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NOTES ON THE GEOLOGY OF SOME OF THE GUANO ISLANDS OFF THE COAST OF NAMIBIA

R. Swart

1. INTRODUCTION

Reconnaissance geological mapping of Seal, Penguin, Halifax, Possession and Pomona Islands was completed in September 1987 as part of a multi-disciplinary study on the guano islands. This report summarises the geology of these islands and also that of Albatross Rock and Sinclair's and Plumpudding Islands which were visited in December 1985. The geology of the guano islands north of Lüderitz has already been described by Swart (1987), with the exception of Hollam's Bird Island which could only be visited by helicopter in May 1988, and is therefore included in this report.

Little has been written on the geology of the guano islands as they are generally small, are not of economic interest and are also not easily accessible. Pomona Island is briefly mentioned by Kaiser (1926), and the occurrence of diamonds on Possession is mentioned by Wagner (1914).

2. HOLLAM'S BIRD ISLAND

The island consists predominantly of a fine- to medium-grained granite with occasional pegmatitic phases. Quartz grains are highly strained, and the plagioclase feldspar is strongly sericitized. This granite has been intruded by quartz veins which vary from a few millimetres to 20cm thick. The granite is similar in appearance to granites of the Damara Sequence on the adjacent mainland (Fig. 1). A coquina layer, located on the western side of the island, is Holocene in age as it occurs together with rusted chain material.

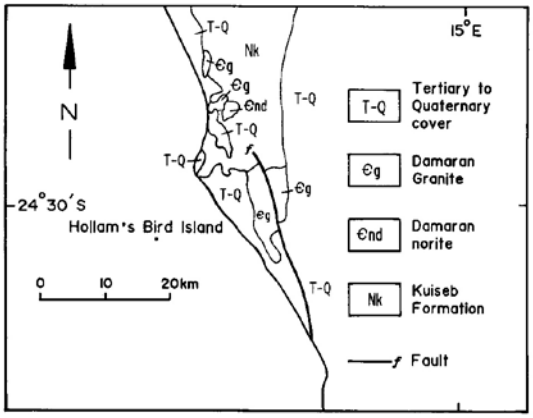

Fig. 1: Simplified geology of the mainland opposite Hollam's Bird Island (after 1 : 1 000 000 geological map of South West Africa/Namibia, 1980).

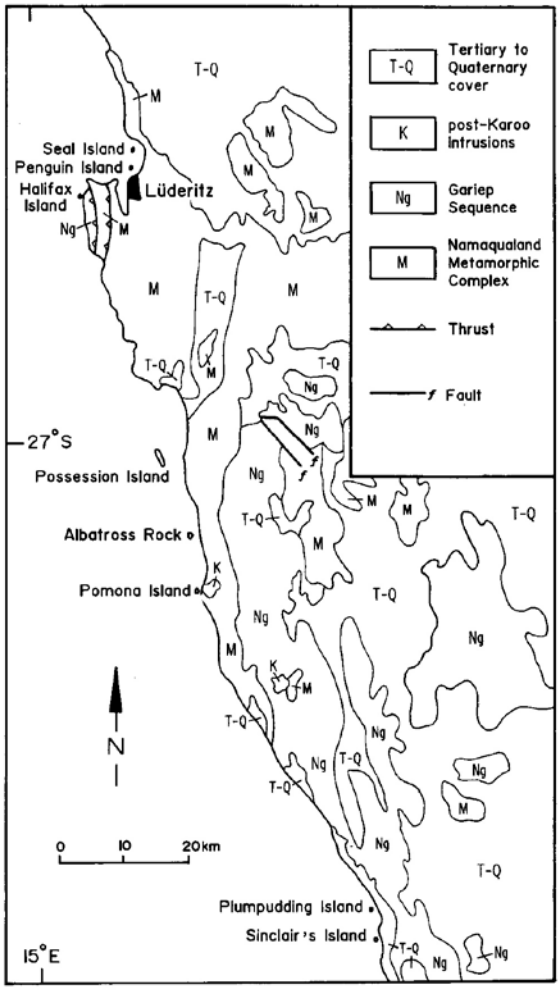

Fig. 2: Simplified geology of the mainland between Lüderitz and Sinclair's Island (after 1 : 1 000 000 geological map of South West Africa/Namibia, 1980).

