Swiss J Palaeontol (2015) 134:145–147
DOI 10.1007/s13358-015-0079-9

Reply to comment on "Urchins on the edge: an echinoid fauna with a mixed environmental signal from the Eocene of Jamaica" by C. van den Ende and S. K. Donovan

Stephen K. Donovan[1] · **Conrad van den Ende**[2]

Received: 11 May 2015 / Accepted: 12 May 2015 / Published online: 10 June 2015

Abstract In the latest of a series of comments on Donovan's research papers on the geology of Jamaica, Mitchell disagrees with van den Ende and Donovan's lithostratigraphic assignment of the Thornton echinoid site, and the model used for interpreting the palaeogeography and palaeoecology of the Yellow Limestone Group. The first point is considered trivial; the Guys Hill Member was formerly included within the Chapelton Formation, and both are in the Yellow Limestone Group (mid-Lower to mid-Middle Eocene). Mitchell's hitherto unpublished data provides supporting evidence for the determination of Miller and Donovan, made almost 20 years ago, and reconsidered by van den Ende and Donovan, that clypeasteroids and oligopygoids rarely occur together in the Yellow Limestone Group. We consider the sequence stratigraphic interpretation of the Yellow Limestone Group to deserve further examination.

Keywords Charles Alfred Matley · Charles Taylor Trechmann · Yellow Limestone Group · Palaeoecology · Palaeogeography

In the 1920s and 1930s there were two notable geologists examining essentially unrelated aspects of the geology of Jamaica (Robinson 1996; Donovan 2008, 2010). Charles Alfred Matley (1866–1947) was director of the short-lived second geological survey of Jamaica (1921–1924). Matley was a British career civil servant and distinguished amateur geologist. He was appointed to the Jamaican position following retirement in 1921 and made two important contributions to Jamaican geology: his map and posthumous memoir of the geology of the Kingston district (Matley 1946, 1951); and the Basal Complex hypothesis, that the Antillean islands were positioned on the topography of a foundered continent (Matley 1929). This erroneous idea was undoubtedly strongly influenced by Matley's expertise in the geology of north-west Wales (Donovan 2013).

The latter theory was opposed by the second geologist researching the Jamaican succession at this time, Charles Taylor Trechmann (1885–1964). Trechmann was independently wealthy, and studied Antillean stratigraphy and palaeontology as a hobby, producing a number of important papers that are still current (Donovan 2003). He disagreed with the evidence and interpretation of Matley's Basal Complex, and their differences engendered a series of published comments and replies (see, for example, Matley 1936, 1937; Trechmann 1936a, b, 1937). Trechmann explained the genesis of the Antilles (and elsewhere) with his own Theory of Mountain Uplift (see, for example, Trechmann 1945, 1955), which failed to gain disciples and almost certainly would not have been formulated but for his rivalry with Matley.

What relevance does this historical aside have to my reply? Only that the interaction between Matley and Trechmann seems to have a modern equivalent in the published correspondence between Donovan and Mitchell, two of the principal authorities (amongst others) on Jamaican geology at the present day. When Donovan publishes a paper on Jamaican palaeontology, Mitchell needs to write a reply, albeit addressing some ancillary point, not the main argument of the original publication. For example, we are writing this in early May and already

✉ Stephen K. Donovan
Steve.Donovan@naturalis.nl

[1] Department of Geology, Naturalis Biodiversity Center, Postbus 9517, 2300 RA Leiden, The Netherlands

[2] Leiden University, Postbus 9500, 2300 RA Leiden, The Netherlands

this is Mitchell's second reply to a Donovan paper in 2015. Donovan et al. (2015) published a review of Jamaican Cenozoic ichnology with which Mitchell and Ramsook (2015) have taken issue or, rather, taken issue with the stratigraphy used therein, a marginal concern. In reply, Donovan and Pickerill (2015) were unable to accept Mitchell and Ramsook's assertion for a 'Moore Town Formation', defined only on the basis of biostratigraphic evidence so far; if anything, it is a biozone, not a formation, as was pointed out long ago by Pickerill and Donovan (1991). Indeed, Donovan and Pickerill noted that Mitchell and Ramsook's assertions on lithostratigraphy were more strongly supported by their data of biostratigraphy.

