

Land snails from the Ypresian/Lutetian of Black Crow, Namibia

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Abstract: The Ypresian/Lutetian freshwater limestone at Black Crow has yielded a diverse fauna comprising aquatic, aquaphile and terrestrial elements. Among the fossil remains there are abundant land snails, but thus far no aquatic molluscs have been identified. The presence of large specimens of *Dorcasia* and small specimens of subulinids suggests that at the time of deposition, the region enjoyed a tropical to sub-tropical climate with summer rainfall.

Key Words: Palaeogene; Namibia; Mollusca; Gastropoda; Subulinidae; Dorcasiidae

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Introduction

Fossil land snails are common at Black Crow, but are difficult to extract from their limestone matrix. During acid treatment to obtain bones and teeth of mammals and other vertebrates, silicified steinkerns of subulinids and acavoids were found and are described herein. Natural erosion of the limestones has exposed several small but tall and slender turritiform shells (Fig. 2) and some large heliciform, depressed globose shells (Fig. 3). The latter specimens are well enough preserved

to provide confident attribution to the genus *Dorcasia* Gray 1838.

The fossil land snails from Black Crow, even though they are not very diverse, show biogeographic affinities with present-day southwestern Africa (Western Cape in South Africa and Western Namibia) and they suggest that at the time of deposition, the region lay within a zone of summer rainfall rather than winter rainfall (Ward *et al.* 1993).

Geological context

Black Crow geology has been described in detail by Pickford *et al.* (2008a, 2008b). Overlying an eroded surface of Gariiep Group dolomite (Proterozoic) there is a thin layer of indurated sandstone, overlain by well-bedded chalcidonic limestones (altered carbonatite ashes of Palaeogene age) which are overlain by

the freshwater Black Crow Limestone (Eocene) (Pickford 2015a, 2015b) (Fig. 1). On a deeply eroded surface of the latter limestone there reposes Blaubok Conglomerate (Late Oligocene to Early Miocene) which is overlain by the Namib 1 Calc-crust (Late Miocene), and loose sand.

Age of Black Crow

The Black Crow limestones are likely to be older than 42.5 Ma (Pickford *et al.* 2014), and the recent recognition of paramyid rodents

at the site open up the possibility that they could be as old as 47 +/- 1 Ma (Late Ypresian to Early Lutetian) (Ogg *et al.* 2016).

