The *Platysaurus intermedius* complex (Sauria: Cordylidae) in the Transvaal, South Africa, with descriptions of three new taxa

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Three new *Platysaurus* taxa, including two species and one subspecies, are described. The new taxa are compared with others in the *P. intermedius* complex in a character analysis indicating relationships. Two of the taxa are closely related to *P. intermedius parvus* Broadley, differing from it in colour, lepidosis and the number of femoral pores. The third taxon is most closely related to *Platysaurus i. wilhelmi* Hewitt but differs in colour and scalation.

Drie nuwe *Platysaurus* taksa insluitende twee spesies en een subspesie word beskryf. Die nuwe taksa word met die ander lede van die *P. intermedius* kompleks in 'n karakter analise vergelyk. Twee van die taksa is verwant aan *Platysaurus intermedius parvus* Broadley maar verskil in kleur, skubsamestelling en die aantal dyporieë. Die derde takson is naas verwant aan *Platysaurus i. wilhelmi* Hewitt maar verskil in kleur en skubsamestelling.

The recent revision of the genus *Platysaurus* by Broadley (1978) resulted in the description and redefinition of many taxa. *P. minor minor* FitzSimons was considered conspecific with *P. guttatus* Smith on the basis of a fully developed brille, but was recognized as a subspecies. *P. minor orientalis* FitzSimons was placed in the synonymy of *P. guttatus guttatus*. *Platysaurus guttatus fitzsimonsi* Loveridge was elevated to specific status on the basis of its large size. The large Transvaal Lowveld forms previously regarded as races of *P. guttatus* were made races of *P. intermedius* Matschie.

Subsequently, a large number of specimens were collected during a survey of the herpetofauna of the Transvaal (Jacobsen 1989). This made it possible to re-evaluate currently recognized species and subspecies based on available morphological characters and male colouration. The result was a change in the status of two forms and the revival of a third (Jacobsen & Newbery 1989). *P. minor* was elevated to species status while the escarpment specimens were found to belong to a distinct taxon *P. orientalis* FitzSimons, with *P. fitzsimonsi* only being a subspecies of the latter. The existence of three undescribed forms was also established and these are the basis of this paper. A total of six species and 13 taxa have now been recorded from the Transvaal.

The genus *Platysaurus* is, with the exception of colour, depauperate in the degree of morphological differentiation between taxa. With few exceptions, most forms are allopatric or parapatric, which makes an assessment of their taxonomic status and relationships difficult. Broadley (1978) gave a character analysis of the genus as a whole. In the Transvaal two species groups are apparent, based on the degree of subdivision of the lower eyelid. These include the *P. guttatus* and the *P. intermedius* complexes (Jacobsen & Newbery 1989). As the new taxa belong to the latter group, it is intended in this paper to provide a character analysis of this complex based on specimens from the Transvaal and, in the case of *P. i. natalensis* FitzSimons and one of the new taxa, also from Natal.

The *Platysaurus intermedius* Complex

Character analysis

Scutellation

Nasals in contact/separated. Few taxa have the nasals in contact. Those that have include *P. i. rhodesianus* (81,08%) and *P. lebomboensis* (63,64%). Most other taxa of the group have the nasals separated, including *P. relictus* (100%), *P. i. parvus* (100%), *P. i. inopinus* (100%), *P. monotropis*

