

EAST AND SOUTH-EASTERN ZIMBABWE

**Papers from the
1987 Study Tour of the Geographical Association of Zimbabwe,
31 August to 4 September, 1987**

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HARARE - MUTARE - CHIREZI - MASVINGO - HARARE REGION

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The object of these notes is to give brief explanations of the major landforms and geological structures which may be seen from the bus during the field trip to the eastern part of Zimbabwe.

Zimbabwe forms part of the African Shield, which consists of old and rigid rocks, and it is only in the Eastern Highlands that extensive folding may be seen. Faulting is, however, common in many parts of the country and there are numerous examples of features which have been derived from intrusive igneous rocks.

1. HARARE - MUTARE

Between Harare and Odzi, the geology consists of old metamorphosed igneous rocks (gneiss) and younger, intrusive granite. Between Marondera and Macheke, and between Rusape and Odzi, dolerite intrusions are also common.

The whole of the central Highveld of Zimbabwe has been formed by doming, due to lateral pressure taking place from several different directions, raising this part of the country above the rest. There are several areas along the main road where one can actually see how the land slopes gradually away to the north and south. This is particularly noticeable around Eagle's Nest, between Macheke and Headlands.

At Eagle's Nest, too, it is possible to see the Nyanga Mountains in the north-east. This highland area was also formed by doming and rises to over 2100 m above sea level. On a clear day, one may see Mt. Inyangani on the horizon. Mt. Inyangani has been formed by a dolerite sill overlying granite. Sills are formed when molten magma moves between layers of sedimentary rock or along a horizontal joint in igneous rock (as was the case with Mt. Inyangani). When exposed, the sill forms a protective cap over the underlying rock.

Increasingly, from Headlands onwards, and especially after Rusape, castle kopies, ruwars and inselbergs appear. These landforms are all caused by the exposure and weathering of large granite batholiths. Much of Zimbabwe is underlain by batholiths (see Pritchard, 1979, p. 95). These intrusive igneous features were formed deep in the earth's crust and consist of large-grained granite masses.

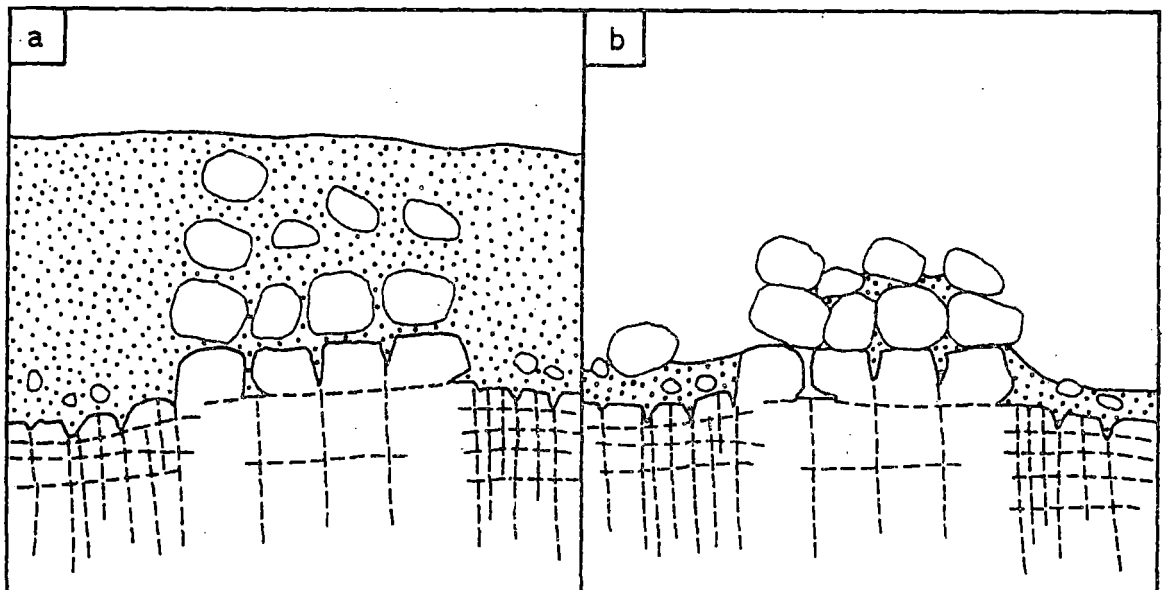
Where greater erosion has taken place, the batholiths have been exposed and weathered to form these rock features so typical of Zimbabwe.

