Caribbean Journal of Earth Science, **40** (**2009**), 15-20.

A new rudist from the Santonian of Jamaica

SIMON F. MITCHELL

Department of Geography and Geology, University of the West Indies, Mona, Kingston 7, Jamaica. e-mail: simon.mitchell@uwimona.edu.jm or barrettia2000@yahoo.co.uk

ABSTRACT. A new rudist bivalve, *Contraspira khanae* gen. et sp. nov., is described from the late Santonian Back River Formation of central Jamaica. This taxon has a right valve similar to that of *Durania*, showing polygonal cellular microstructure, radial plications on the commissure and depressed radial bands. The left valve coils ventrally and is the most diagnostic character of the genus, since other radiolitid rudists have left valves that coil dorsally. The lower part of the body cavity of the right valve, and the whole of the left valve are filled with large cellular structure developed in the inner shell layer. The species is a unique member of the late Santonian fauna of Jamaica.

1. INTRODUCTION

During the late Cretaceous, diverse assemblages of rudist bivalves were found on the carbonate platforms of the Caribbean and Central American (Whitfield, 1897; Adkins, 1930; Palmer, 1933; Mac Gillavry, 1937; Alencàster, 1971; Chubb, 1971; Rojas et al., 1996). Although diverse assemblages have been described from the Campanian and Maastrichtian, Santonian assemblages are poorly documented. The growth form of the rudist bivalves was high variable, with elevator morphotypes showing great variability in valve length and degree of coiling (Kauffman and Johnson, 1988). Despite this variability, all described radiolitid rudists have left (free) valves that are either uncoiled (cap like) or coil over the dorsal side of the right (attached) valve. Radiolitid rudists lacking a ligament and with a polygonal cellular structure in the outer layer of the right valve are common in the Upper Cretaceous of the New World. Most of these have been attributed to the genus *Durania*, whereas a few have been placed in new genera, such as, *Chiapasella* Müllerried, *Tampsia* Stephenson and *Macgillavryia* Rojas, Iturralde-Vinent and Skelton.

A restudy of the Late Cretaceous succession in central Jamaica has revealed the presence of a *Durania*-type rudist with a large, coiled left valve. The left valve coils over the ventral side making it unique amongst know radiolitids. Furthermore, it increases the diversity of rudists from the Santonian of the Caribbean and Central American region. All material is preserved in the collections of the Geology Museum, University of the West Indies (UWIGM numbers).

2. STRATIGRAPHY

The material described in this paper was collected from the lower part of the Crofts Synthem in the Central Inlier of Jamaica (**Figure 1**) The Crofts Synthem consists of the Peters Hill, Back River and Dawburn Content formations (Mitchell, 2003). The Peters Hill Formation rests unconformably on conglomerates, andesites and basalts of the Arthurs Seat Formation. It is up to 25 m thick, and consists of a basal conglomerate succeeded by shallow-water, rudist-bearing limestones. The limestone is bioclastic and contains a prolific rudist fauna including *Barrettia coatesi* (Chubb), *Torreites chubbi* Grubić, *Durania lopeztrigoi* (Palmer), *Biradiolites* sp., *Bournonia* sp., *Antillosarcolites*? sp. and *Antillocaprina* sp., and the echinoid *Metholectypus trechmanni* Hawkins. Jiang and Robinson (1987) suggested a Santonian age for the Peters Hill Formation and overlying mudstone based on calcareous nannofossils.

The detailed stratigraphy of the overlying Back River Formation at Peters Hill has not been published previously. The lower part consists of three units. The lowest is a sequence of about 4 m of mudstones and thin sandstones. Rare rudists are found in a sandstone at the top of this unit and include *D. lopeztrigoi* and *Contraspira khanae* sp. nov.

The lower mudstone unit is succeeded by a 1-m-thick limestone that contains an abundant ramose coral; rudists have not been seen. Above this limestone is a mudstone sequence containing a rich assemblage of fossils including the inoceramid bivalves *Cataceramus balticus* (Boehm) and *C. balticus kunimiensis* (Nago and Matsumoto) and the echinoid *Hemiaster* sp. The inoceramids suggest an early Campanian age (Kauffman, 1966).