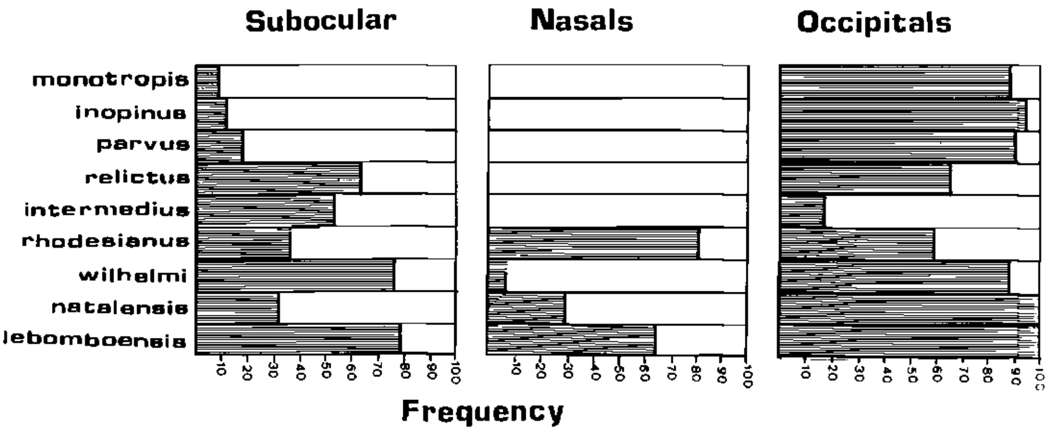

Figure 1 Variability of three parameters in the Transvaal *Platysaurus intermedius* complex. Occipitals in contact with interparietal (hatched). Nasals in contact behind rostral (hatched). Subocular excluded from lip (hatched).

(100%), *P. i. intermedius* (100%), *P. i. wilhelmi* (93,42%) and *P. i. natalensis* (70,97%) (Figure 1).

Occipital/interparietal arrangement. The occipital is considered to be in contact with the interparietal even if it is broken up into two scales. It is considered to be separate if the posterior parietals are in contact. Based on this, the following taxa have the occipital in contact with the interparietal; *P. i. natalensis* (100%), *P. lebomboensis* (100%), *P. i. inopinus* (95,0%), *P. i. parvus* (90,62%), *P. i. wilhelmi* (88,64%), *P. monotropis* (88,23%) and *P. relictus* (65,08%). *P. i. rhodesianus* (59,80%) represents an intermediate condition while *P. i. intermedius* (82,73%) is the only taxon which has the scales mostly separated (Figure 1).

Third subocular entering the lip. This condition is found in a number of taxa including *P. monotropis* (91,18%), *P. i. inopinus* (88,09%) and *P. i. parvus* (82,05%). A more intermediate condition is evidenced in *P. i. natalensis* (68,33%) and *P. i. rhodesianus* (64,28%). The exclusion of the third subocular from the lip is greatest in *P. lebomboensis* (78,38%) and *P. i. wilhelmi* (76,14%) with more intermediate conditions being found in *P. relictus* (63,28%) and *P. i. intermedius* (52,88%) (Figure 1).

Gulars between posterior sublabials. The number of gulars between the posterior sublabials varies considerably but differs in frequency (Figure 2). The mean number of gulars is reflected in Table 1.

Median gular row. On account of the difficulty in determining which scales should be incorporated, it was decided during this analysis that the median gular scales would be counted anterior to a line drawn across the posterior margins of the posterior sublabials. This would provide comparable results and as far as possible exclude subjectivity.

Most taxa display an enlarged median gular scale row which is narrowest at the apex behind the mental and broadens posteriorly. Only in *P. i. intermedius* and *P. i. rhodesianus* do the posterior scales subdivide into smaller scales. Although the mean number of scales between taxa are close, it may be significant to note that both *P. lebomboensis* and *P. i. wilhelmi* have values considerably lower (Table 1).

Scalation on the side of the neck. Following Broadley (1978), the scales on the side of the neck of only adult males of the various taxa were compared. The results can be seen in Figure 3. Spinose scales are exclusive to *P. i. rhodesianus* and *P. i. natalensis* while an intermediate condition exists in *P. i. intermedius, P. lebomboensis* and *P. i. wilhelmi*. Conical scales are more pronounced in *P. monotropis* followed by *P. i. inopinus, P. i. parvus* and *P. relictus* with older specimens showing rounded to flattened scales.

Relative size of dorsal and lateral scales. As recorded by Broadley (1978), *P. relictus* is the only taxon in which the lateral scales are not larger than the dorsal scales. In all other taxa the former are larger to much larger than the latter. The heterogeneous dorsals of *P. i. wilhelmi, P. lebomboensis* and to a lesser extent of *P. i. natalensis* indicate a subgroup of the *intermedius* complex.