Castle Kopies or tors are formed in one of two ways:

- a) Deep weathering of jointed rock either of a batholith or of a boss or stock (which is a thick column of intrusive igneous rock formation above a batholith) may create isolated 'corestones' - (Fig. 1a). Rain wash selectively removes finer sands and clays, leaving

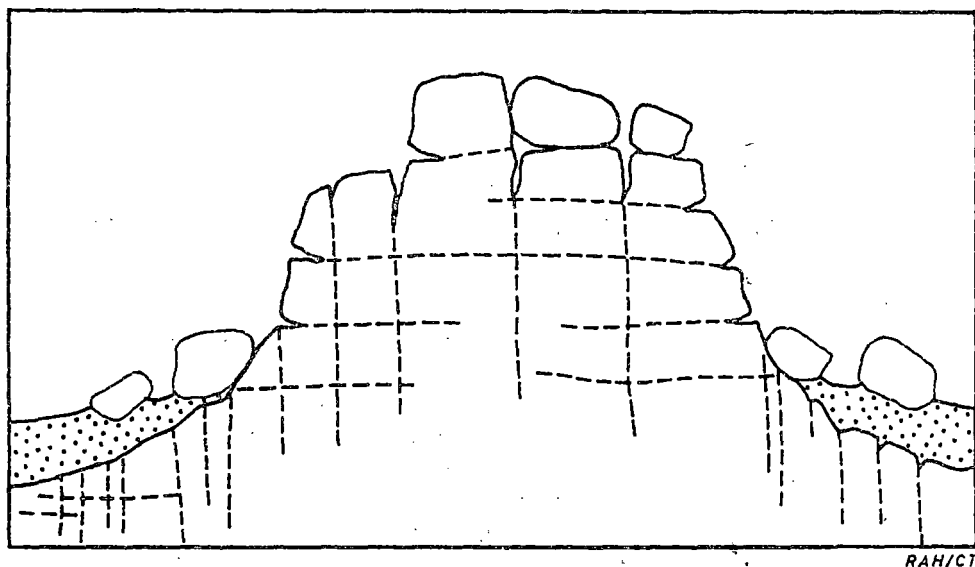
the corestones exposed on the surface. These accumulate to form a castle kopje or a tor (Fig. 1b).

Fig. 1: The formation of a castle kopje or tor from corestones
(Source: Small, 1985)



b) Where inselbergs have been exposed, with very well developed vertical and horizontal joints, deep weathering and stripping of the rocks takes place, again creating a castle kopje or a "blocky" inselberg (Fig. 2).

Fig. 2: Blocky inselberg - may form a castle kopje
(Source: Small, 1985)



Ruwāres are low, rounded, "whale-back" domes, surrounded by weathered plains. They simply represent the first stages in the exposure of an inselberg (Fig. 3).

Fig. 3: A "ruware"
(Source: Small, 1985)

