic guide - An abridged version. *Episodes*, 22: 255–272.

NORTH AMERICAN COMMISSION ON STRATIGRAPHIC NOMENCLATURE, 2005. North American Stratigraphic Code. *Bulletin of the American Association of Petroleum Geologists*, 89: 1547–1591.

SALVADOR, A., Editor, 1994. *International Stratigraphic Guide*. Boulder: Geological Society of America, 214 pp.