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# A NEW SPECIES OF *PSAMMOBATES* (REPTILIA: TESTUDINIDAE) FROM THE EARLY PLEISTOCENE OF SOUTH AFRICA.

by

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**ABSTRACT**

A new species of *Psammobates* Fitzinger is described from early Pleistocene cave deposits at Sterkfontein in the Gauteng Province of South Africa. It seems to be most closely related to *P. oculiferus* (Kuhl), which today occurs to the west and north of the type locality, but the proportions of its depressed carapace come closest to *Homopus femoralis* Boulenger.

KEYWORDS: *Psammobates*, Pleistocene, South Africa, Drimolen.

## INTRODUCTION

Until recently almost all the fossil tortoises recorded from Africa were large forms belonging to the genus *Geochelone* (Meylan & Auffenberg 1986), apart from some *Chersina* fossils reported from the Pliocene of Langebaanweg (Hendey (1973, 1981) and from upper Pleistocene and Holocene deposits throughout the southern Cape Province (Klein & Cruz-Uribe 1983). Meylan & Auffenberg (1986) recorded *Kinixys erosa* Schweigger and a new genus and species *Impregnochelys pachytectis* from the Miocene of Kenya and *Chersina* sp. from the Miocene of South Africa (Arrisdrift on the Orange River), also noting the presence of *Chersina* among Pleistocene material from Hopefield. Subsequently *Homopus fenestratus* was described from Carlisle Bridge in the Eastern Cape Province (geological horizon unknown) (Cooper & Broadley 1990).

Brain (1981: p.184) reported fragments of unidentified tortoise carapace and plastron from Sterkfontein Member 5, Swartkrans Member 2 and Kromdraai A and B, but most of these would probably be *Geochelone*, which is the common tortoise in cave deposits at Makapansgat (Broadley 1962) and in Zimbabwe (Broadley in prep.).

In the circumstances, the recent discovery of a partial shell of one of the smaller South African genera is of considerable interest.

## MATERIAL & METHODS

Comparative osteological material of all African tortoise genera was available in the Herpetology Department of the Natural History Museum of Zimbabwe in Bulawayo (NMZB). The osteology of the shells of the Malagasy genus *Pyxis* and its subgenus *Acinixys* is well illustrated by Bour (1981).

Nomenclature for bones follows Zangerl (1969) and the convention for neural formulae is that of Auffenberg (1974).

## SYSTEMATIC PALAEONTOLOGY

Class Reptilia
Order Testudines
Family Testudinidae

*Psammobates antiquorum* sp. nov

*Diagnosis*: A species of *Psammobates* apparently closest to *P. oculiferus*, but different in the more depressed carapace, with a step slop anteriorly, the wider anterior peripherals and the very broad posterior lobe of the plastron. The anterior neural formula is

? ? <6 <6 4.

*Etymology*: The specific name is derived from *antiquorum* (Latin = of old times), as this is the first extinct species of *Psammobates* to be described.

*Holotype*: DN803, an adult, collected by Dr. A. Keyser of the Palaeo-anthropological Research Group, University of the Witwatersrand, housed in the collections of the Bernard Price Institute for Palaeontological Research, University of the Witwatersrand, Johannesburg. The specimen consists of a partial shell, missing the portion of the carapace posterior to the seventh peripherals, the fifth (left) or sixth (right) costals and the sixth neural. The carapace has gaped open between the second and third neurals and costals post mortem; the left half of the nuchal, most of first and second neurals and the first and second left costals are missing. There is minor damage to the margins of the carapace and the anterior lobe of the plastron, while much of the left side of the plastron is missing

*Type locality and horizon*: Drimolen, a Plio-Pleistocene dolomitic cave site located on the farm Sterkfontein 519JQ, Krugersdorp District, Gauteng Province, South Africa. From Plio-Pleistocene sediments estimated at 1.6 to 2 M.a.

*Comparisons and generic assignment*: As the specimen is incomplete, its generic assignment was determined by a process of elimination. Despite its small size, the specimen has a fully ossified shell with complete sutures between all bones, thus ruling out *Malacochersus*. The lack of any indication of a carapacial hinge and the alternate widening and narrowing of costals 3 to 5 eliminates *Kinixys* from consideration. The depressed carapace and <6 <6 4 formula for neurals 3 to 5 indicates that the specimen cannot be assigned to *Geochelone*, *Testudo*, *Chersina* or *Pyxis*, which all have at least the fourth neural octagonal (Meylan & Auffenberg 1986; Bour 1981), while *Acinixys* has a 6> 6> 6> 6> neural formula (Bour 1981). The sulcus on the left epiplastron indicates that the gulars were at least as long as broad – a diagnostic character separating *Psammobates* from *Homopus* (Loveridge & Williams 1957). In their cladogram for the Testudinidae, Gaffney & Meylan (1988) treat *Psammobates* and *Homopus* as sister genera.