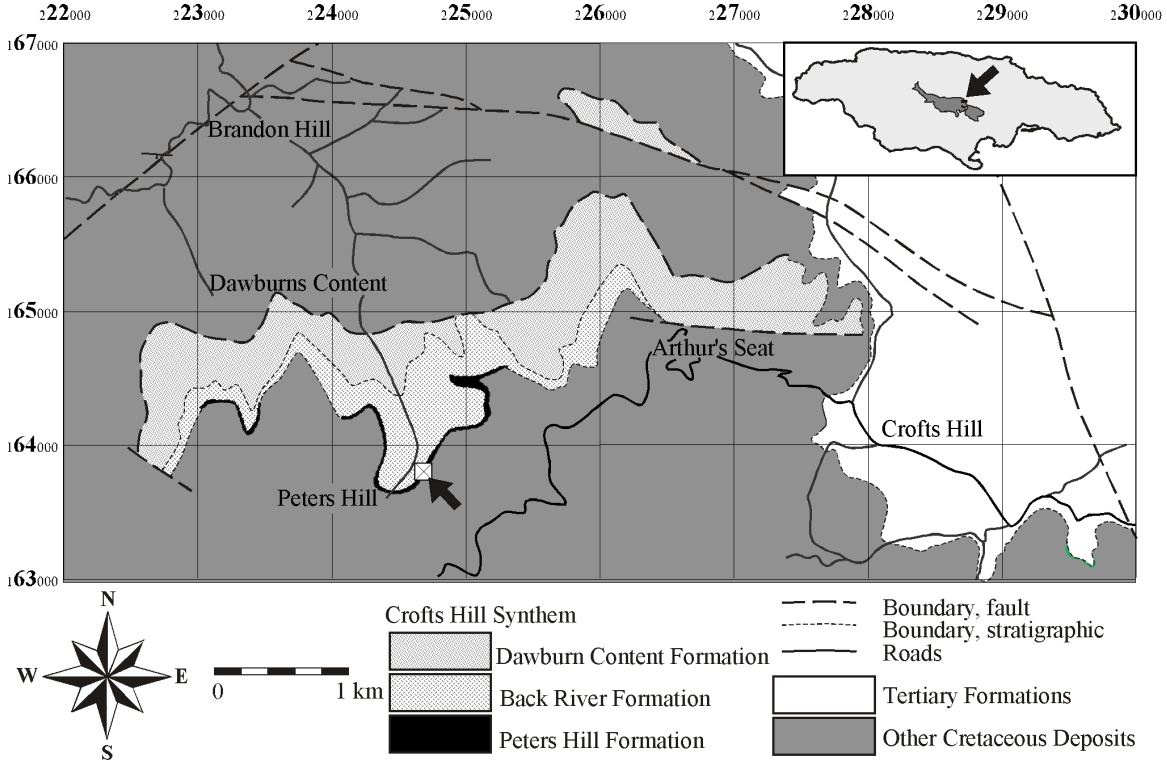

Figure 1. Location of Contraspira khanae Mitchell in the Back River Formation at Peters Hill (black arrow). Inset map of Jamaica showing Central Inlier and location of map area. The grid is the metric Jamaican grid.

3. SYSTEMATIC PALAEONTOLOGY

Family Radiolitidae d'Orbigny, 1847
Genus *Contraspira* gen. nov.

Derivation of name. Latin contra, against, and Latin, spira, coil.

Type and only known species. *Contraspira khanae* sp. nov., from the Back River Formation of Jamaica.

Diagnosis. Right valve conical to cylindrical, large, with a polygonal cell pattern in the outer layer. Anterior radial band a wide depressed belt, posterior radial band narrow and deeply incised. No ligamental infold is present. Left valve tall and strongly coiled, overhanging the radial bands of the right valve; inner shell layer with coarse cellular texture. Anterior myophore long, posterior myophore short.

Discussion. *Contraspira* is a distinctive genus combining a *Durania*-like right valve with a strongly coiled *Chiapasella*-like left valve. The coiled left valve distinguishes the species from *Durania*, which has an operculum-like left valve. In outer form, *Contraspira* resembles *Chiapasella*, but is distinguished by a lack of infoldings in the right valve, the absence of pallial canals in the outer layer of the left valve, the different radial bands, and the direction of coiling of the left valve. *Macgillavryia* is distinguished by the thick outer layer of the right valve and the central boss-like form of the left valve. *Tampsia* is distinguished by the radial bands.

Contraspira khanae sp. nov.
Figures 2-4

Derivation of name. After Shakira Khan (University of the West Indies) who collected the first specimen (holotype).

Type specimens. Holotype, UWIGM.RUD.2005.6; Paratype, UWIGM.RUD.2005.7; both from Back River Formation, Peters Hill, Central Inlier, Jamaica.