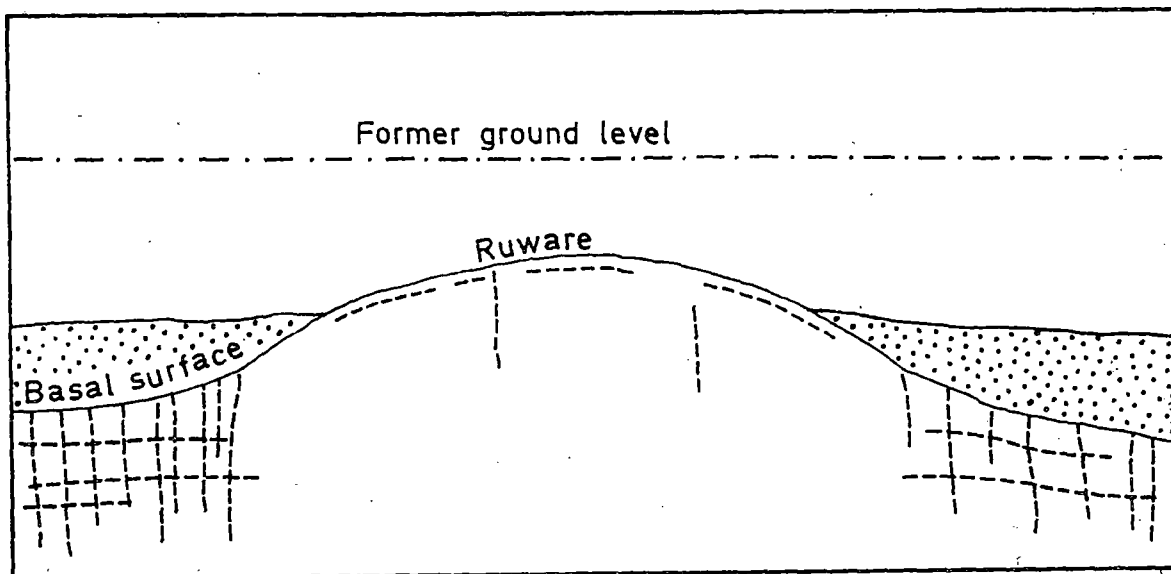
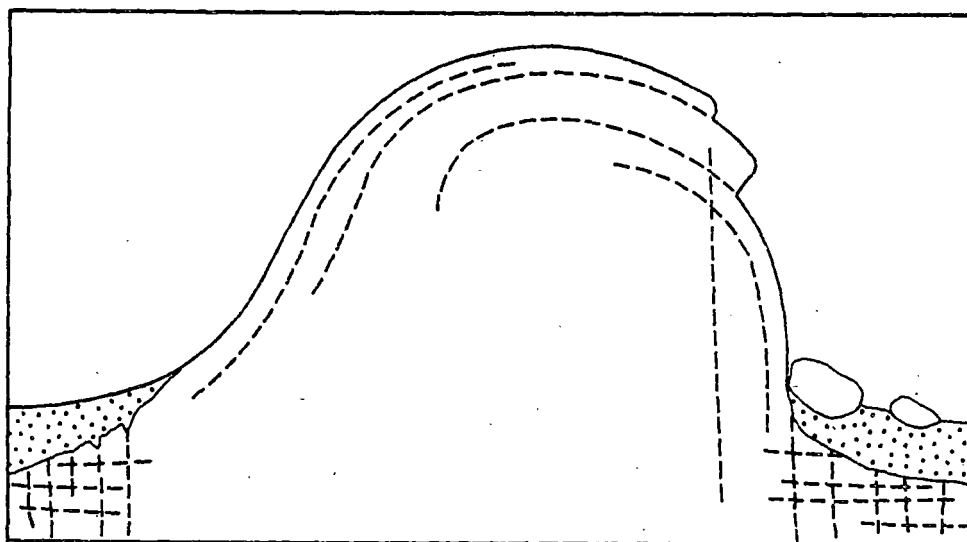