## DESCRIPTION

*Measurements*

Plastron length 98 mm; maximum shell width (at sutures of peripherals 4 and 5) 80 mm; maximum shell height (at anterior edge of neural 3) 48 mm.

*Carapace*

Probably oval in outline, somewhat depressed (Table 1). From the front of the first neural the nuchal slopes at an angle of 45° to the horizontal. The first neural is missing (apart from an anterior fragment with an interdigitating suture) and the second is represented only by the right posterior portion, which has parallel outer borders. The third neural is almost square, but the anterior corners are cut off, making it hexagonal like the fourth neural, which is wider anteriorly, while the fifth is tetragonal and narrower caudad, the shape of the damaged sixth

**TABLE 1.**
**Shell proportions for African Species of Testudinidae**

| | | *Plastron Length* | *Shell Width* | *Shell Height* | *H/W* | *Ratios L/W* | *H/L* |
|---|---|---|---|---|---|---|---|
| *Geochelone pardalis* | NMZB 6751 | 103.0 | 77.5 | 61.5 | 0.79 | 1.33 | 0.60 |
| *Testudo graeca* | NMZB-UM 32982 | 152.0 | 126.6 | 87.0 | 0.69 | 1.20 | 0.57 |
| *Kinixys natalensis* | NMZB 1107 | 99.0 | 83.0 | 50.5 | 0.61 | 1.19 | 0.51 |
| ***Psammobates antiquorum*** | DLN - LI-P2-1 | 98.0 | 80.0 | 49.0 | 0.61 | 1.22 | 0.50 |
| *Psammobates aocculiferus* | | | | | | | |
| NMZB 6104 | No locality | 94.0 | 80.0 | 58.0 | 0.72 | 1.17 | 0.62 |
| NMZB - UM 9823 | Botswana | 93.0 | 78.5 | 57.0 | 0.73 | 1.18 | 0.61 |
| NMZB-UM 12756 | Botswana | 81.0 | 71.0 | 51.0 | 0.72 | 1.14 | 0.63 |
| NMZB-UM12757 | Botswana | 91.0 | 80.0 | 59.0 | 0.74 | 1.14 | 0.65 |
| NMZB-UM12758 | Botswana | 84.0 | 76.0 | 49.0 | 0.64 | 1.11 | 0.58 |
| NMZB-UM16109 | Botswana | 89.0 | 75.0 | 52.0 | 0.69 | 1.19 | 0.58 |
| NMSB-UM 23226 | Botswana | 75.0 | 66.0 | 44.5 | 0.67 | 1.14 | 0.59 |
| *Psammobates tentorius* | | | | | | | |
| NMZB 5531 | Beaufort West | 108.0 | 92.5 | 66.0 | 0.71 | 1.17 | 0.61 |
| NMZB 5534 | Hanover | 93.0 | 87.0 | 55.0 | 0.63 | 1.07 | 0.59 |
| NMZB 6650 | Beaufort West | 103.0 | 88.0 | 68.5 | 0.78 | 1.17 | 0.67 |
| NMZB 7173 | Springbok-Augrabies | 75.0 | 68.0 | 45.5 | 0.67 | 1.10 | 0.61 |
| NMZB-UM 33636 | Victoria West | 76.0 | 69.0 | 42.0 | 0.61 | 1.10 | 0.55 |
| *Psammobates geometricus* | | | | | | | |
| NMZB 6563 | Gordons Bay-Strand | 94.0 | 79.0 | 60.0 | 0.76 | 1.19 | 0.64 |
| *Homopus femoralis* | | | | | | | |
| NMZB 840 | Middelburg | 70.5 | 59.0 | 35.0 | 0.59 | 1.19 | 0.50 |
| NMZB 1260 | Cradock District | 119.0 | 104.0 | 55.0 | 0.53 | 1.14 | 0.53 |
| NMZB 7069 | Neuweldberg | 70.0 | 56.0 | 32.5 | 0.58 | 1.25 | 0.46 |
| *Homopus areolatus* | | | | | | | |
| NMZB 1261 | Port Elizabeth | 76.5 | 64.5 | 35.5 | 0.55 | 1.19 | 0.46 |
| NMZB 6460 | Port Elizabeth | 89.0 | 75.5 | 50.0 | 0.66 | 1.18 | 0.56 |
| *Homopus boulengeri* | | | | | | | |
| NMZB 7179 | Sutherland | 81.0 | 68.5 | 37.5 | 0.55 | 1.18 | 0.46 |
| *Homopus signatus* | | | | | | | |
| NMZB 6468 10Km | S of Steinkopf | 83.5 | 71.0 | 41.0 | 0.58 | 1.18 | 0.49 |
| *Cherisina angulata* | | | | | | | |
| NMZB-UM 32979 | Port Elizabeth | 136.5 | 97.0 | 67.5 | 0.70 | 1.41 | 0.49 |