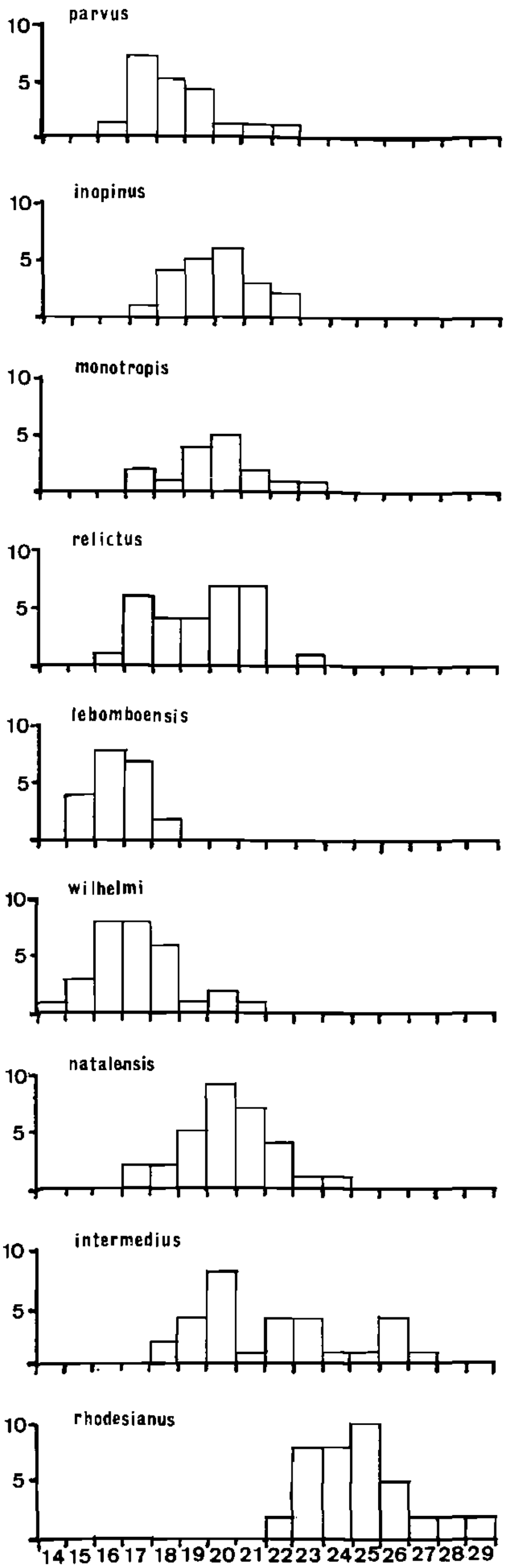

Figure 2 Frequency histogram of gulars between posterior sublabials in the Transvaal *Platysaurus intermedius* complex.

Table 1 A comparison of morphological characters of nine species and subspecies of the *Platysaurus intermedius* complex

	Number of							
	Gular scales (mean ±1 *SD*)	Median gulars (mean ±1 *SD*)	Dorsal scales	Mean SVL M/F	Mean tail length/Total length (%) (±1 *SD*)	Lamellae 4th toe (mean ±1 *SD*)	Femoral pores (mean ±1 *SD*)	Ventrals (mean ±1 *SD*)
monotropis	19,7	12,3	71–90	74,1/67,0	58,0	18,9	17,7	19,5
	±1,6	±1,7			±1,3	±1,2	±0,8	±1,4
inopinus	19,6	12,3	76–92	68,0/65,4	61,0	20,0	17,9	22,3
	±1,4	±1,3			±1,4	±1,2	±1,8	±1,6
parvus	18,2	12,2	72–82	72,3/66,7	61,4	18,2	15,9	19,3
	±1,5	±1,2			±1,8	±1,2	±1,5	±1,1
relictus	19,2	13,0	88–104	66,5/58,6	61,7	19,7	19,9	18,4
	±1,7	±2,2			±2,2	±1,1	±1,8	±1,0
intermedius	21,8	12,7	74–94	84,2/72,8	61,3	19,4	17,4	17,0
	±2,7	±1,6			±1,5	±1,2	±1,9	±1,5
rhodesianus	24,8	12,8	76–102	91,6/74,1	61,8	21,7	19,1	20,9
	±1,8	±1,7			±2,6	±1,6	±2,0	±1,3
wilhelmi	17,0	10,7	74–88	72,1/64,7	62,3	18,8	17,1	17,3
	±1,6	±1,4			±3,1	±1,2	±1,3	±0,9
lebomboensis	16,3	9,9	68–87	69,0/60,7	63,1	17,9	16,7	16,9
	±0,9	±1,1			±1,1	±1,2	±1,6	±1,0
natalensis	20,2	12,3	68–86	73,1/ ?	61,3	17,9	14,8	17,2
	±1,6	±1,6			±1,5	±1,4	±0,8	±1,3