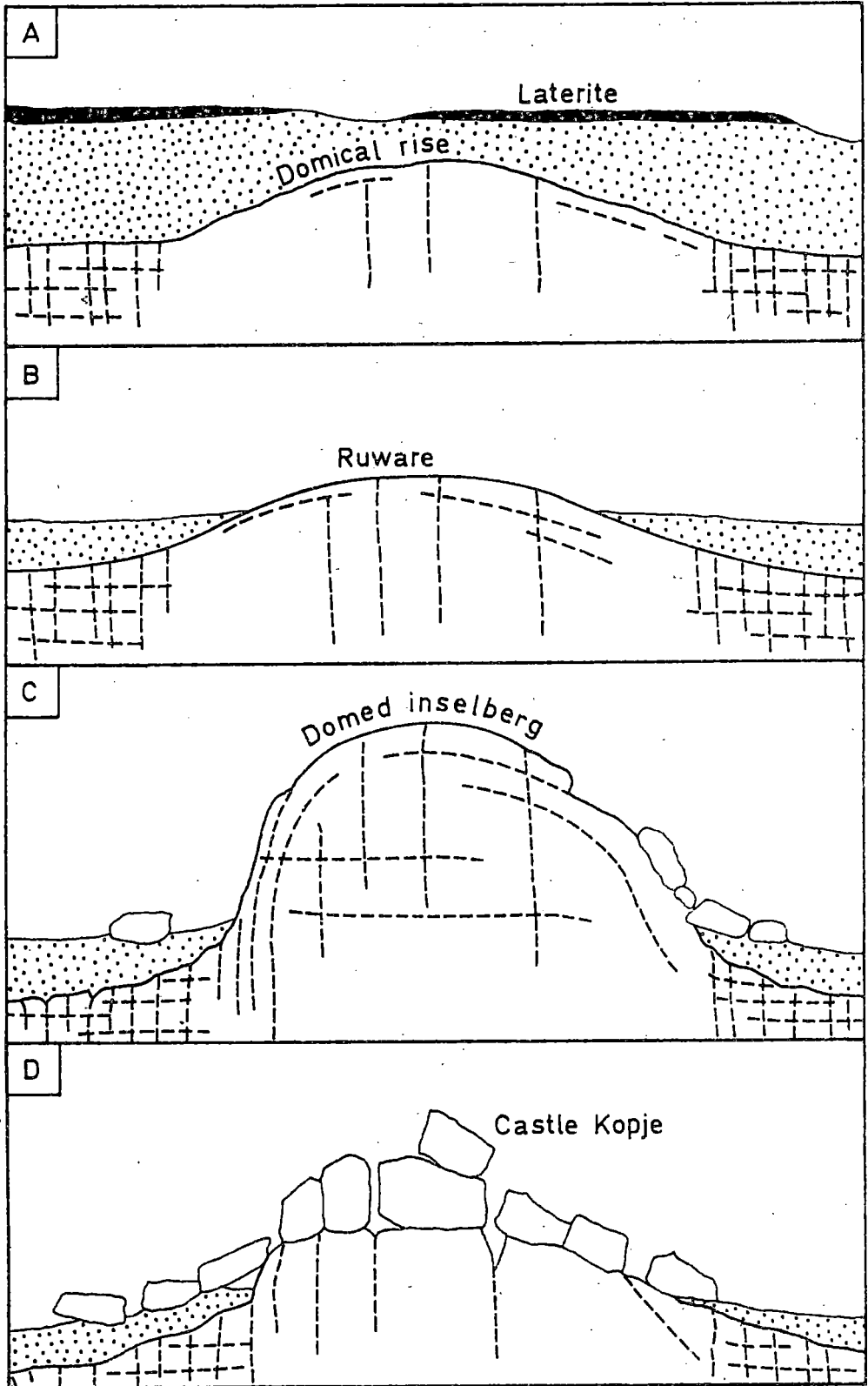
Fig. 4: A domed inselberg
(Source: Small, 1985)



RAH/CT

Domed Inselbergs are formed when the dominant joints are curvilinear, which gives a convex shape to the inselberg, either as a whole or on its upper parts (Fig. 4). These joints result from pressure release. As the overlying weathered material is removed, pressure is released and the rock recoils upwards and outwards to form a series of curvilinear shells. Note that the process is not weathering, although the weathering process can utilise the joints once they are formed. Strongly domed inselbergs of this type are called bornhardts in some parts of Africa. Fig. 5 shows how these features may develop through time from a ruware to an inselberg and then decline to form a castle kopje.

Fig. 5: The development and decline of inselbergs
(Source: Small, 1985)



RAH/CT

From Odzi through to Mutare the road passes through a belt of lavas and basalts mixed with sediments and intrusive igneous rocks. These have been substantially eroded to form hilly country around Mutare and Penhalonga.