neural cannot be determined. The sutures between the first, second and third costals are almost straight and parallel, the third and fifth costals are wider proximally and narrower distally, while this condition is reversed in the fourth costal. The first four peripherals continue the slope of the first two costals, with no tendency to recurve; the fifth and sixth become more steeply sloping and the seventh (left) flares outward. It is unfortunate that the posterior portion of the carapace is missing, because the three Recent species of *Psammobates* have diagnostic suprapygal patterns (Broadley 1997).

*Plastron*

The left epiplastron shows traces of a gular sulcus, indicating that the gulars were at least as long as broad, while the endoplastron is similar in size and shape to that of *P. oculiferus*. The right hyoplastron

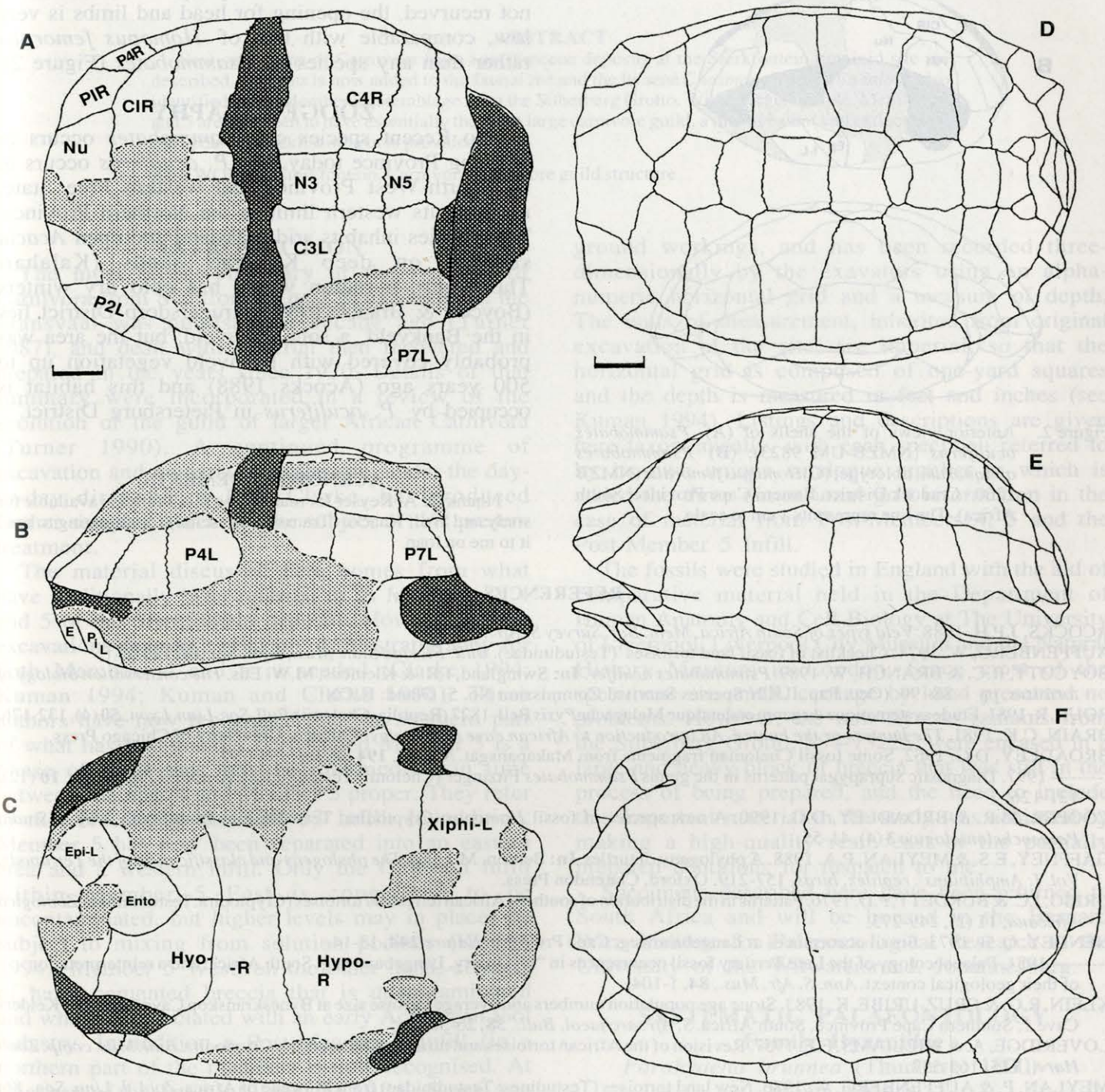



Figure 1. Left - *Psammobates antiquorum*, holotype: (A) dorsal, (B) lateral and (C) ventral views. KEY: C = costal; Ento = entoplastron; Epi = epiplastron; Hyo = hyoplastron; Hypo = hypoplastron; L = left; N = neural; Nu = nuchal; P = peripheral; R = right; Xiphi = xiphiplastron. The heavy stipple indicates the sandy matrix, the light stipple indicates plaster filler. Right - *Psammobates oculiferus* (NMZB-UM 9823 10km west of Nata, Botswana): (D) dorsal, (E) lateral and (F) ventral views. The line represents 1 cm to scale.

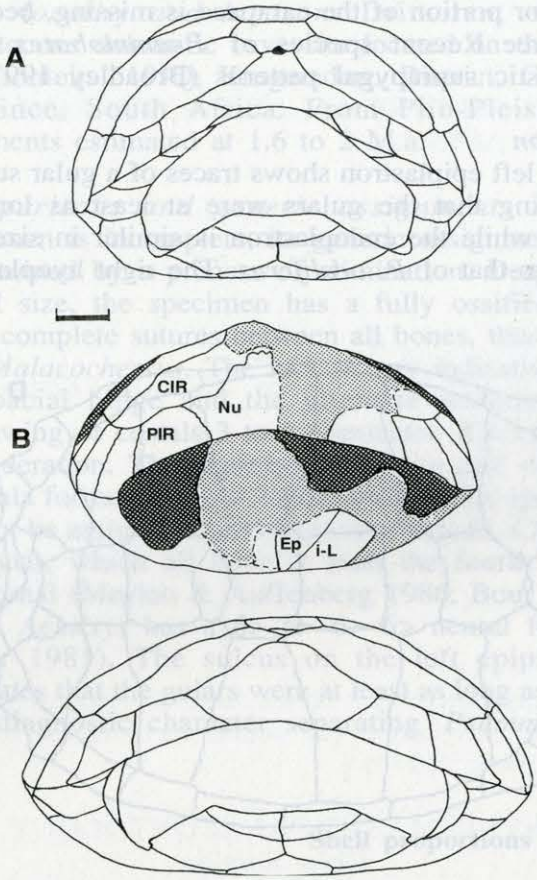