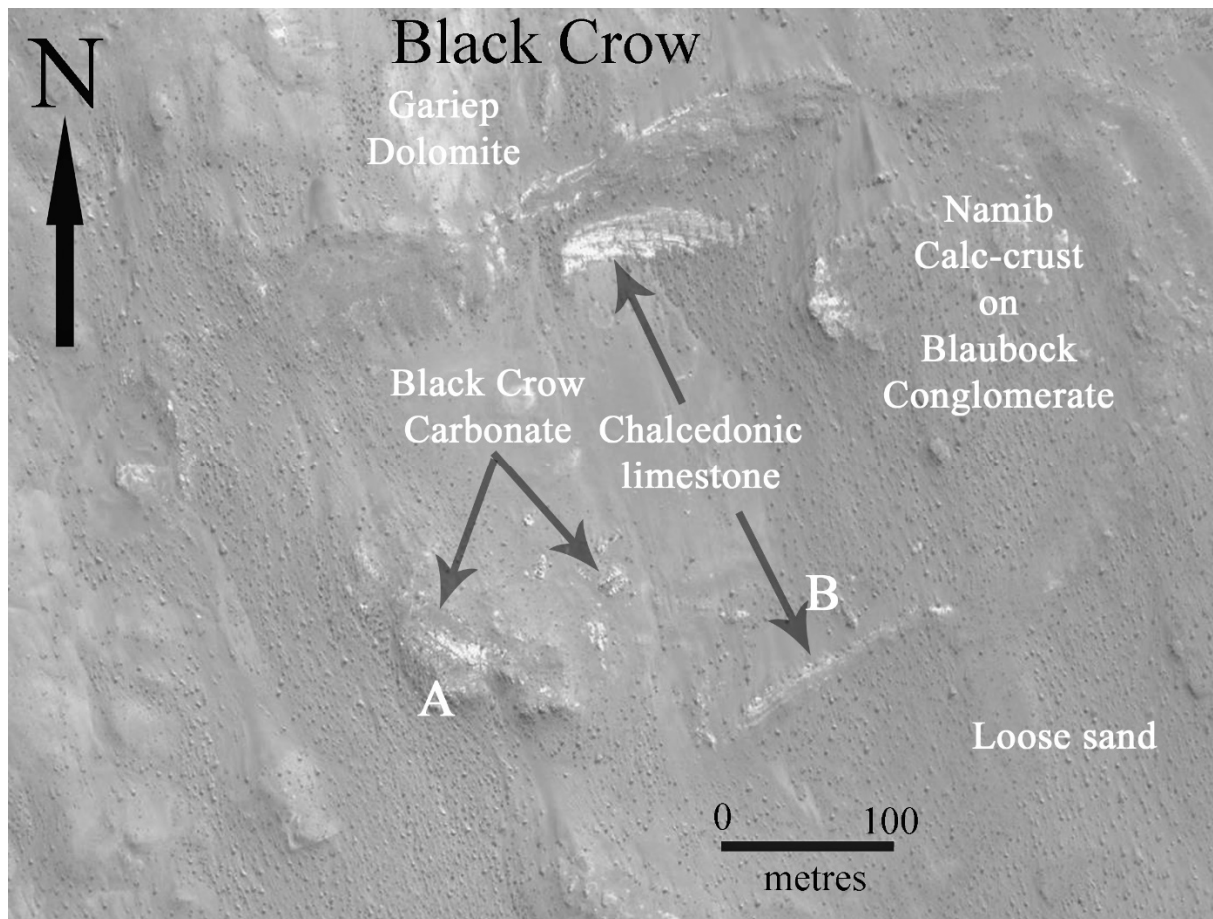


Figure 1. Satellite image of the Black Crow Carbonate Basin, Sperrgebiet, Namibia. The fossil land snails described herein were collected near the western flank of the outcrop at 'A'. Image modified from Google Earth.

Systematic Palaeontology

Gastropoda Cuvier 1795

Family cf Subulinidae Fischer & Crosse 1877

Genus and species indet.

Locality: Black Crow, Namibia.

Material: GSN BC Su 1'17-Su 8'17, eight steinkerns.

Description and comments

The steinkerns are slender and turritiform, up to 10 mm tall, with 8.5 whorls in

the most complete specimen. It seems that the apex is obtuse, but given the poor nature of the preservation it is not possible to be sure. These steinkerns are more likely to represent Subulinidae rather than any of the other turritiform land snails such as streptaxids or the freshwater snails of the family Thiaridae.