Material. Only the holotype and paratype are known.

Diagnosis. As for genus.

Description. Large species, right valve up to 185 mm in diameter, and generally cylindrical in its

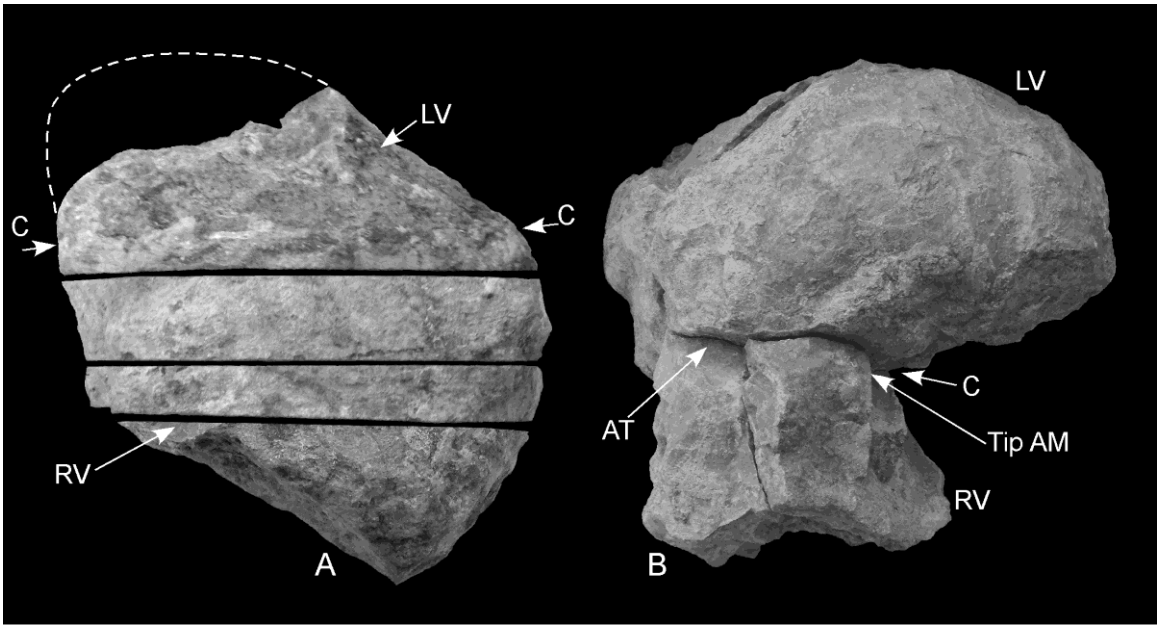

Figure 2. ***Contraspira khanae*** **Mitchell. A, holotype, UWIGM.RUD.2005.6, bivalve with upper part of right valve (RV) and incomplete left valve (LV) with commissure (C) indicated by arrows, view from the posterior, left valve coils over the ventral radial band (to left in figure). B, paratype, UWIGM.RUD.2005.7, bivalve with complete left valve and fragments of the right valve, commissure follows crack indicated by arrow C, view from the anterior, left valve coils over the ventral radial band (to right in figure). positions of anterior myophore (AM) and anterior tooth (AT) which are attached to the fragments of the right valve indicated for reference to coiling direction. Both from lower Back River Formation, Peters Hill, Clarendon, Jamaica, and × 0.28.**

upper part, lower part of right valve unknown. Inner layer moderately thick (3.5 mm); the inner layer expands in thickness to form the sockets and myophore supports. Outer layer 50 mm thick on the dorsal side, 25-28 mm thick on the anterior and posterior sides, and 7 mm thick in the radial bands. Funnel plates strongly plicate producing a stellate pattern on transverse sections. The funnel plates are separated by well-developed polygonal cells with a diameter of 0.8 to 1 mm. The lower part of the body cavity is filled with coarse cystose structure (similar to that in *Chiapasella*) with cells up to 15 mm long. The radial bands are represented by strong depressions; the anterior band is 61 mm wide, the posterior band 10 mm, and the interband, 34 mm. The anterior band corresponds to a downfold of the funnel plates and accommodates the overhanging left valve. The posterior band is encased in matrix, and its form cannot be ascertained; it is probably a downfold. The interband appears to be an upfold.