3. SEAL AND PENGUIN ISLANDS

These two islands, which are located close to each other in Lüderitz Bay (Fig. 2), are comprised of coarse-grained amphibolites and quartzites that have been intruded by granites and migmatites. The quartzites have sutured grain boundaries, and the granites are brecciated on a micro-scale. Crenulated greenschists, possibly formed by retrograde metamorphism of high grade schists, were also observed. Malachite staining is locally present. Joints trend north-east and north-west to west-north-west. These rocks form part of the Namaqualand Metamorphic Complex (NMC).

4. HALIFAX ISLAND

This island consists of two hilly areas joined by a sand isthmus. Rock types on the island include diamictites and highly sheared quartzites. The diamictites contain dominantly quartzite clasts with a few granitic inclusions. Clasts, up to 50 cm in diameter, are in some cases extremely well rounded and are enclosed in a strongly deformed quartzo-feldspathic matrix. Thin, deformed granitic dykes are also found.

Greenman (1966) interpreted the succession at Diaz Point on the mainland adjacent to Halifax as a boulder conglomerate. He estimated that 90 % of the clasts are granitic and that the rest are quartzitic with only one augen gneiss clast being observed. In contrast to this, Kröner and Jackson (1974) suggested that the 'conglomeratic' rocks found at Diaz Point (Fig. 2) are reworked basement and that the clasts are of tectonic origin and are actually dismembered granitic and pegmatitic veins. These intensely sheared rocks have been included in the Gariep Group on the 1 : 1 000 000 geological map of SWA/Namibia (1980).

The quartzite layers on the northern side of Halifax Island have been intruded by a 50 cm wide alkaline lamprophyre (camptonite) dyke, which has phenocrysts of olivine and zoned titanaugite set in a groundmass of brown amphibole (kaersutite), opaque minerals and plagioclase. The dyke is near vertical and trends 105°. Greenman (1966) has described similar camptonite dykes of post-Karoo age from the mainland.

5. POSSESSION ISLAND

The largest and best exposed of the islands on the west coast, Possession consists of gneisses, coarse-grained granodiorites and amphibolites. A well-developed joint set trends north-north-west. These lithologies are similar to the NMC rocks which are found onshore.

Wave-cut platforms, about 20 m above present sea level, are developed in the central-western parts of the island. Marine gravels also occur in this area and on the southern side of the island. These deposits :were prospected for diamonds at the beginning of this century and the mounds which resulted from sieving are still preserved. Wagner (1914) reported that 223,5 carats were discovered during eight months of prospecting in 1910, 180 of which came from the southern portion of the island. This deposit averaged about 1,6 m (5 ft) thick (Wagner, 1914; p. 307-308), but has now been removed by the mining. However, the sediments in the central parts of the island can still be found *in situ*. These have a trimodal grain size distribution, with very large (up to 40 cm), well rounded, blocks of basement with low sphericity, resting amongst well rounded, highly spherical quartzite cobbles which are in turn set in a matrix of 1 to 3 mm sized grains. These gravels are of unknown age.

6. ALBATROSS ROCK

The bedrock on Albatross is poorly exposed as the island is covered by a thick layer of guano. The main rock type recorded is a medium-grained dolomite with accessory quartz and feldspar. A syenitic dyke has intruded this dolomite.

On the 1: 1 000000 geological map of SWA/Namibia (1980), Albatross Rock has been shown as consisting of rocks of the NMC. It is, however, more probable that the dolomite forms part of the Gariep Group, and that the dyke is related to the post-Karoo Pomona Complex which lies to the south of the island.

