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NOTES ON SOME FOSSIL POCKETS AND BONE BEDS IN THE CYNOGNATHUS-ZONE IN THE BURGHERSDORP AND LADY FRERE DISTRICTS

By J. W. Kitching

Most palaeontological field workers are familiar with the blue to green shales and maroon to red mudstones, as well as the fine-grained greenish-blue sandstones, of the *Cynognathus*-zone, all these colours contributing to its general patchy appearance. Heights within the zone can unfortunately not be determined reliably with the assistance of particular colour sequences, but a conspicuous and persistent sandstone horizon marks the middle level of the zone. Our knowledge of the manner in which fossils occur both above and below this horizon is not satisfactory.

With the description of some immature *Diademodon* specimens and a *Bauria cynops* in two papers published earlier in this issue of *Palaeontologia Africana* (Brink, p.97 and p.39), which were found in a fossil pocket next to the Wonderboomspruit on the farm Cragievar five miles south of Burghersdorp, it has become desirable to draw attention to the occurrence of fossil pockets and bone beds in this zone. Only sites visited and recorded in the field catalogue of this Institute will be dealt with and these are confined to the Burghersdorp and Lady Frere districts.

A fossil pocket is here defined as a limited area to which there is confined a number of fossil specimens individually preserved and not sparsely and sporadically distributed as is more usual in this zone.

A bone bed is defined as a thin lenticular deposit of fragmentary skeletal material belonging to a number of individuals, more often of the same species.

Fossil pockets and bone beds in the Burghersdorp district.

While visiting the Albany Museum in Grahamstown in 1960, I came across the the record of the locality of the type specimen of *Lycaenognathus platyceps*, given as Wonderboomrivier, alias Wonderboomspruit, below the railway bridge near Burghersdorp. In March 1962, this locality was relocated after some difficulty in finding the owner of the property.

On the Burghersdorp side of the railway bridge crossing the Wonderboomspruit there is approximately half a mile of exposure between the river and railway line, ranging from blue-green mudstone in the river bed to a soft blue-green shale in the east bank, immediately above which there is a two ft. sandstone horizon which forms part of a small terrace or flat between the river and the railway.

Mud nodules varying in colour from reddish-brown to grey occur from the river bed through the shale as well as the sandstone horizon, some of them protruding from the sandstone on top. At this level and in a confined area there is an