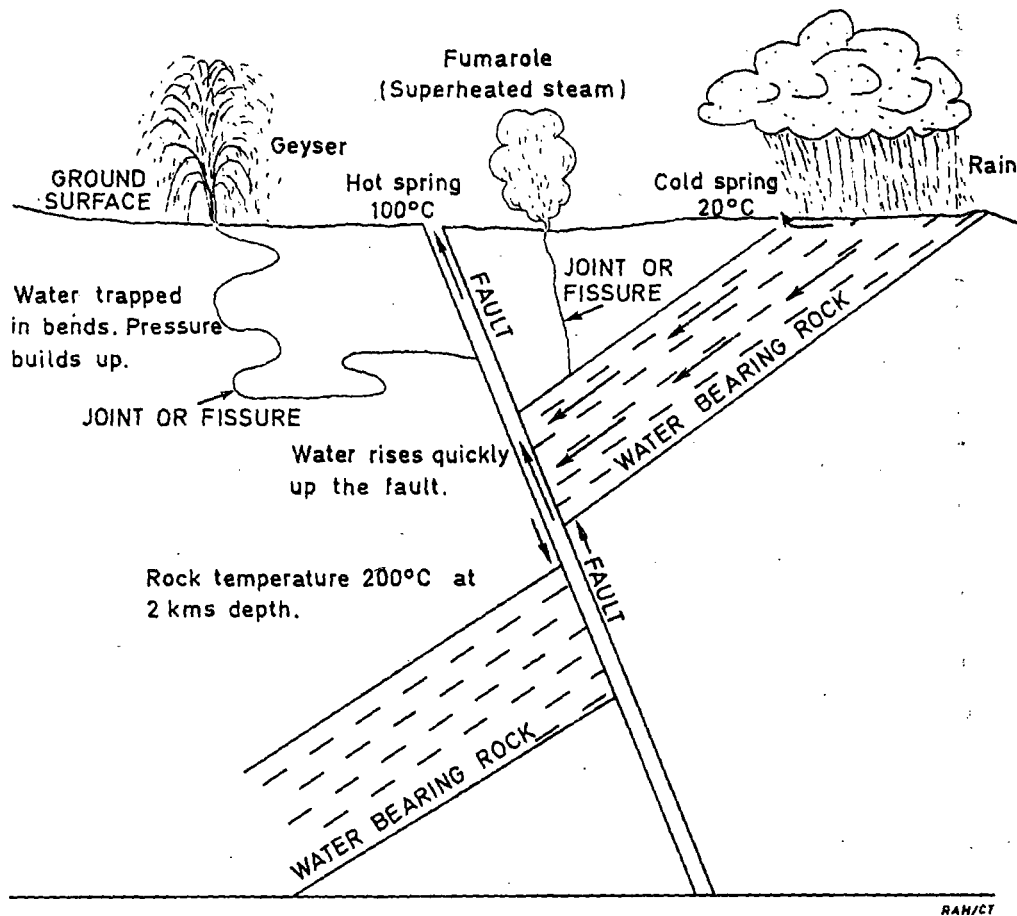
2. MUTARE - CHIPINGE (Chikore Mission)

In the first part of this section, the main road passes through country comprised of granite, with dolerite intrusions. These types of rock also form the Vumba Mountains, lying to the east of the road.

As one moves southwards, faulting occurs with increasing frequency, with faults generally trending in an E.N.E. to W.S.W. direction. Between the Odzi and the Save rivers around Hot Springs, there is considerable grid faulting.

Hot Springs, near the Odzi river, takes its name from the hot springs which occur in the area. When water, moving through the rocks, flows to a great depth, it is heated. If there are faults in the crust of the earth which provide a direct route to the surface for the water, hot springs and geysers occur. The hot water carries chemicals in solution which are sometimes deposited around the exit (Fig. 6).

Fig. 6: The formation of hot springs and geysers



At a hot spring, water bubbles to the surface steadily, whereas in the case of a geyser it explodes into the air intermittently. There are no geysers in Zimbabwe, but several instances of hot springs. For example, a second hot spring occurs near the Odzi River at Mwengesi Spring, north of Hot Springs. The Rupisi Hot Spring lies in the Save river valley, between Birchenough Bridge and Chisumbanje.