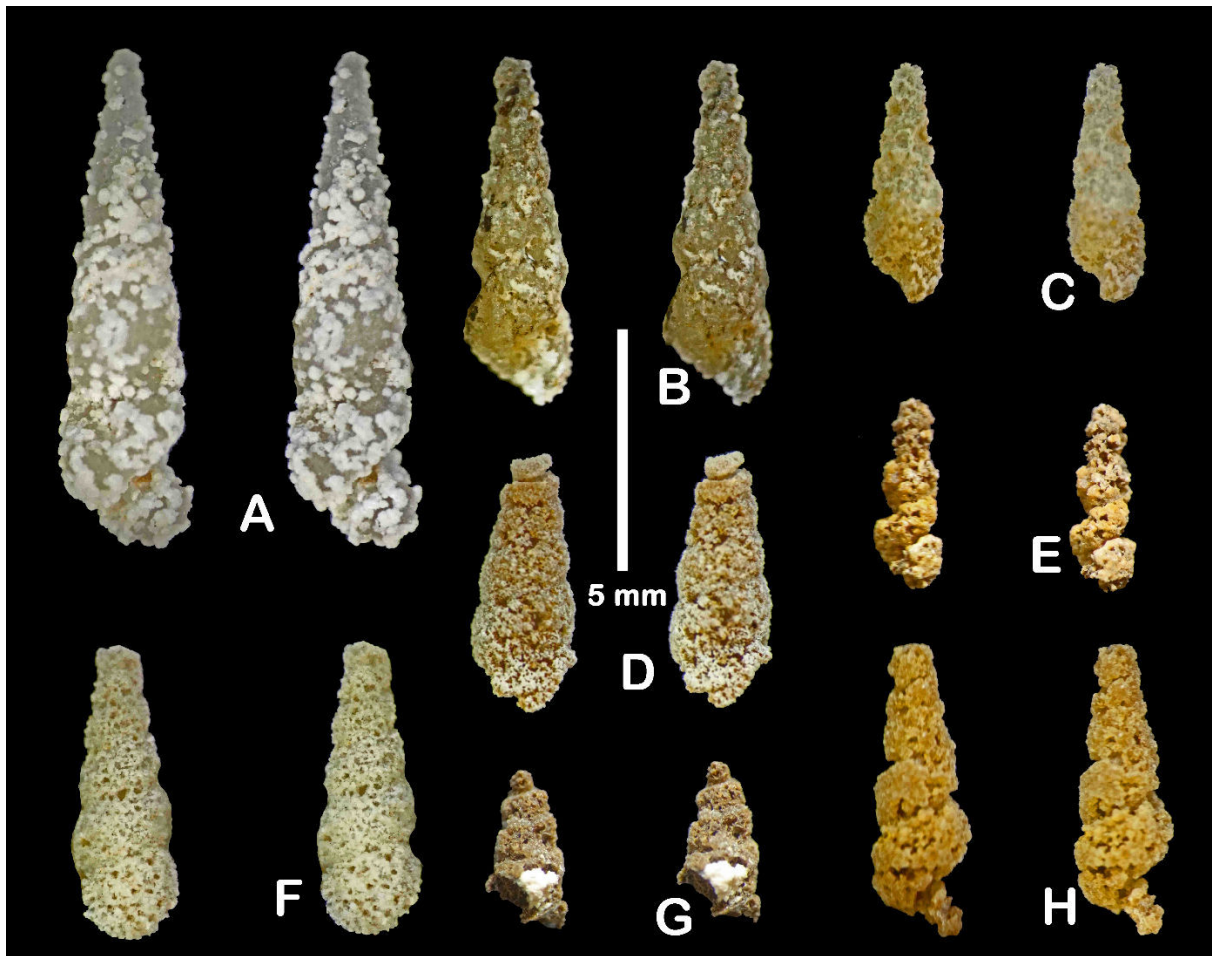


Figure 2. Stereo images of steinkerns attributed to Subulinidae from the Ypresian/Lutetian limestone at Black Crow, Namibia. A-H) GSN BC Su 1'17-Su 8'17 (scale : 5 mm).

Family Dorcasiidae Connolly 1915

Genus *Dorcasia* Gray 1838

Species *Dorcasia* sp. indet.

Material: Fossils left in situ in the field (see Fig. 3).

Description and comments

The various specimens of *Dorcasia* found at Black Crow, of which four are illustrated in Fig. 3, are medium-sized, heliciform, depressed globose shells up to 40 mm in diameter. The spire is low, the apex

obtuse, the sutures are slightly sunken and the body whorl bends down in the fully adult shell. The outer surface of the shell is adorned with radial costae. Fully adult shells have 5 whorls.