Figure 2. Anterior views of the shells of (A) *Psammobates oculiferus* (NMZB-UM 9823); (B) *Psammobates antiquorum*, holotype; (C) *Homopus femoralis* (NMZB 1260 - Cradock District, Eastern Cape Province, South Africa). The line represents 1 cm to scale.

and the damaged hypoplastra closely match those of *P. oculiferus*. The xiphiplastra are much broader than those of Recent *Psammobates* or *Homopus* and look more like those of *Testudo*, although the margins are too damaged to show the development of notches at the femoro-anal sulci and the anal notch.

*Anterior aspect*

The depressed shell is most noticeable from the front, because the nuchal and peripherals 1 and 2 are not recurved, the opening for head and limbs is very low, comparable with that of *Homopus femoralis* rather than any species of *Psammobates* (Figure 2).

## ZOOGEOGRAPHY

No Recent species of *Psammobates* occurs in Gauteng Province today, but *P. oculiferus* occurs in the North-West Province and western Free State, reaching its western limit in the Northern Province. This species inhabits arid grassland and open *Acacia* savanna on deep Kalahari sands (Kalahari Thornveld), a region which has cold dry winters (Boycott & Branch 1989). Krugersdorp District lies in the Bankveld, a sour grassveld, but the area was probably covered with bushveld vegetation up to 500 years ago (Acocks 1988) and this habitat is occupied by *P. oculiferus* in Pietersburg District.

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