From Birchenough Bridge, as one climbs towards Chipinge, the road enters a region of limestone, shale, quartzite and basalt which form the highland areas of Chipinge and Chimanimani. To the north, in the highlands around Chimanimani, there are also many dolerite intrusions, causing very broken relief. The entire region has undergone folding and there is extensive faulting in the northern portion of the highland area, with faults running generally in an E.N.E. - W.S.W. direction.

The Chimanimani Mountains are formed from quartz-mica schists, orthoquartzite and phyllites, which are metamorphic rocks. These mountains are fold mountains and were formed by complicated folding. Overthrust folds, nappes and thrust planes may all be seen in this range (see Pritchard, 1979, p. 84, Fig. 159). Scenically very beautiful, the Chimanimani Mountains have largely been reserved as a National Park.

3. CHIKORE MISSION - CHIREDDZI

From Chikore, the road drops down from the Chipinge Highlands to the floor of the Save Valley, and meets the Chisumbanje road at Rupisi Hot Springs. This part of the Save Valley consists of alluvium and other deposits, forming a broad flat valley floor. Further south, the road passes through sandstones, grits and siltstones formed by even earlier deposits.

At Chisumbanje, the underlying rock is basalt, giving rise to heavy clays. This basalt was formed from extensive lava flows which cover much of the south-east of Zimbabwe and extend as far west as the Tuli Circle. To the west of Chisumbanje, on the far bank of the Save River, lie coal measures, embedded in sandstone. Unfortunately, this coal is of low quality and, at the moment, is not economically viable to mine.

Chiredzi lies just off the basaltic lava flow, in a belt of paragneisses and other high grade sediments. These soils provide the fertility utilised by the Triangle and Hippo Valley sugar estates.

4. CHIREDDZI - HARARE

Between the Mutirikwi and the Tokwe rivers, the road passes out of the belt of high grade sediments, into a region of gneisses (metamorphosed sandstone) of various ages, with intrusions of dolerite and basaltic rocks. The countryside becomes more rugged and castle kopjes and inselbergs appear once more.

After reaching the main Masvingo-Beitbridge road, some very large and spectacular inselbergs are apparent, particularly after the road has climbed up onto the area of old gneiss and intrusive granite domes.

On the higher ground around Masvingo there is a belt of rich, mineral bearing rock of sedimentary and volcanic origin (metasediments and metavolcanics) which extends westwards to Mashava and reappears

around Zvishavane. Great Zimbabwe, however, lies south of this belt in a belt of intrusive granites.

From Masvingo to Mvuma, the road climbs back onto the domed central highveld belt. Geologically, this area consists of a large granite batholith which has not yet been eroded sufficiently to produce inselbergs, although a few castle kopjes may be seen. Just south of Mvuma, around Fairfield, where the road crosses the railway line, there is a patch of aeolian (wind deposited) sands and Mvuma itself is located on mineral-rich metavolcanics.

To the west of Mvuma, but out of sight from the road, lies the Great Dyke. The Mvuma-Gweru road crosses this feature at Lalapanzi. The Great Dyke is, in fact, not a dyke at all, but a lopolith some 515 kms long and 5 - 10 km wide, extending across Zimbabwe from the Zambezi escarpment north of Mvurwi to Mberengwa Communal Land. This lopolith was formed by magma moving slowly between layers of rock. The weight of the magma caused the crustal rocks beneath it to sink and it developed into a saucer-like shape. In the case of the Zimbabwean lopolith, the intrusions of magma were formed in a series, one after another. Before each intrusion of magma solidified, the heavier minerals sank to the base of the intrusion leaving bands of lighter minerals such as chromite at the top of each layer (Pritchard 1979, p. 97, Fig. 187).

From Mvuma, the road to Harare continues across the domed highveld area, consisting of older gneisses and younger intrusive granite, which has not yet been eroded sufficiently to form inselbergs or castle kopjes. The only exception to this pattern is a belt of poor grits, sandstones and siltstones lying between Featherstone and Beatrice. These sediments are similar to those found in the lower Save Valley, just north of Chisumbanje.

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