7. POMONA ISLAND

Pomona Island consists of an alkaline syenite intrusion which is characterized by a coarse grain size, an inequigranular texture and an abundance of perthite. Subsidiary minerals are biotite, pyroxene and amphibole, while zircon, sphene, opaque minerals and apatite are accessory phases. Plagioclase, although occasionally present, is not a widespread phase. The syenite resembles the inner syenite described by Marsh (1976) from the Pomona Complex on the adjacent mainland (Fig. 2). Kaiser (1926) reported that the western portion of the island consists of basement rocks, but only syenite similar to that found on the rest of the island was

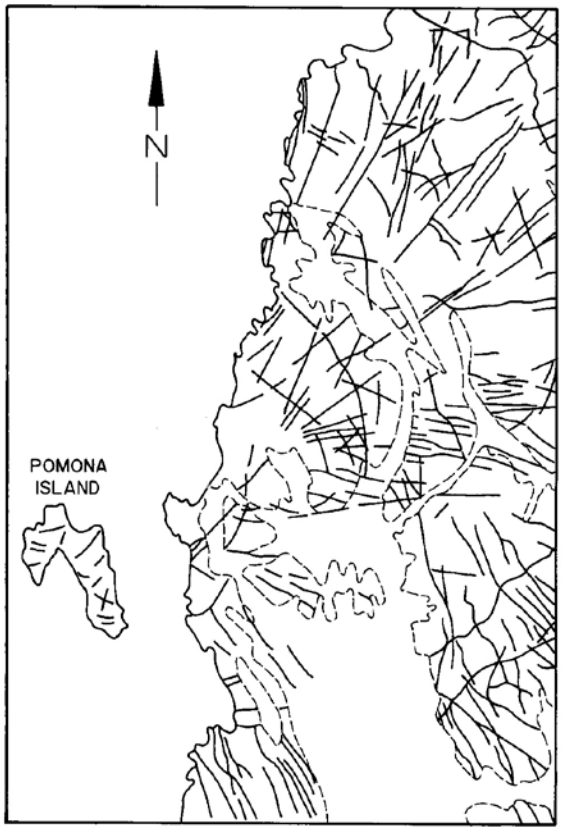

Fig. 3: Radial pattern of dykes in the area of the Pomona Complex compared to the fracture pattern on the island (after Marsh, 1976; Fig. 3).

identified in this study.

The syenite is intruded by a number of dykes, two of which were sampled for petrographic work. One is a fine-grained dark grey tinguaite dyke. Feldspar is the dominant mineral and pyroxene is the most common accessory mineral. Disseminated copper (chalcopyrite) mineralization is associated with this dyke. The second dyke is leucocratic, medium- to coarse-grained and consists predominantly of perthite, plagioclase, biotite and sphene. Copper mineralization is also associated with this dyke. The pattern of dykes and fractures is similar to the well-developed radial pattern of dykes found on the mainland (Marsh, 1976; Fig. 3).

The rocks found at Pomona Island are all similar to those described by Marsh (1976) from the post-Karoo Pomona Complex.

8. PLUMPUDDING ISLAND

Plumpudding Island consists largely of metasiltstones, graphitic shales, quartz-feldspar-tremolite schists and possible albitolites. Discrete aggregates of specular haematite are common. These lithologies are correlated with the volcano-sedimentary Oranjemund Formation of the Gariep Sequence as defined by Tankard *et al.* (1982, Fig. 9.2, p.277).

Agates are abundant on the beaches of Plumpudding Island and this has given rise to rumours of diamond riches. However, the island itself is poor in diamonds.

9. SINCLAIR'S ISLAND

Sinclair's Island, the most southerly of the islands visited, consists of medium-grained metaquartzites of the Gariep Group. It is occasionally linked to the mainland by an ephemeral sand bridge.

10. ACKNOWLEDGEMENTS

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