Well, here we are again (Potter 1950, pp. 67, 68). Van den Ende and Donovan (2015) have contributed a paper on the systematics of a poorly preserved, but nonetheless informative collection of echinoids from the Eocene of Jamaica. Mitchell (2015b) is troubled with two facets of this publication; he disagrees with our designation of lithostratigraphic formation and our palaeoecological interpretation. As to the first assertion, this is of some interest, as we only made our lithostratigraphic assignment with some doubt by reference to Robinson and Mitchell (1999, p. 6): "These oyster-rich beds most probably correspond to … the higher parts of the Guys Hill Formation" (van den Ende and Donovan 2015, 'Locality and Horizon'). As Mitchell's comment is based on his unpublished mapping, there is little to discuss; no evidence per se is presented in support of this assertion and the descriptions of formations in Robinson and Mitchell (1999) are obviously in need of revision. But, of course, it must be remembered that the Guys Hill Formation was formerly a member of the Chapelton Formation (Robinson 1988, Fig. 3; Robinson and Wright 1993, Fig. 1; Robinson and Mitchell 1999). The main point is to emphasise that these rocks are still part of the mid-Lower to mid-Middle Eocene Yellow Limestone Group (Robinson 1994); in truth, little has changed.

Our explanation of echinoid distribution was developed following a previous published interpretation by Miller and Donovan (1996, text-Fig. 4; see also Donovan et al. 2007, Fig. 5), which is based on published interpretations of the palaeogeographic evolution and facies migration of the mid-Cenozoic limestones of Jamaica, such as Versey (1963, pp. 26–28), Eva (1977) and Eva and McFarlane (1985). Mitchell's new data on the distribution of echinoids in the Yellow Limestone Group of Jamaica is welcomed. It is good to know that our results are reproducible and we look forward to the detailed documentation of Mitchell's sites. But it does not alter the underlying thesis of van den Ende and Donovan (2015) that clypeasteroids and oligopygoids are rarely associated in the Eocene of the Yellow Limestone Group.

Similarly, the sequence stratigraphic interpretation of deposition of the Yellow Limestone Group is important and interesting, but, again, does not alter our interpretation of the echinoids. That the analysis of Miller and Donovan (1996) was time averaged is hardly new information; see the original paper. Indeed, this assessment was published less than 10 years after the first stratigraphic treatment of the Jamaican fossil Echinoidea (Donovan 1988); the available data for separating the echinoids of the Yellow Limestone Group biostratigraphically was essentially inadequate. And we are not quite ready to accept Maharaj and Mitchell's (2000) interpretation of two major transgressive–regressive cycles as a depositional model for the Yellow Limestone Group, although we recognise the concept to be of interest. Maharaj's expertise is in physical geography. Donovan was involved in a re-examination of one of her geological interpretations in north-central Jamaica in association with Dr. Thomas Stemann, of Mitchell's department. Maharaj (1996) described purported evidence for a palaeochannel that followed a major fault. Instead, Stemann and Donovan (2008) reinterpreted the so-called palaeochannel as a sinkhole exposed during quarrying; there was no fault. Thus, if we are cautious and require more evidence than the conference paper of Maharaj and Mitchell (2000) to be completely convinced of their sequence stratigraphic model for deposition of the Yellow Limestone Group, we feel that it is with some justification. Publication of a fuller interpretation in a recognised peer-reviewed journal would do much to quieten any doubts and win our conversion.

We would also ask where an interested geologist might obtain a copy of Mitchell (2015a)? This is the second time that it has been used as evidence against Donovan this year, yet a careful perusal of the website of the Department of Geography and Geology of the University of the West Indies at Mona failed to reveal the map's availability (accessed 9 May 2015).

One last thing. The next paper by Donovan on the geology of Jamaica is likely to appear in Cave and Karst Science later this year. Donovan looks forward to reading Mitchell's comments presently.

