PART I: GENERAL GEOLOGY

3. REGIONAL GEOLOGY

Interest in the geology of the Damara Orogenic Belt goes back to the end of the nineteenth century. Summaries of this work have been given by Smith (1965, p. 3) and later by Hugo (1974, p. 1-6). Gevers, in the mid-nineteen-thirties, was the first to complete a comprehensive study of the regional geology of this area (Jacob, 1974, p. 1). In 1969 and 1970 Jacob re-mapped the area in detail, thereby contributing to a better understanding of the complex geology.

Recent discoveries of uranium mineralization led to an upsurge in prospecting activities. Anglo American Prospecting Co. Ltd mapped the geology in its concession areas, and in the Dorstrivier area the mapping confirmed the work of Jacob (Annual Prospecting Report, 1973, Prospecting Grant M46/3/209). To the south and west of Jacob's area, and mainly in the Tumas River Valley, the continuation of the lithological features was proved. (Annual Prospecting Report, 1974, Prospecting Grant M46/3/430; Annual Prospecting Report, 1974, Prospecting Grant M46/3/433; Annual Prospecting Report, 1974, Prospecting Grant M46/3/487).

3.1 Stratigraphy

The South African Committee for Stratigraphy (SACS) draughted a South African Code of Stratigraphic Terminology and Nomenclature (1971). Based on the principles and guidelines set out in the Code, recommendations concerning

suitable informal nomenclature are presented for the super= ficial calcareous rocks which comprise large parts of the Namib Desert. With regard to the rocks of the Damara orogen, lithostratigraphic recommendations proposed by Kröner et al, 1974 (in Jacob, 1974, p. 4) are used.

The complete stratigraphic column is given in Table 1.

Jacob (1974, p. 3) discussed the terminology used for the rocks of the Damara orogen, and used the term Husab Formation (ibid, p. 5). According to SACS this is no longer acceptable, the term Karibib Formation being preferred as this is historically more appropriate (Hugo, 1974, p. 7). The name is derived from the marble of this unit which is mined in a quarry on the farm Karibib 54.

(Granite rocks are well developed throughout the sequence below the Namib group, and particular types are largely confined to certain lithological units. The meta= morphic equivalent of the Nosib Group is the Red Granite gneiss, and that of the Swakop Group is the Salem Granite. Other granites occurring within the area, for example alaskites, Bloedkoppie and Gawib Granites, are not confined to any lithological sequence).

whereas the Salem Granite represents granitized sediments of the Swakop Group ←

The superficial calcareous rocks lie unconformably on the rocks of the Damara orogen which cover large areas of the Namib Desert. It is proposed that the term Namib group be used to include all these rocks. From east to west across the Namib Desert the calcareous rocks undergo compositional changes. In the east they are mainly

TABLE 1: STRATIGRAPHIC TERMINOLOGY FOR THE ROCKS IN THE DAMARA OROGEN

KHAN/SWAKOP AREA		
GROUP	SUBGROUP	FORMATION
NAMIB		GEMSBOK CALCRETE
	UNCONFORMITY	
		LANGER HEINRICH CALCRETE AND TUMAS GYPCRETE
MAJOR UNCONFORMITY		
SWAKOP	KHOMAS	WITPOORT AND TINKAS
		KARIBIB
		CHUOS
	UNCONFORMITY	
	HAKOS	RÖSSING
UNCONFORMITY		
NOSIB		KHAN
		ETUSIS
MAJOR UNCONFORMITY		

calcretes and in the west largely gypcrete. Terms such as the Langer Heinrich calcrete formation and the Tumas gypcrete formation are proposed to account for the compositional changes, although they are chronostratigraphically equivalent. Both names are derived from the Langer Heinrich Mountain and the Tumas River respectively, as the rocks are well represented in these areas.

The Gemsbok calcrete formation is lithologically similar to the Langer Heinrich calcrete formation, but the change in name is necessary due to the presence of an unconformity separating the two formations. The name Gemsbok is derived from the name of a tributary of the Gawib River which enters it from the south, close to a typical outcrop (Map 1).

3.2 Regional Structure

Structurally, the Damara orogen has been subjected to four episodes of deformation (Jacob, 1974, p. 34). The second phase was primarily responsible for the north-easterly structural direction, where anticlinoria and synclinoria were formed with a wavelength approximating 10 km (ibid., p. 38).

Nosib Group rocks and Red Granite gneiss outcrop mainly as large dome structures, with the anticlines being much broader than the intervening synclinal structures. In the Dorstrivier area, plastic deformation of the rock took place because folding was the main structural element. Very little faulting occurred (Annual Prospecting Report,

1973, Prospecting Grant M46/3/209).

Toens (1973) demonstrated that there are parallel relationships between the structural grain, metamorphic grade, magnetic susceptibility and radioactivity of the rocks of the Damara orogen. Magnetic and radiometric anomalies are intimately associated with high-grade metamorphism, particularly in rocks of the Nosib Group. On the other hand, the Nosib Group rocks comprising the Langer Heinrich Mountain have a low metamorphic grade with no corresponding magnetic or radiometric anomalies. Corner (1975) completed a traverse up the Swakop River, where he measured the radioactivity and magnetic susceptibility of all the rock types. He found that areas containing mineralized alaskites have associated negative magnetic anomalies which may be the result of remobilization of rocks and intrusion of alaskites in a new, but changed, magnetic field (Corner, 1975, p. 5).