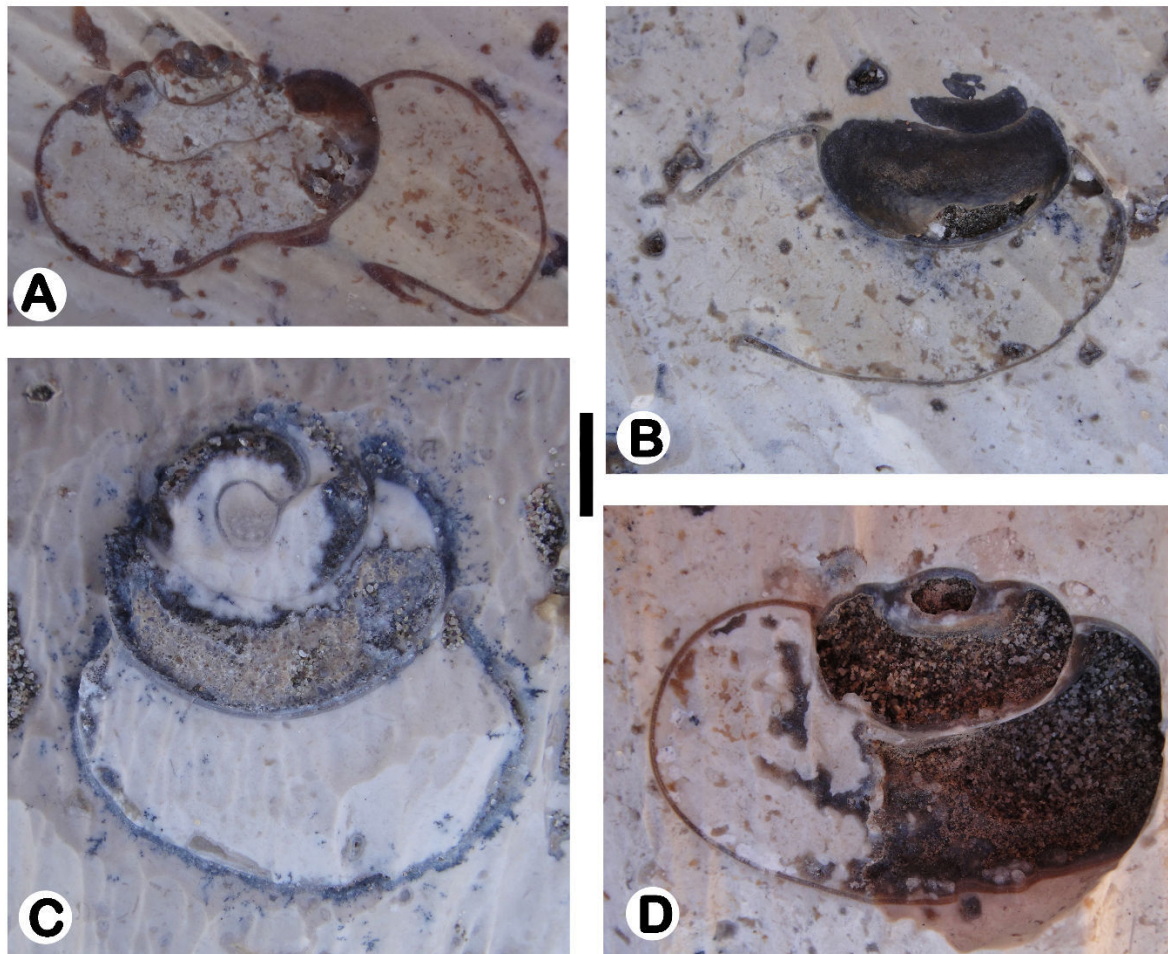


Figure 3. Field images of shells of *Dorcasia* in Ypresian/Lutetian limestone at Black Crow, Namibia (scale : 10 mm).

Discussion

Pickford (1995) demonstrated that in tropical Africa the dimensions of subulinid shells are useful indicators concerning the type of vegetation cover in an area. Large species (43-63 mm tall) occur in forest alongside medium species (15-41 mm tall), but are absent from woodland and grassland. If an assemblage from a collecting area comprises only medium-sized and small species it is likely to be woodland or grassland (or nyika – Pickford 1995), whereas if only small species (3-12 mm tall) are found the likelihood is that the area is arid. If the same situation prevailed in the Palaeogene, then the Black Crow occurrence in which only short subulinids are known (10 mm tall or less) would suggest that the area was relatively open and dry at the time of deposition. However, considering the poor state of preservation of the fossils, we do not insist on this interpretation.

Wenz (1926) described two species of *Dorcasia* from deposits correlated to the Pomona Schichten of Kaiser & Beetz (1926), one from calcareous sand at Gamachab (*D. kaiseri*), the other from marly sandstone at the foot of Chalcedon Tafelberg (*D. antiqua*). However, the descriptions of the sites and the sediments which yielded the fossils suggested to Pickford (2008) that they were likely to be of Plio-Pleistocene age. Extended searches by the Namibia Palaeontology Expedition at both localities failed to result in any further finds of *Dorcasia*, but some Plio-Pleistocene fossils were found at Gamachab. To resolve the uncertainty about these specimens, it is necessary to re-study the original fossils, the present whereabouts of which are unknown although Connolly (1939) wrote that they are preserved in the Munich Museum. Dutoit (1954) mentioned the presence of *Dorcasia* in

the Pomona Schichten, but he provided no details about the fossils, nor of the precise circumstances of the discovery. As it stands, there is sufficient doubt about these previous records of supposedly Palaeogene dorcasids in the Sperrgebiet that they should be ignored until they can be substantiated.

The genus *Dorcasia* is, however, present in the Ypresian/Lutetian freshwater

limestone at Black Crow (Fig. 3). The shells are large in the context of the genus. This is of interest because at present the larger species of the genus occur in summer rainfall areas (Fig. 4) whereas the smaller species occur in areas of all year rainfall and winter rainfall (Pickford 2008). The fossils from Black Crow plead for a summer rainfall regime at the time of deposition of the limestones.