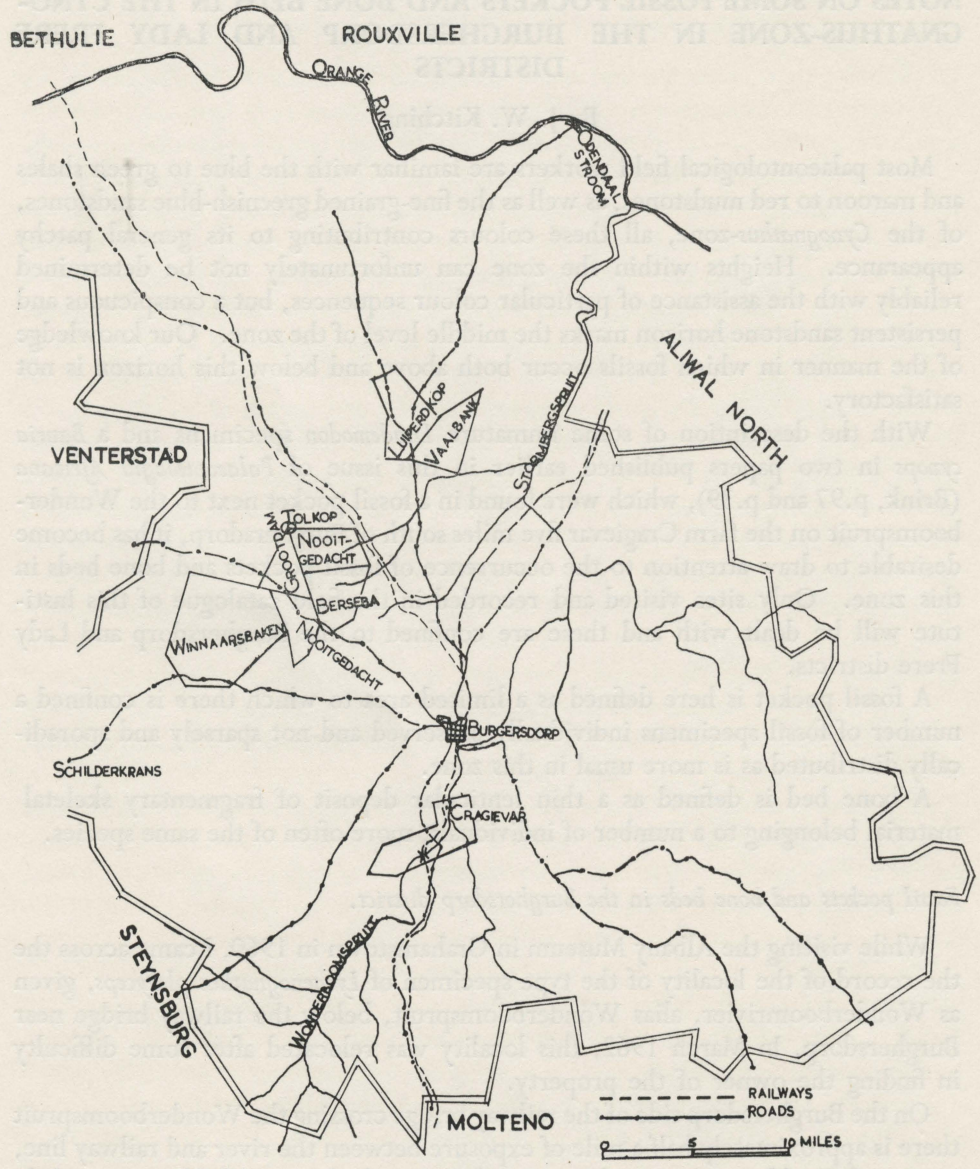


Fig. 24—Map of the Burgersdorp (Albert) district, giving the farm boundaries on which fossil pockets, and bone beds have been located.

exceptionally large concentration of these nodules and it was from these that some twelve almost complete cynodont skulls with parts of skeletons, as well as a complete *Bauria cynops* skull, were recovered from a limited area some two yards square. The site is close to a dolerite dyke which cuts across the exposure, while farther south, towards the bridge, the same nodules at the same level produced only two other specimens.

South of the railway bridge and small terrace, at a slightly higher level, there is a nine inch thick bone bed overlain by an 18 inch sandstone horizon. A fair amount of material was excavated from this bed, which yielded only fragmentary skull and skeletal remains of the genus *Kannemeyeria*.

From the small plateau or terrace, a 150 ft. hill slopes up to a dolerite cap, the shale exposures varying from maroon to blue and grey in colour. Fossil bones are rather sparsely and sporadically distributed throughout these exposures.

Fifteen miles north-west of the Wonderboomspruit locality and twelve miles from Burghersdorp on the Schilderkrans road, lies the farm Winnaarsbaken which is divided into five portions, all known as Winnaarsbaken, but distinguished by the addition of the farmer's surname. The traditional Winnaarsbaken (Coetzee), of long standing fossil fame, lies almost in the centre of the subdivisions.

To the south of Winnaarsbaken (Coetzee) lies the portion known as Winnaarsbaken (Kruger). To the north of the homestead on the latter there is a hill, 30 ft. high. At an intermediate height up the slope of this hill and facing the traditional Winnaarsbaken hill, there is a nodule layer within a blotchy shale exposure extending along the hill for about sixty yards. On moving horizontally from the one side of this layer to the other, the nodules start very abruptly and end equally suddenly, indicating a very restricted occurrence. The nodules are similar to those of Wonderboomspruit locality and are almost certainly of exactly the same age, because both sites are at the same 5,000 ft. contour and the strata are perfectly horizontal. Complete skulls, some with portions of skeletons, or skeletal elements alone of the genus *Trirachodon* were recovered from these nodules by the National Museum, Bloemfontein, the South African Museum, Cape Town, and the Bernard Price Institute. Particularly interesting is the occurrence of numbers of very immature, almost embryo-like specimens, but up to date none of these has been extracted from the matrix. As far as can be ascertained no other genus is represented in this fossil pocket.

