

Ampullariid gastropods from the Palaeogene Hudi Chert Formation (Republic of the Sudan)



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ABSTRACT

The age of the Hudi Chert fauna is highly controversial and crucial for the reconstruction of the geological history of the Nile valley. Herein, six species of Ampullariidae (Gastropoda) are described from the Hudi Chert Formation in the Republic of the Sudan, documenting that alleged relations of the Hudi Chert fauna with Oligocene faunas from Egypt turned out to be based on misidentifications. Although an Oligocene age cannot be excluded, we propose an Eocene age for the Hudi Chert fauna based on the known stratigraphic range of the newly established genus *Sudanistes*. A Neogene age is clearly excluded based on the presence of the exclusively Palaeogene genus *Pseudoceratodus*. The Hudi Chert ampullariids lived in an extensive freshwater system of swamps and ponds, whereas riverine conditions and deep lake setting are unlikely depositional environments.

Pila busserti Harzhauser & Neubauer is described as a new species and *Sudanistes* Harzhauser & Neubauer is introduced as a new genus.

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1. Introduction

Understanding the age, origin and distribution of the Hudi Chert Formation in Sudan is of relevance to the reconstruction of the Cenozoic landscape history in northeastern Africa (e.g. Burke and Gunnell, 2008). The alignment of outcrops of the Hudi Chert Formation along the present course of the Nile was used by Berry and Whiteman (1968, p. 1 and p. 23) to suggest that “in the central and northern Sudan there must have been a Nile valley in Late Cretaceous and Early Tertiary times” that “was occupied by a freshwater lake in which the Hudi Chert formation was laid down”. However, such a far-reaching hypothesis depends on the age and depositional environment of the cherts, and on whether or not the chert boulders are in situ. Because we interpret all cherts inspected during field work as river transported clasts, they do not mark the position of a former lake and thus do not support the hypothesis of Berry and

Whiteman (1968) and Vail (1978). Nevertheless, the cherts are of paramount importance for the reconstruction of the Palaeogene landscape.

Due to the freshwater nature of the Hudi Chert Formation depositional environment, biostratigraphic tie points are difficult to assess. Biostratigraphically indicative plant fossils, such as pollen and Characean oogonia, are either not preserved or could not be extracted from the silicified rocks. Therefore, the mollusc fauna is the most important tool for evaluating the age of the Hudi Chert Formation. The mollusc fauna was first mentioned by Cox (1932) and subsequently formally described by Cox (1933). Soon afterwards, a homonym for one these species was replaced by Cox (1935). An additional thiarid species was described by Medani (1972) and a first synthesis by Gautier (1973) listed eight freshwater species. Since then no new data on this peculiar African fauna has been published.

A field campaign by R.B. in 1987 resulted in a small collection of new specimens. Most of the fossils represent ampullariid gastropods and some of the specimens add new conchological information to the descriptions of Cox (1933). The study of these taxa resulted in a critical evaluation of former identifications, thus contradicting previous biostratigraphic interpretations.

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2. Geological setting

Patchy outcrops of fossiliferous lacustrine chert are widespread in the Cretaceous sedimentary basins of northern and eastern Sudan (Fig. 1). Cherts in the form of boulders were first discovered in 1910 near the Hudi Railway Station, some 30 km east-north-east of the city of Atbara. Cox (1932, 1933) introduced the name Hudi Chert Formation for these deposits. The chert occurs in three principal forms: as loose clasts in surface scree, as clasts in conglomerates, and as clasts in gravel ridges. All deposits unconformably overlie Upper Cretaceous sediments, primarily sandstones. Origin and age of the Hudi Chert Formation are much debated. Most authors proposed deposition in shallow lakes (e.g. Cox, 1932, 1933; Berry and Whiteman, 1968; Medani, 1972). However, Andrew in Andrew and Karkanis (1945) suggested formation in a large lake stretching 500 km from east to west and 250 km from north to south that had existed in Sudan approximately at the same position as today's Nile valley. Both Cox (1932, 1933) and Andrew in Andrew and Karkanis (1945) interpreted the loose chert boulders at the type locality as river-transported gravels, while Sandford (1933) considered them as resting more or less in-situ. Whiteman (1971) suggested that large boulders mark the palaeo-margin of shallow lakes and explained the bouldery appearance as being caused by intense weathering. He moreover concluded that the cherts are polygenetic in origin, some representing lake deposits, others possibly silcretes. Cox (1932, 1933) interpreted the chert as having formed by a secondary silicification of originally siliceous limestone and sandy sediment during the later Cenozoic, probably similar to

the formation of silcrete. In contrast, Kheiralla (1966) and Whiteman (1971) favoured a primary origin of most of the chert in the form of the deposition of a silica gel, perhaps including opaline tests of diatoms. As sources of the silica the authors suggest local volcanoes and hot springs. Also, a volcanogenic source of the silica but a secondary silicification of an original limestone was proposed by Vail (1978). Herein, we do not aim to resolve the processes that led to the formation of the Hudi Chert Formation but will focus exclusively on its mollusc fauna and its biostratigraphic and palaeoecologic significance. All described specimens were collected in 1987 in the vicinity of the Hudi railway station (Fig. 2), which is the type locality of the Hudi Chert Formation (17°41'10" N, 34°16'05" E to 17°49'05" N 34°10'35" E, based on Google Earth Version 7.1.5.1557) and are stored in the collection of the Natural History Museum Vienna (NHMW 2016/0219/0001–NHMW 2016/0223/0002).