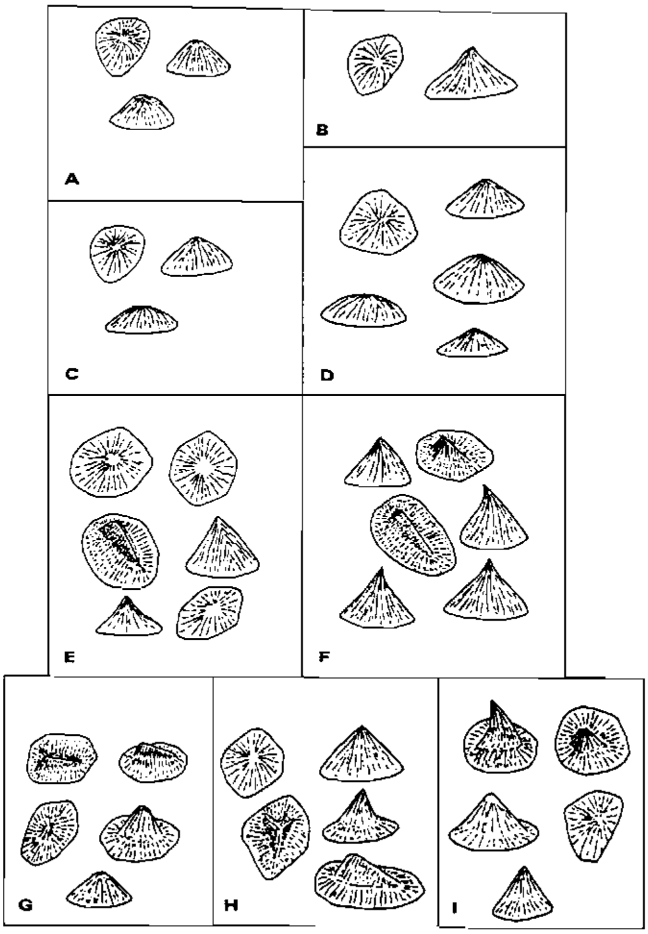

Figure 3 Enlarged neck scales in the Transvaal *Platysaurus intermedius* complex. A. *parvus*; B. *monotropis*; C. *inopinus*; D. *relictus*; E. *intermedius*; F. *rhodesianus*; G. *wilhelmi*; H. *lebomboensis*; I. *natalensis*.

Number of dorsal scales at midbody. As mentioned by Broadley (1978), counts of dorsal scales at midbody are very variable. The new taxa fall within the variation exhibited by the group as a whole (Table 1). *P. relictus* still has the highest counts of the Transvaal taxa.

Number of ventrals transversely at midbody. The mean number of ventrals in the group ranges from 16,86 in *P. lebomboensis* to 22,35 in *P. i. inopinus* (Figure 4).

Number of lamellae beneath fourth toe. Although there is little interspecific variation in the complex, the largest species, *P. i. rhodesianus*, has the most (x = 21,72), although it is followed by the relatively small *P. i. inopinus* (Figure 4).

Scales on the heels. Broadley (1978) found this character to assist in separating more primitive taxa from the more advanced forms. This characteristic is also of use in distinguishing between *P. i. wilhelmi* and *P. lebomboensis*. The latter has a row of strongly keeled and spinose scales which is mostly lacking in the former.

Number of femoral pores

Although Broadley (1978) implies that this character has no taxonomic value and claims that much of the variation is ontogenetic, it has as much credibility as most other morphological characters in the genus. Ontogenetic variation is very limited, if present at all, the variability being intraspecific as can be seen in Figure 5. The mean number of femoral pores ranges from 14,78 in *P. i. natalensis* to 19,96 in *P. relictus* (Figure 4).