On the old Winnaarsbaken (Coetzee) in the famous fossil koppie or hill to the south and close to the homestead, above the three established fossil horizons, there is a very limited bone bed about four feet wide and ten inches thick overlain by a sandstone layer, 3 ft. thick. This bone bed yielded an abundance of crushed amphibian remains as well as a few isolated cynodont teeth. To the north-east of the homestead there is another bone bed in a low hill with pale grey shaly exposures, yielding mostly isolated cynodont teeth and fragmentary skeletal elements.

To the east of Winnaarsbaken on the Burghersdorp-Venterstad road lies the farm Nooitgedacht (van Wyk), bordering on Grootdam to the north and Berseba to the east, both being portions of the original Nooitgedacht. Approximately a mile to the north of the Nooitgedacht (van Wyk) homestead there is a shallow erosion donga running northwards along the foot of a low hill. In the west bank of the donga, towards the Grootdam boundary fence which crosses the highest point of this hill, there is an exposure of some 30 to 40 feet square of red to grey-green shales with thin sandstone bands. This exposure contains the largest bone bed on record in the field notes of the Institute. In cross-section the bed ranges in thickness from nine inches around the perimeter to eighteen inches maximum. A sample block two feet by two feet by nine inches thick yielded over 500 jaw, skull, skeletal fragments and isolated teeth of *Diademodon* and *Cynognathus*.

Across the donga from this exposure, on the east side, at the foot of the hill near the Grootdam boundary fence there is a continuation of the same coloured shale on the same horizon, which yielded an abundance of fragmentary *Kannemeyeria* and amphibian remains. Two feet above this horizon and separated by a foot of sandstone, there is a bone bed varying from eight to fifteen inches in thickness yielding fragmentary amphibian remains.

Above the latter bone bed the hill slopes gently to about twenty feet in height, forming an almost triangular crest descending gradually both east and west, while persisting for two miles due north until it terminates in a symmetrical koppie known as Tolkop. The boundary fences of the farms Grootdam, Ontevreden and of the original Nooitgedacht meet at the highest point of Tolkop. A dolerite dyke runs along the length of the ridge, bisecting it longitudinally. Shale exposures are sparse, but they nevertheless yielded a beautifully preserved *Bauria cynops*, a *Diademodon browni* and a small *Kannemeyeria* skull.

Due north of Burghersdorp on the Odendaalstroom road lies the farm Luiperdkop which annexes on to one of the many farms in the district known as Vaalbank. Fossil-bearing outcrops are sparse and occur on the slopes of a low hill to the north and north-west of the Luiperdskop homestead. One of these low hills runs almost parallel to the boundary between Luiperdskop and Vaalbank, eventually changing with an angle across the boundary fence in a north-easterly direction. In the corner at the foot of the ridge there is a very small grey-green outcrop which consists mainly of a nine inch thick bone bed from which *Kannemeyeria* and cynodont remains were recovered. A good sagittal half of a *Diademodon mastacus* skull, a *Cyclogomphodon* and the type of *Cistecynodon parvus* were recovered from sporadic red to grey-green outcrops along the slopes of the ridge.

Fossil pockets and bone beds in the Lady Frere district

Half a mile south of Lady Frere there is a very limited exposure of hard blue-grey mudstone immediately on top of which there is a maroon to grey-green shale

exposed on both sides of the Cacadu river. When this locality was first discovered and on the recovery of three *Diademodon* specimens, a *Sesamodon* skull with skeleton, an *Inusitatodon*, an immature *Kannemeyeria* and an unidentified anomodont, it became apparent that this occurrence was peculiar compared with other localities on the Lady Frere commonage and farther afield. Many more specimens may have been recovered from this fossil pocket by palaeontologists who have previously operated in this area.

Due south of this locality and west of the Lumku mission station near to the Cacadu river there is a 12 inch bone bed immediately below a 4 ft. sandstone horizon in which there is an abundance of fragmentary cynodont remains, some of which are embedded in the sandstone immediately above.