3. Systematic palaeontology

Class Gastropoda Cuvier, 1795

Subclass Caenogastropoda Cox, 1960

Unassigned order

Superfamily Ampullarioidea Gray, 1824

Family Ampullariidae Gray, 1824

Genus *Lanistes* Montfort, 1810

Type species: *Lanistes olivieri* Montfort, 1810 [= *Lanistes boltenianus* (Röding, 1798) = syn. *Lanistes carinatus* (Olivier, 1804)]; original designation. Recent, Egypt.

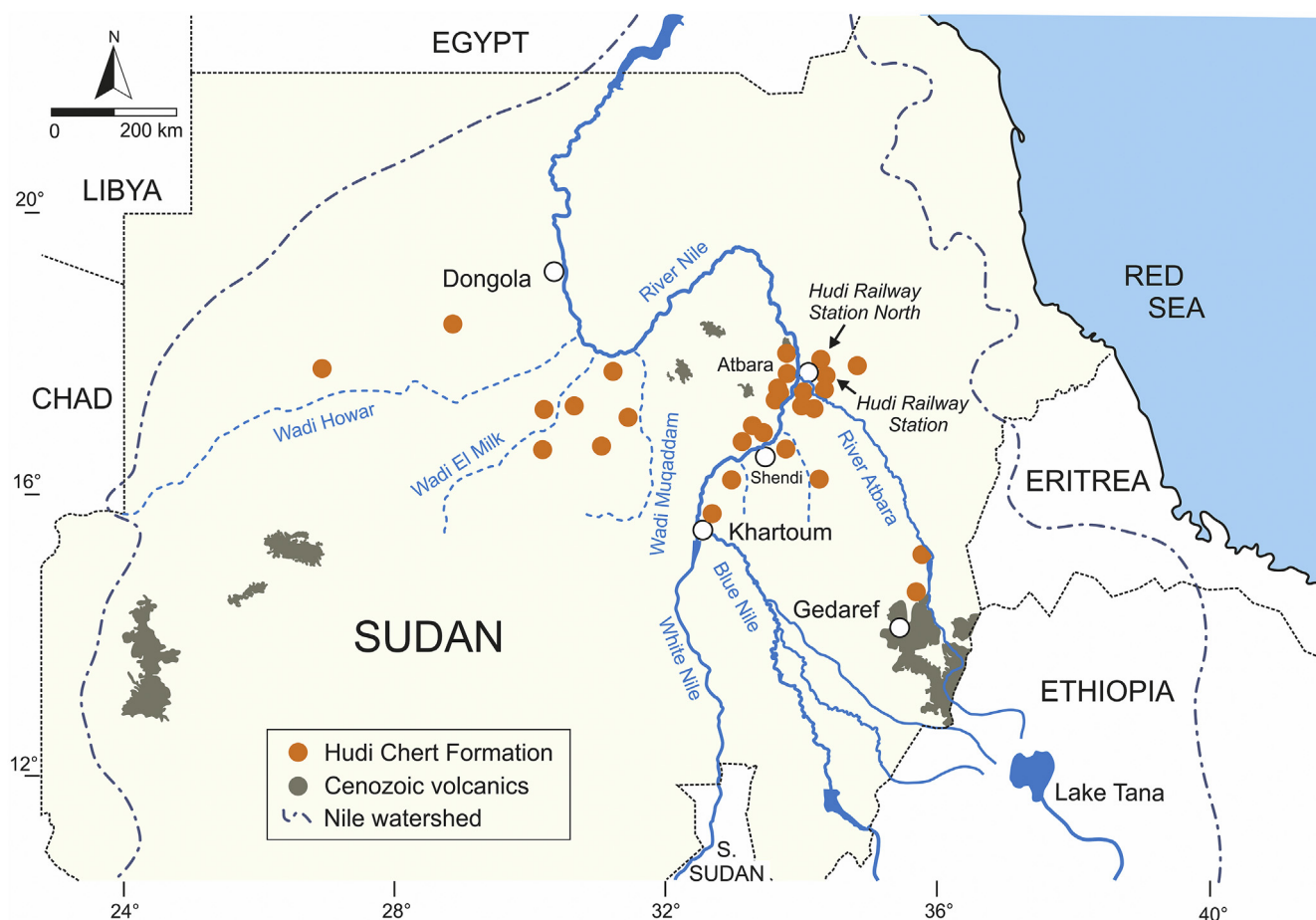


Fig. 1. Geography of northeastern Africa and geological map showing the distribution of Hudi Chert Formation occurrences (modified after Bussert, 1998).

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