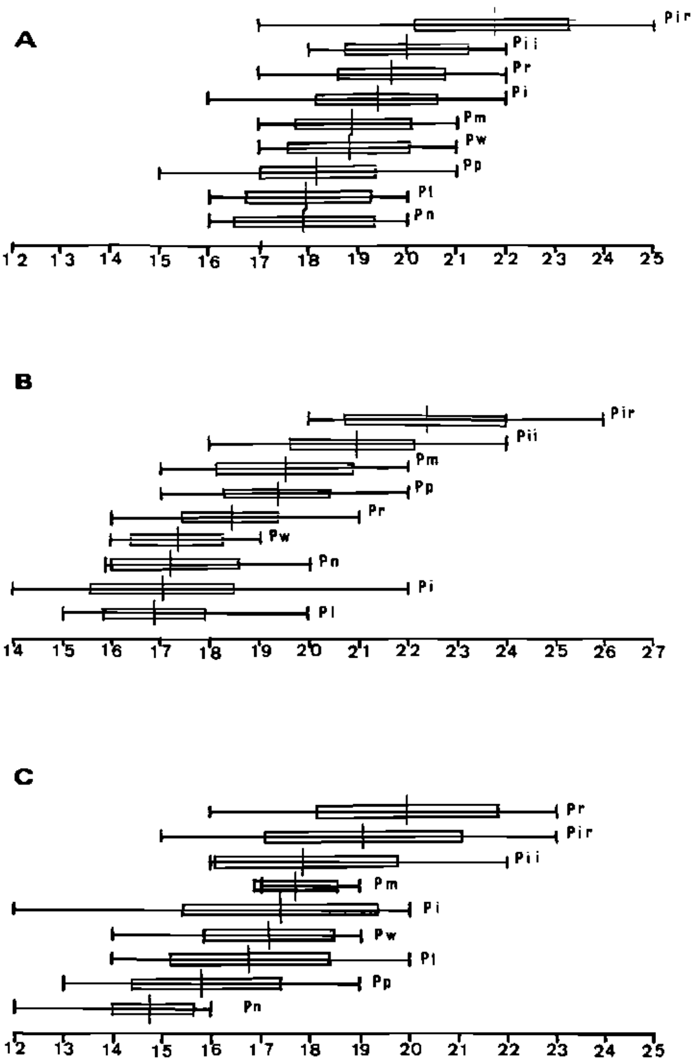

Figure 4 Mean, one standard deviation on either side of the mean and range of A. Lamellae; B. Ventrals; C. Femoral pores in the Transvaal *Platysaurus intermedius* complex. Pn = *P. i. natalensis;* Pp = *P. i. parvus;* Pl = *P. lebomboensis;* Pw = *P. i. wilhelmi;* Pi = *P. i. intermedius;* Pm = *P. monotropis;* Pii = *P. i. inopinus;* Pir = *P. i. rhodesianus;* Pr = *P. relictus.*

Colour

Broadley (1978) discussed colour and markings within the genus *Platysaurus* with a brief reference to function. He considered the striped condition reflected most strongly by the females to be ancestral. Jacobsen & Newbery (1989) further discussed colour variation in Transvaal *Platysaurus* species including that of the three taxa described here. These authors tabulated the dorsal colours of males of the various taxa. Most forms exhibit a distinct to indistinct, continuous to intermittent pale vertebral stripe. Within the complex, green, blue and black are the most frequent colours which indicates that they are of long standing. Most colour deviations from this appear to be found at the periphery of distribution of the genus. Newbery (1981) gave greater insight into the function of colour between males and between males and females, which indicates that colour may be the most important determinant of the status of a taxon. Although ontogenetic variation does exist, colour certainly is one of the most consistent characters.