To the east of the main road between Queenstown and Lady Frere there is a mountain known to the Xosas as Matyantya and to the Europeans at the Driversdrift Trading Store as Middlekop, the Afrikaans term for a centrally situated feature, in this case surrounded by a circle of mountains. Matyantya has a blotchy appearance due to the patches of blue-green shales and red to maroon

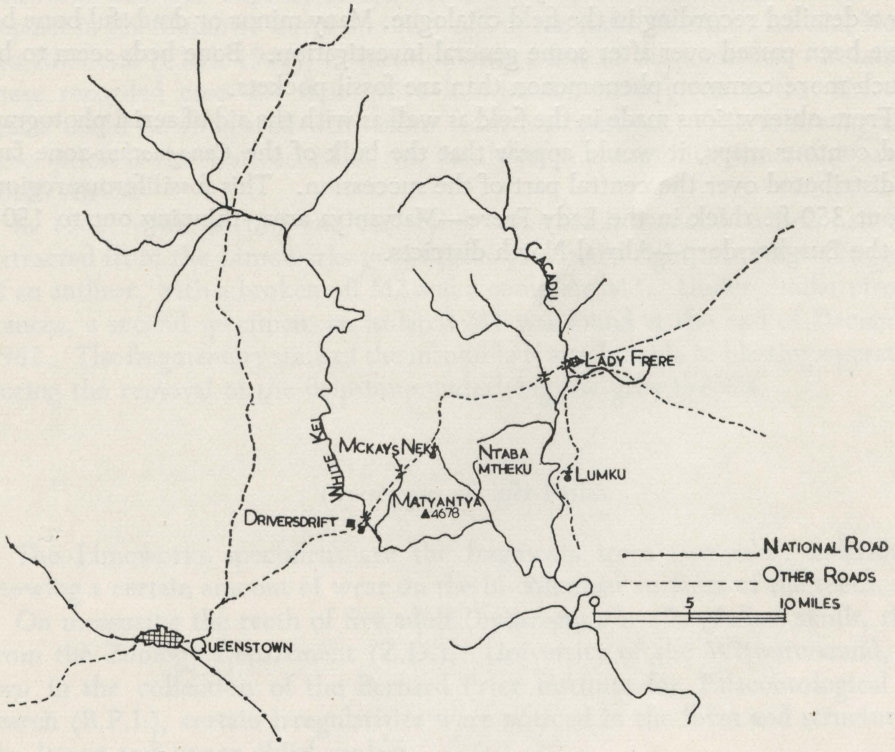


Fig. 25—Map of the Queenstown-Lady Frere area where fossil pockets and bone beds have been located.

mudstones, and there are four characteristic grey sandstone horizons. Fossil remains are sparsely distributed throughout in the shales and mudstones; among many specimens collected there are on record a well preserved *Bauria cynops*, *Diademodon*, *Cynognathus* and a large *Kannemeyeria latifrons*.

While working systematically through the exposures on the slopes of Matyantya two bone beds were discovered and placed on record. The one is low at the base of the mountain in a blue-green mudstone exposure, facing the Queenstown —Lady Frere main road. It measures some four inches around the perimeter and reached a thickness of fifteen inches in the middle. This deposit yielded fragmentary remains of small cynodonts. The second bone bed is at a level 150 ft. above the White Kei river and about 50 ft. above the second prominent sandstone horizon, in a maroon coloured shaly mudstone. This particular matrix is characterised by its strong and almost indelible staining quality; this quality is exploited by the Xosas, for both cosmetics and fabric, and their quarry is very close to this bone bed. The site faces the Bolotwa road and the bed extends for about 12 feet along the exposure, with a maximum thickness of 16 inches; it yields only *Kannemeyeria* remains.

Attention has been drawn only to the more outstanding bone beds which called for a detailed recording in the field catalogue. Many minor or doubtful bone beds have been passed over after some general investigation. Bone beds seem to be a much more common phenomenon than are fossil pockets.

From observations made in the field as well as with the aid of aerial photographs and contour maps, it would appear that the bulk of the *Cynognathus*-zone fauna is distributed over the central part of the succession. This fossiliferous region is about 350 ft. thick in the Lady Frere—Matyantya area, thinning out to 150 ft. in the Burghersdorp—Aliwal North districts.