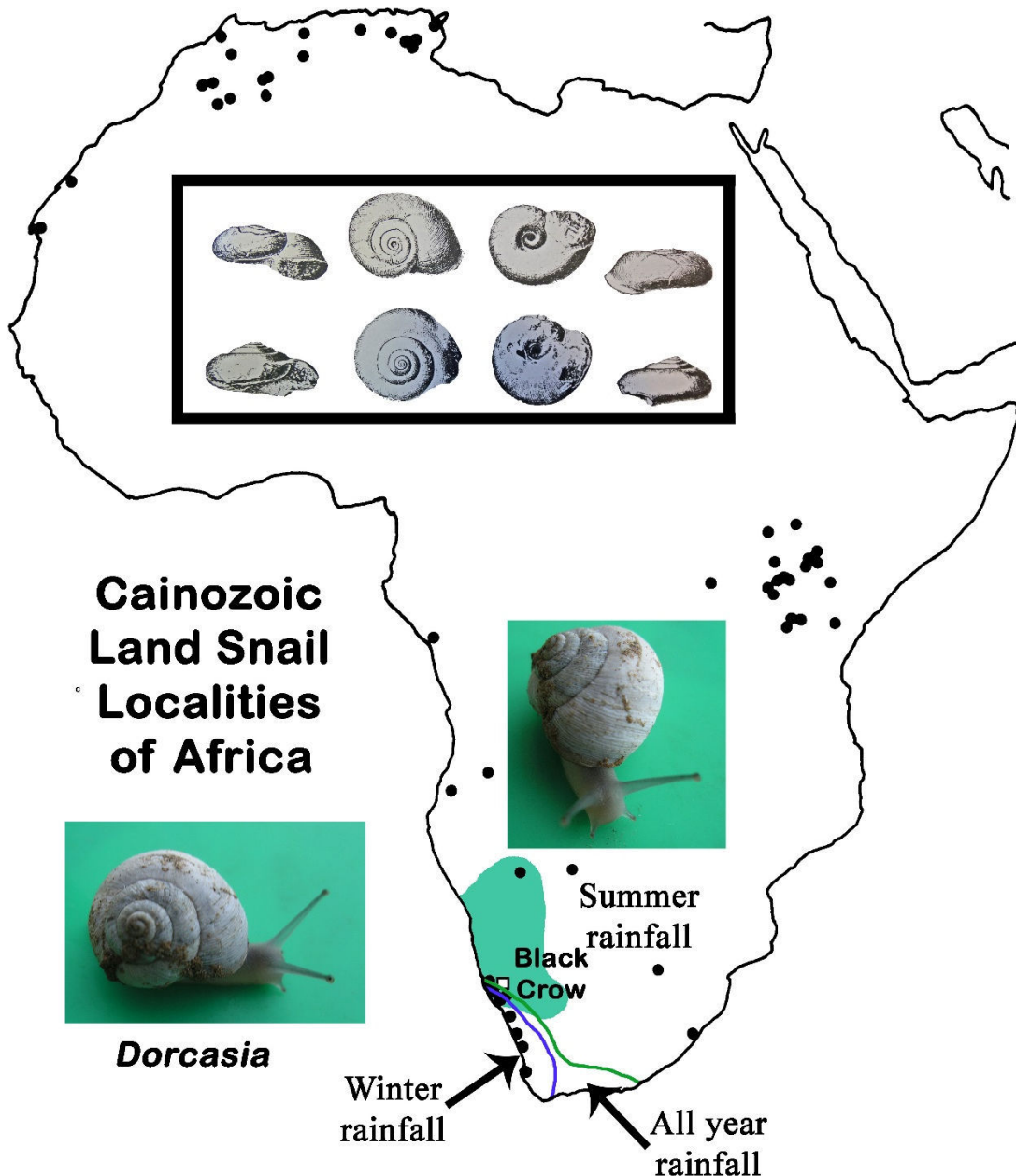


Figure 4. Cainozoic Land Snail localities of Africa (black dots). Black Crow (open square) is the oldest known terrestrial gastropod locality south of the Equator. Green represents the present-day distribution of the genus *Dorcasia* (distribution from Van Bruggen 1969). Inset shows fossil *Dorcasia* shells from Gamachab (top row - holotype of *D. kaiseri*) and Chalcedon Tafelberg (bottom row - holotype of *D. antiqua*) (Wenz 1926). The extant *Dorcasia* was photographed at Skilpadberg, Orange River Valley, Namibia. Also shown are the winter, all-year and summer rainfall zones of southern Africa.

Conclusions

Fossil land snail shells from Ypresian/Lutetian limestone at Black Crow, Sperrgebiet, Namibia, belong to two taxa, a poorly preserved probable subulinid species and a large dorcasiid. The latter taxon is confidently attributed to the genus *Dorcasia*, and is of large size (40 +/- mm diameter). The diversity of land

snails at Black Crow is extremely low suggesting that the region was not forested at the time of deposition, but more likely woodland or bushland. The dimensions of the *Dorcasia* shells suggest that, at the time of deposition, the area lay within a summer rainfall belt.

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