References

Donovan, S. K. (1988). A preliminary biostratigraphy of the Jamaican fossil Echinoidea. In R. D. Burke, P. V. Mladenov, P. Lambert, & R. L. Parsley (Eds.), *Echinoderm Biology: Proceedings of the Sixth International Echinoderm Conference, Victoria, British Columbia, 23–28 August, 1987* (pp. 125–131). Rotterdam: A.A. Balkema.

Donovan, S. K. (2003). Charles Taylor Trechmann and the development of Caribbean geology between the wars. *Proceedings of the Geologists' Association, 114*, 345–354.

Donovan, S. K. (2008). The 'Forbidden theory of mountain uplift' of Charles Taylor Trechmann (1884–1964): a tectonic theory of the 1950s in context. In S. K. Donovan (Ed.), Crustal and Biotic Evolution of the Caribbean Plate. *Geological Journal, 43*, 605–619.

Donovan, S. K. (2010). Three points of view: Wendell P. Woodring (1891–1983), Charles A. Matley (1866–1947), Charles T. Trechmann (1884–1964), and Jamaican geology in the 1920s and 1930s. In S. K. Donovan (Ed.), Jamaican Rock Stars, 1823–1971: the Geologists who explored Jamaica. *Geological Society of America Memoir, 205*, 59–78.

Donovan, S. K. (2013). Misinterpreting by localism: transposing European geology and tectonics onto Jamaica and the Antilles. *Proceedings of the Geologists' Association, 124*, 530–535.

Donovan, S. K., Blissett, D. J. & Pickerill, R. K. (2015). Jamaican Cenozoic ichnology: review and prospectus. In S. K. Donovan & C. B. Stringer (Eds.), Pleistocene on the Hoof. *Geological Journal, 50*, 364–382.

Donovan, S. K. & Pickerill, R. K. (2015). Reply to discussion of Jamaican Cenozoic ichnology: review and prospectus: (v. 50, p. 364–382). *Geological Journal, 50*, 3. doi:10.1002/gj.2677.

Donovan, S. K., Portell, R. W., & Domning, D. P. (2007). Contrasting patterns and mechanisms of extinction during the Eocene-Oligocene transition in Jamaica. In W. Renema (Ed.), *Biogeography, time and place: distributions, barriers and Islands* (pp. 247–273). Dordrecht: Springer.

Ende, C. van den & Donovan, S. K. (2015) Urchins on the edge: an echinoid fauna with a mixed environmental signal from the Eocene of Jamaica. *Swiss Journal of Palaeontology*, 14. doi:10.1007/s13358-015-0072-3.

Eva, A. N. (1977). The paleoecology and sedimentology of Middle Eocene larger foraminifera in Jamaica. In 1st International Symposium of Benthonic Foraminifera of Continental Margins, Part B. Paleoecology and Biostratigraphy. *Maritime Sediments Special Publication, 1*, 467–475.

Eva, A. N. & McFarlane, N. (1985). Tertiary to early Quaternary carbonate facies relationships in Jamaica. *Transactions of the Fourth Latin American Geological Congress, Port-of-Spain, Trinidad, 7th–15th July, 1979, 1*, 210–219.

Maharaj, R. (1996). A note on a Quaternary palaeo-channel found at the Berrydale Quarry, near Discovery Bay, parish of St. Ann, Jamaica. *Journal of the Geological Society of Jamaica, 31*, 43–46.

Maharaj, R. & Mitchell, S. F. (2000). Sequence stratigraphy of mixed clastic-carbonate systems—a case example from the Eocene of Jamaica. *Geological Society of Trinidad and Tobago/Society of Petroleum Engineers (GSTT 2000 SPE) Conference, Port-of-Spain, Trinidad, Proceedings*, SSO1.1–SS01.7.

Matley, C. A. (1929). The Basal Complex of Jamaica, with special reference to the Kingston district. With petrographical notes by Frank Higham, M.Sc., A.R.S.M., F.G.S. *Quarterly Journal of the Geological Society, London, 85*, 440–492.

Matley, C. A. (1936). The basal complex in Jamaica—a reply. *Geological Magazine, 73*, 331–333.

Matley, C. A. (1937). The age of the Jamaican granodiorite and its associated rocks. *Geological Magazine, 74*, 495–507.