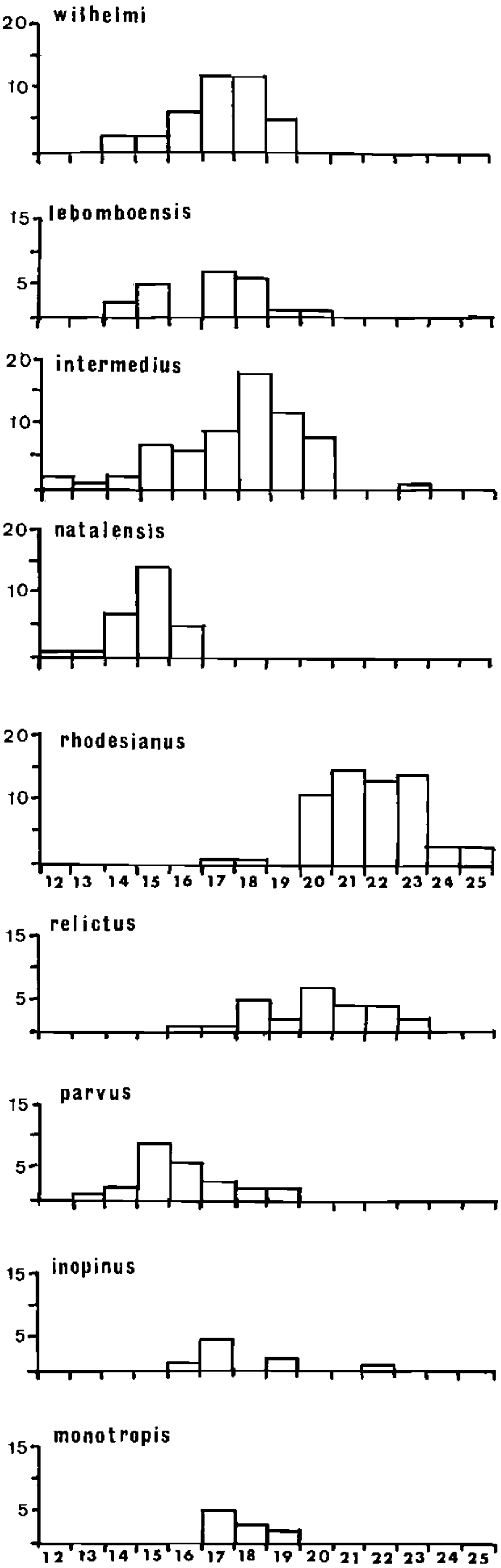

Figure 5 Frequency histogram of variation in femoral pores in the Transvaal *Platysaurus intermedius* complex.

Size and proportions

Although Broadley (1978) refers to absolute size as a useful tool for separating closely related forms in the *P. intermedius* group, it is not very useful. As Broadley (*loc cit*) pointed out, it is not possible to calculate average snout-vent lengths for adults owing to a bias in favour of large specimens. This can be remedied by limiting the size of the smallest adult (Jacobsen 1989) when deriving mean sizes of adults. Although this is largely arbitrary, it does provide a baseline from which the different taxa can be compared (Table 1).

Tail length / total length ratio

Although Broadley (1978) considers ratios using tail length to be unsatisfactory, owing to the large number of regenerated tails, it does prove useful when using only those specimens which are considered to have original tails (Table 1). *P. monotropis* has the shortest tail in relation to total length (x = 58,05%) and *P. lebomboensis* the longest (x = 63,10%).

Platysaurus monotropis sp.nov. (Figures 6a & b)

***Platysaurus intermedius* (Orange), Jacobsen & Newbery, 1989.**

Material examined. Seventeen specimens. Holotype: TM 70003, adult male; Farm Blackhill 317LR, Potgietersrust district (2328BB), Transvaal, collector R.E. Newbery, 4 November, 1985. Allotype: TM 69990, adult female; same data as holotype. Paratypes: TM 69992-3, 69995, 70002, 70006, same data as holotype; TM 69991, 69996-9, 70001,

