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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 J. Palaeontol. DOI 10.1007/s13358-015-0072-3]

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Abstract van den Ende and Donovan (2015: "Urchins on the edge: an echinoid fauna with a mixed environmental signal from the Eocene of Jamaica" Swiss J. Palaeontol. doi:10.1007/s13358-015-0072-3) describe an interesting echinoid fauna from the Guys Hill Formation of Thornton, Jamaica. Based on geological mapping, this fauna should be assigned to the Chapelton Formation and not the Guys Hill Formation. A brief review of echinoids from the Chapelton Formation, including two localities in central Jamaica indicates that geographically distinct shelf edge and lagoonal assemblages are not present. Instead, the echinoids are better interpreted as open marine and restricted marine, and their distribution explained by a large-scale transgressive–regressive cycle with a ramp-type geometry.

Keywords Echinoids · Eocene · Chapelton Formation · Guys Hill Formation · Jamaica

van den Ende and Donovan (2015) have published an interesting paper that describes a rich middle Eocene echinoid fauna, including phymosomatoids, oligopygoids, clypeasteroids and spatangoids, from Thornton, Jamaica. This echinoid fauna was attributed to the Dump Member of the Guys Hill Formation (Yellow Limestone Group) by comparison to descriptions given in Robinson and Mitchell (1999). However, this assignment is open to question. Further, van den Ende and Donovan (2015) suggest that the echinoid distribution in the Yellow Limestone of Jamaica was characterised by a high-energy shelf edge assemblage of oligopygoids and a low-energy lagoonal facies with *Fibularia* and neolaganids, with the Thornton locality representing a transition zone between. This interpretation is discussed here based on several, yet undescribed, echinoid faunas from localities in central Jamaica.

The echinoid fauna described by van den Ende and Donovan (2015) was collected in 1997 in the company of the present author. The collection came from the garden/yard of a house in the community of Thornton and was collected at a time when students from the University of the West Indies were undertaking mapping projects in the area. Subsequently, in 2003, the present author undertook provisional geological mapping in this area to understand the stratigraphic succession. Three formations were recognized: the Guys Hill and Chapelton Formations of the Yellow Limestone Group, and the Tory Formation of the White Limestone Group (for descriptions of formations see: Robinson and Mitchell 1999; Mitchell 2004, 2013). This mapping demonstrated that the Thornton echinoid locality is within the Chapelton Formation and well above the boundary within the underlying Guys Hill Formation. Therefore, van den Ende and Donovan (2015) erroneously attributed the Thornton locality to the Guys Hill Formation.

van den Ende and Donovan (2015) used the newly described echinoid fauna from Thornton to assess the distribution of echinoids across Jamaica during Yellow Limestone time. They compiled data on the geographical distribution of echinoids and distinguished a high-energy, shelf edge assemblage of oligopygoids (occurring around the margin of the Clarendon Block), and a low-energy lagoonal facies with *Fibularia* and neolaganids (occurring within the interior of the Clarendon Block). The traditional interpretation of the Eocene palaeogeography of Jamaica largely stems from the works of Hose and Versey (1957)

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and Eva and McFarlane (1985) who suggested a block (e.g., Clarendon Block) and trough (North Coast Belt, Wagwater Belt, Montpelier-Newmarket Belt) physiography for the deposition of the Yellow Limestone and White Limestone groups. New work on the lithofacies coupled with geological mapping (Mitchell 2013, 2015, in progress) suggests that many of the platform margins migrated over time and that ramp-like geometries might be more appropriate than steep fault-controlled margins.

Although it is quite understandable why van den Ende and Donovan included all Yellow Limestone occurrences of echinoids in their study (i.e., to have more points), it should be pointed out that that the Yellow Limestone (together with the basal White Limestone) contains two major transgressive regressive cycles: a lower Freemans Hall–Stettin cycle, and an upper Guys Hill–Chapelton–Troy cycle (Maharaj and Mitchell 2000). Both cycles show major onlap patterns from the north and west onto the Clarendon Block with the lower cycle being much less extensive than the upper cycle. The facies distributions and echinoid faunas of these two cycles are different and amalgamating them will undoubtedly present a confusing pattern of echinoid distribution and ecology at this time.

During my mapping campaign across the Yellow Limestone of Jamaica over the last 18 years, many additional echinoid localities have been discovered. It is worth mentioning a few of them here. In the area around Coleyville in the northern part of the parish of Manchester (close to the type locality of the Dump Member), a threefold division of the Chapelton Formation can be made using echinoids. The lower part is generally devoid of echinoids, the middle part contains common examples of *Oligopygus* sp. and the upper part contains common to abundant examples of *Neolaganum* sp. (in addition, there is a short zone of overlap of *Oligopygus* and *Neolaganum*). At Lowe River, to the south-east of Wait-a-Bit, the lower part of the Chapelton Formation contains an abundant and diverse echinoid assemblage including *Fibularia*, spatangoids, *Neolaganum* and *Oligopygus* (in decreasing order of abundance); this is very similar to the echinoid assemblage reported by van den Ende and Donovan (2015) from Thornton. Both Coleyville and Lowe River are situated within the centre of the Clarendon Block within what would be traditionally be accepted as 'lagoonal' facies.

The available evidence suggests that rather than distinct 'shelf edge' and 'lagoonal assemblages', there were more 'restricted marine' assemblages (*Fibularia* and *Neolaganum*) and more 'open marine' assemblages (oligopygoids). With the ramp-type geometry now becoming apparent in the transgressive–regressive cycles of the Yellow Limestone Group, the distribution of echinoids can be explained by the spread of more open marine environments across the Clarendon Block pushing the 'more restricted' echinoid assemblages to the south-east and allowing the spread of the 'open marine' assemblage into the centre of the Clarendon Block during transgression. Subsequently, the progradation of more restricted carbonate facies with their 'more restricted' echinoid assemblage occurred during regression. As such, a combined geographic and stratigraphic approach, rather than a purely geographic approach, to the distribution of echinoids in the Yellow Limestone of Jamaica might be more useful in understanding echinoid palaeoecology at this time. I hope these comments are useful to the reading of the paper.

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References

Eva, A.N., & McFarlane, N.A. (1985). Tertiary to early Quaternary carbonate facies relationships in Jamaica. In *Transactions of the 4th Latin American Geological Conference, Port-of-Spain, Trinidad, 7th–15th July, 1979*, 1 (pp. 210–219).

Hose, H.R., & Versey, H.R. (1957). Palaeontological and lithological divisions of the lower Tertiary limestones of Jamaica. *Colonial Geology and Mineral Resources*, 6 (for 1956) (pp. 19–39).

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

Mitchell, S. F. (2004). Lithostratigraphy and palaeogeography of the White Limestone Group. In: S. K. Donovan (Ed.), *The mid-Cainozoic White Limestone Group of Jamaica. Cainozoic Research*, 3 (pp. 5–29).

Mitchell, S. F. (2013). Stratigraphy of the White Limestone of Jamaica. *Bulletin de la Societe Geologique de France, 184*(1–2), 111–118.

Mitchell, S.F. (2015). *Geology of the parish of St Catherine (1:50,000 scale)*. Geological Map. Department of Geography and Geology, The University of the West Indies, Mona, Kingston 7, Jamaica.

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

van den Ende, C., & 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,*. doi:10.1007/s13358-015-0072-3.