Matley, C. A. (1946). *Outline of the geology of the Kingston district of Jamaica* (p. 4). London: Institute of Jamaica, Kingston, published by the Crown Agents of the Colonies.

Matley, C. A. (ed. F. Raw). (1951). *Geology and Physiography of the Kingston District, Jamaica* (p. 139). London: Institute of Jamaica, Kingston, published by the Crown Agents of the Colonies.

Miller, D. J. & Donovan, S. K. (1996). Geomorphology, stratigraphy and palaeontology of Wait-a-Bit Cave, central Jamaica. *Tertiary Research, 17 (for 1995)*, 33–49.

Mitchell, S. F. (2015a). *Geology of the Parish of St Catherine*. 1:50,000 scale. Department of Geography and Geology, University of the West Indies, Mona (Not seen).

Mitchell, S. F. (2015b). Comment on "Urchins on the edge: an echinoid fauna with a mixed environmental signal from the Eocene of Jamaica" by C. van den Ende and S. K. Donovan. *Swiss Journal of Palaeontology*. doi:10.1007/s13358-015-0077-y.

Mitchell, S. F. & Ramsook, R. (2015). Discussion of Jamaican Cenozoic ichnology: review and prospectus: (v. 50, p. 364–382). *Geological Journal, 50*, 4. doi:10.1002/gj.2675.

Pickerill, R. K., & Donovan, S. K. (1991). Observations on the ichnology of the Richmond formation of eastern Jamaica. *Journal of the Geological Society of Jamaica, 28*, 19–35.

Potter, S. (1950). *Some notes on Lifemanship with a summary of recent researches on Gamesmanship* (p. 126). London: Rupert Hart-Davis.

Robinson, E. (1988). Late Cretaceous and early Tertiary sedimentary rocks of the Central Inlier, Jamaica. *Journal of the Geological Society of Jamaica, 24 (for 1987)*, 49–67.

Robinson, E. (1994). Jamaica. In S. K. Donovan & T. A. Jackson (Eds.), *Caribbean geology: an introduction* (pp. 111–127). Kingston: University of the West Indies Publishers' Association.

Robinson, E. (1996). Charles Alfred Matley: his links with mid Twentieth Century geology in Jamaica. *Contributions to Geology, UWI, Mona, 2*, 20–26.

Robinson, E., & Mitchell, S. F. (1999). Upper Cretaceous to Oligocene stratigraphy in Jamaica. *Contributions to Geology, UWI, Mona, 4*, 1–47.

Robinson, E. & Wright, R. M. (1993). Jamaican Paleogene larger foraminifera. In Wright, R. M. & Robinson, E. (Eds.), Biostratigraphy of Jamaica. *Geological Society of America Memoir, 182*, 283–345.

Stemann, T. A., & Donovan, S. K. (2008). Paleo-channel or sinkhole? Reinterpretation of an enigmatic structure near Discovery Bay, north central Jamaica. *Caribbean Journal of Science, 44*, 242–245.

Trechmann, C. T. (1936a). The Basal Complex question in Jamaica. *Geological Magazine, 73*, 251–267.

Trechmann, C. T. (1936b). The Complex question in Jamaica. *Geological Magazine, 73*, 382–383.

Trechmann, C. T. (1937). The supposed basal complex in Jamaica. *Geological Magazine, 74*, 561–562.

Trechmann, C. T. (1945). *The West Indies and the mountain uplift problem* (p. 25). Durham: Castle Eden Co. **(Privately published)**.

Trechmann, C. T. (1955). *The British Association for the suppression of science or a new explanation of mountain uplift, based on lunar gravitation and ocean pressure* (p. 64). Durham: Castle Eden, Co. **(Privately published)**.

Versey, H. R. (1963). Older Tertiary limestones. In Zans, V. A., Chubb, L. J., Versey, H. R., Williams, J. B., Robinson, E. & Cooke, D. L., Synopsis of the geology of Jamaica: an explanation of the 1958 provisional geological map of Jamaica. *Geological Survey of Jamaica Bulletin, 4 (for 1962)*, 26–43.