The left valve is moderately long and strongly ventrally coiled so that the coil overhangs the anterior radial band. The outer layer is up to 1 cm thick, and is composed of funnel plates. The inner layer comprises a thin marginal layer up to 2 mm thick and a network of radially elongated, crescent-shaped cells very similar to those developed in the left valve of *Chiapasella*. The left valve is filled with this cellular structure, which projects down into the right valve to partially fill (support) the area between the two myophores. The teeth project down into the right valve and slide into grooves in the right valve. The myophores project down strongly into the right valve and have a prominent set of grooves and ridges that correspond to similar features developed on the inner layer of the right valve. The posterior myophore is about half as long as the anterior myophore (**Figures 3-4**).

Distribution. Only known from the lower part of the Back River Formation of Peters Hill, central Jamaica. Based on the calcareous nannofossil data presented by Jiang and Robinson (1987), this is of late Santonian age.

Discussion. *Contraspira* is unique amongst the radiolitid rudists in possessing a left valve that coils ventrally. Many genera (e.g., *Chiapasella*) have coiled left valves, but these are always strongly dorsally coiled. The right valve of *Contraspira khanae* is very like that of *Durania*, although the differences in the width of the radial bands help to distinguish the two genera.

Contraspira shows several characteristics in

Figure 3. ***Contraspira khanae*** **Mitchell. Holotype, UWIGM.RUD.2005.6, abapical section of right valve cut 10 mm below commissure, viewed looking towards left valve; myocardinal elements of left valve visible in body chamber showing teeth, myophores and cellular structure in the inner layer of the left valve. Lower Back River Formation, Peters Hill, Clarendon, Jamaica; × 0.8. See Figure 4 for interpretation.**

common with *Macgillavryia* and *Chiapasella*, namely: no ligamental infold; a polygonal cellular pattern (although in some *Macgillavryia* this is very fine amoeboid) in the outer layer of the right valve; and a cellular fill in the interior of the right and left valves. This contrasts with *Durania lopeztrigoi*, which has conical tabulae in the lower part of the right valve. The similar characters in *Contraspira* and *Chiapasella* (and possibly *Macgillavryia*) may indicate that these form a monophyletic group.

Acknowledgements. *I would like to thank Shakira Khan for finding the first specimen of this rudist. Many thanks to the reviewers Peter Skelton and Thomas Steuber for valuable suggestions on the original manuscript.*