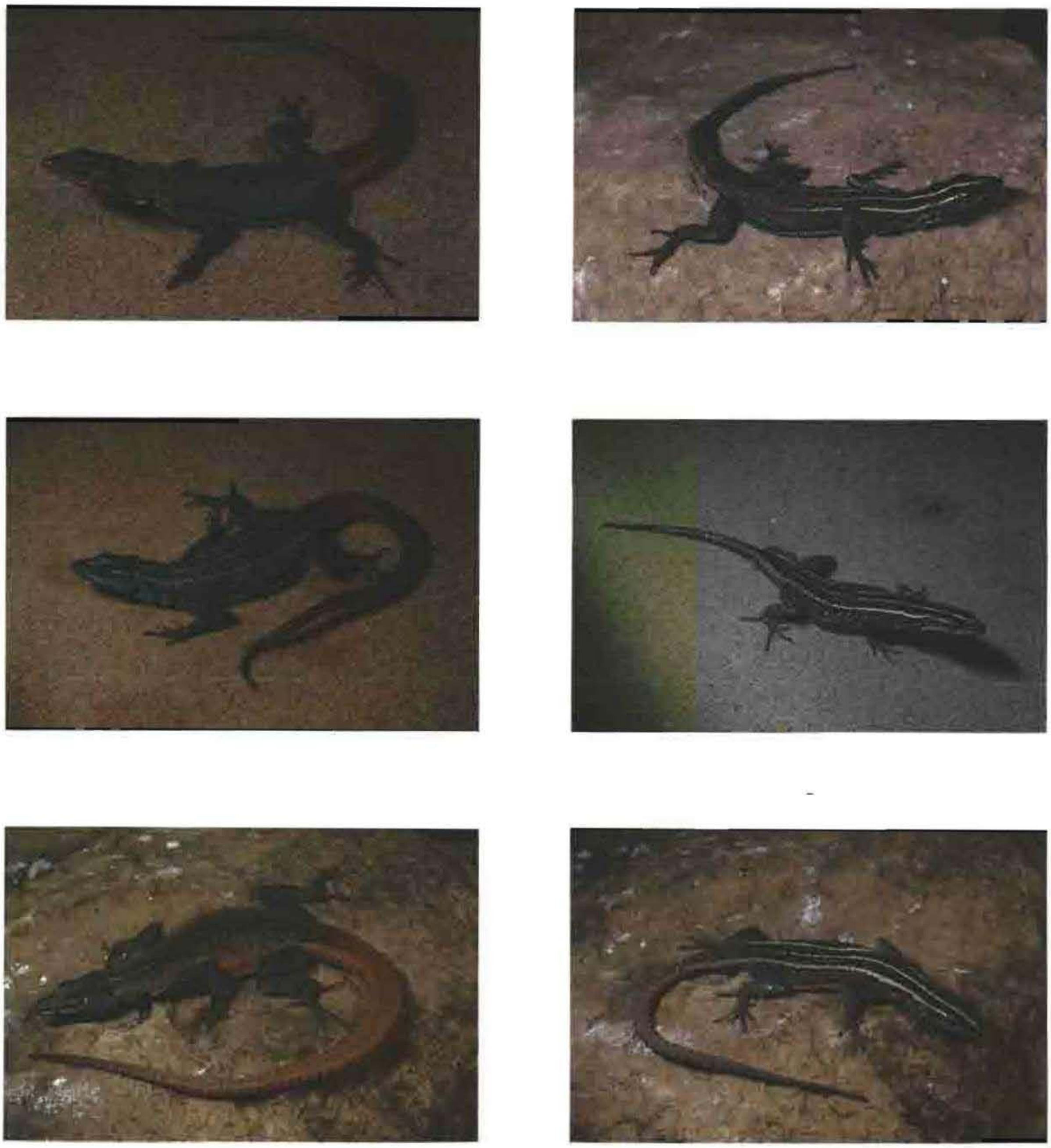

Figure 6 Three new *Platysaurus* taxa. Top: *P. monotropis* (a. male, b. female); Centre: *P. i. inopinus* (c. male, d. female); Bottom: *P. lebomboensis* (e. male, f. immature male).

70005, same locality as holotype, collectors R.E. Newbery and N.H.G. Jacobsen, 29 April to 22 June, 1983; TM 69994, Farm The Park 266LR, Potgietersrust district (2328BB), Transvaal, collectors R.E. Newbery and N.H.G. Jacobsen, 22 June, 1983; TM 70000, 70004, Farm Sweethome 315LR, Potgietersrust district (2328BB), collectors R.E. Newbery and N.H.G. Jacobsen, 26 May, 1983.

Type Locality. Farm Blackhill 317LR 23°12'S, 28°52'E, Potgietersrust district, Transvaal.

Etymology. The species is named 'one of a kind' as it is the only phenon in the Transvaal with an orange head and gular region, differing radically in this respect from all other forms.

Diagnosis. A medium-sized *Platysaurus*, differing markedly from any other Transvaal species in having an orange head in males, with or without a black collar. The ventrals are mostly in less than 22 longitudinal rows and femoral pores in males number 17 or more. The tail is short, averaging 58% of total length, which appears to be the shortest of all *Platysaurus* taxa.