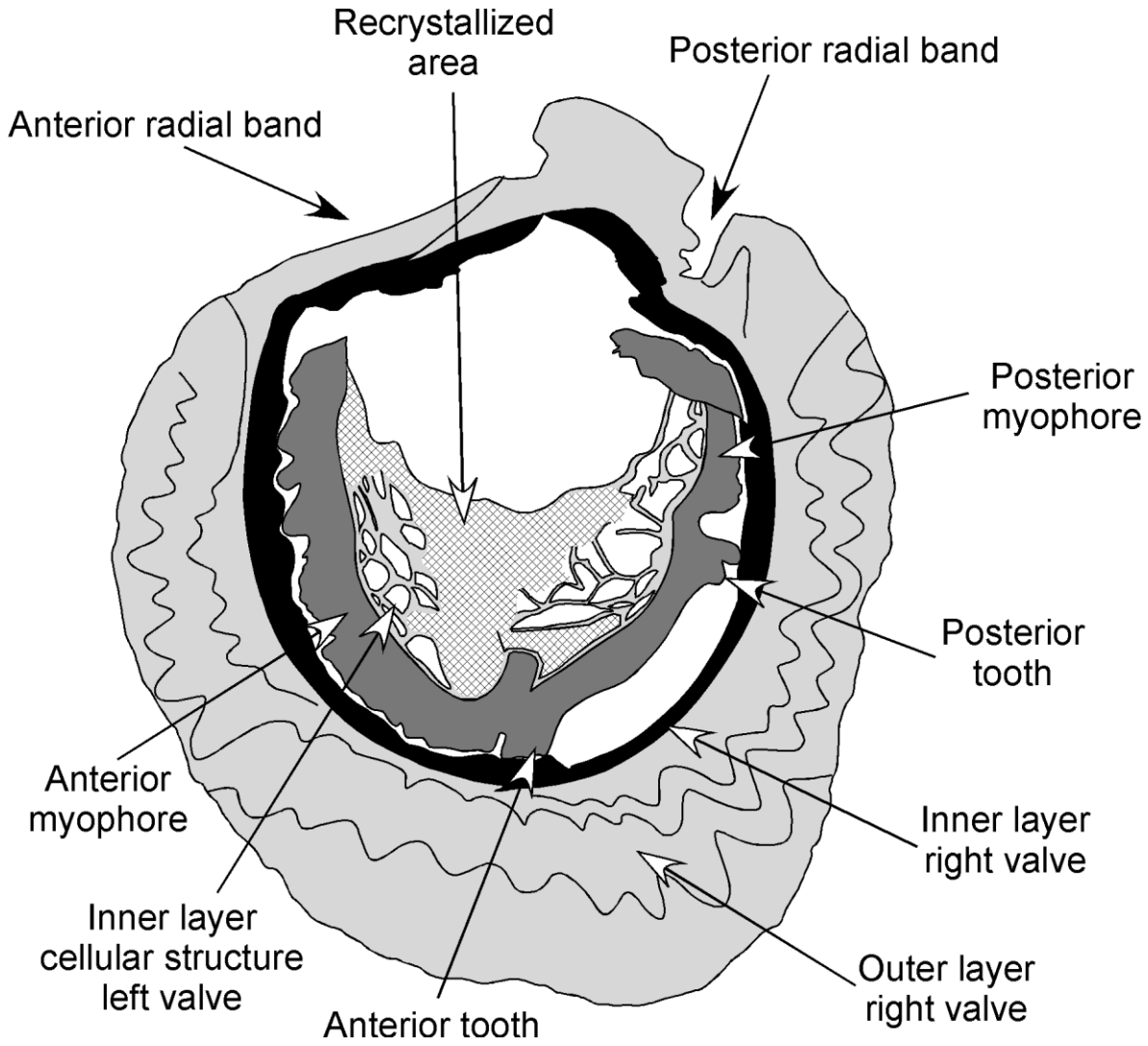

Figure 4. Interpretation of myocardinal elements visible in Figure 3.

REFERENCES

Adkins, W.S. 1930. New rudistids from the Texas and Mexican Cretaceous. *The University of Texas Bulletin Contributions to Geology*, **3001**, 77-100, 121-133.

Alencàster, G. 1971. Rudistas del Cretacico Superior de Chiapas. *Paleontologia Mexicana Número*, **34**, 1-91.

Chubb, L.J. 1971. Rudists of Jamaica. *Palaeontographica Americana*, **7**(45), 161-257.

Jiang, M.-J. and Robinson, E. 1987. Calcareous nannofossils and larger foraminifera in Jamaican rocks of Cretaceous to early Eocene age. In : **Ahmad, R. (ed.)**, *Proceedings of a workshop on the status of Jamaican geology. Geological Society of Jamaica, special issue*, 24-51.

Kauffman, E. G. 1966. Notes on Cretaceous Inoceramidae (Bivalvia) of Jamaica. *Journal of the Geological Society of Jamaica*, **8**, 32-40.

Kauffman, E.G. and Johnson, C.C. 1988. The morphological and ecological evolution of middle and Upper Cretaceous reef-building rudists. *Palaios*, **3**, 194-216.

Mac Gillavry, H.J. 1937. *Geology of the Province of Camaguey, Cuba with revisional studies in rudist paleontology (mainly based upon collections from Cuba). Geographische en Geologische Mededeelingen, Utrecht*, **14**, 1-168.

Mitchell, S.F. 2003. Sedimentary and tectonic evolution of central Jamaica. In : **Bartolini, C., Buffler, R. T. and Blickwede, J. (eds)**, The Circum-Gulf of Mexico and the Caribbean: hydrocarbon habitats, basin formation, and plate tectonics. *American Association of Petroleum Geologists Memoir*, **79**, 605-623.

Orbigny, A. d' 1847. Sur les brachiopodes ou palliobranches. *Comptes rendus hebdomadaires des Séances de l'Académie des Sciences*, **25**, 266-269, Paris.

Palmer, R.H. 1933. Nuevos rudistas de Cuba. *Revista de Agricultura*, **14**, 95-125.

Rojas, R., Iturralde-Vinent, M. and Skelton, P.W. 1996 (dated 1995). Stratigraphy, composition and age of Cuban rudist-bearing deposits. *Revista Mexicana de Ciencias Geológicas*, **12**, 272-291.

Whitfield, R.P. 1897. Descriptions of species of Rudistae from the Cretaceous rocks of Jamaica, W. I., collected and presented by Mr. F. C. Nichols. *Bulletins of the American Museum of Natural History*, **9**, 185-196.

Revised manuscript received: September, 2008
Accepted: 24th September, 2008