Description. Holotype: TM 70003, adult male. Snout/vent length 75,0 mm; tail 107,0 mm; mass 9,5 g. Head triangular and slightly wider than the neck. Neck with two lateral flanges edged with enlarged conical scales. Rostral hexagonal, large and as wide as deep. Nostril situated near posterior margin of nasal, narrowly separated from 1st upper labial, posterior nasal and frontonasal. Nasals separated by rostral and frontonasal. Frontonasal heptagonal, wider than long, in contact with nasals, rostral, loreal and prefrontals. Frontal small, longer than broad and hexagonal, tapering posteriorly. Frontoparietals in broad median contact, and narrowly with the posterior supraoculars. Anterior parietals in broad contact anteriorly but separated by trapezoid interparietal posteriorly. Interparietal in contact with occipital. Posterior parietals large and pentagonal and separated from each other by the occipital. Superior temporals three. Supraoculars four. Supraciliaries four. A single loreal in contact with frontonasal, posterior nasal, preocular, prefrontals and second upper labial. A single preocular present. Suboculars five with the 3rd in contact with the lip and 4th narrowly excluded from the lip. Temporals in roughly two rows, uppermost much larger than lower. Lower eyelid opaque and septate. Upper labials four anterior to the subocular. Mental about as broad as deep. Lower labials five. Sublabials five, anterior pair in contact behind mental. Median row of 13 enlarged gulars. Gulars between posterior sublabials 21. Dorsum covered in relatively homogeneous rounded and flattened granules with larger almost conical scales laterally. Scales at midbody 78, those along the vertebrae slightly enlarged. Ventrals in 20 longitudinal and 40 transverse rows between collar and groin. Feet small, heels spinose and 20 lamellae under the 4th toe. One to one and a half rows of generation glands anterior to a row of 18/19 femoral pores at the posterior margin of the thighs. Caudal scales in whorls, flat to slightly keeled dorsally, spinose laterally and smooth ventrally becoming keeled distally.

Colour. Head blackish-tinged with orange including the interior margins of the supraoculars. Three orange-brown stripes on the head, one from the snout to the occipital and one on either side from the posterior margin of the eye through the supratemporals to the back of the head. Dorsally body blue-green suffused with orange anteriorly. Limbs blackish tinged with green. Laterally the upper and lower labials orange brown, the temporals are tinged with the same colour and the conical scales on the side of the neck are orange. The sides of the body are blue becoming blue-green dorso-laterally. The tail is brick red tinged with blackish dorsally. Ventrally chin and throat bright orange bordered posteriorly by a partial black collar. Chest blue with a few green scales, the interstices between the scale rows blackish, the lower chest and abdomen dark blue. The underside of the fore limbs greenish blue and that of the hindlimbs blue. Underside of tail coral red.

Allotype: TM 69990, adult female. Snout/vent length 71,0 mm; tail 94,0 mm; mass 8,0 g. Lepidosis similar to that of holotype with the exception of the suboculars which number four, with both three and four in contact with the lip. The supratemporals number four. A median row of 12 enlarged gular scales present and there are 20 gulars between the posterior sublabials. Dorsals relatively homogeneous, the interstices between the granules taken up by very small granules. Dorsal scales at midbody 90 with the lateral scales much larger than those on the back. Ventrals in 22 longitudinal and 37 transverse rows between collar and groin. Feet similar to that of the holotype, with 20 lamellae under the 4th toe. A row of 17/19 indented non-functional femoral pores. Caudal scales as for the holotype.

Colour: Dorsally the head blackish-grey with three white stripes, one median from snout to occiput which continues posteriorly as a thin line terminating at the sacrum, and one on either side from the supraoculars to the rear of the head and continuing posteriorly fading anterior to the groin. The back is blackish brown with paler mottling in the area between the stripes. Limbs blackish. Tail buffy brown with blackish infusion mesially. Laterally buffy-brown. Ventrally chin and gular with blue blotches and ocelli. Collar and chest blue with darker margins on some scales, this becoming more frequent posteriorly. Abdomen pinkish brown, almost obscured by the blackish infusions on each scale. Underside of forelimbs pale bluish with blackish markings and of hindlimbs whitish with scattered blackish infusions. Underside of tail pale pinkish brown.

Paratypes: Similar to holotype and allotype with the exception of TM 70004 which has the frontoparietals in narrow contact. Row of enlarged gulars varies from 12–16 but is mostly 15. Gulars between the posterior sublabials range from 17–21. The occipital is separated from the interparietal in TM 69996 and 69999. Scales at midbody range from 79–89 and ventrals in 17–22 longitudinal (Figure 4) and 36–40 transverse rows with 37 predominating. Subdigital lamellae under the 4th toe range from 17–21. Femoral pores in males range from 17–19 with a mean of 17,70 (Figure 4) and 17 predominating (50%).

Colour: Males similar to the holotype, differing only in the extent of the collar, which is well developed in some and is

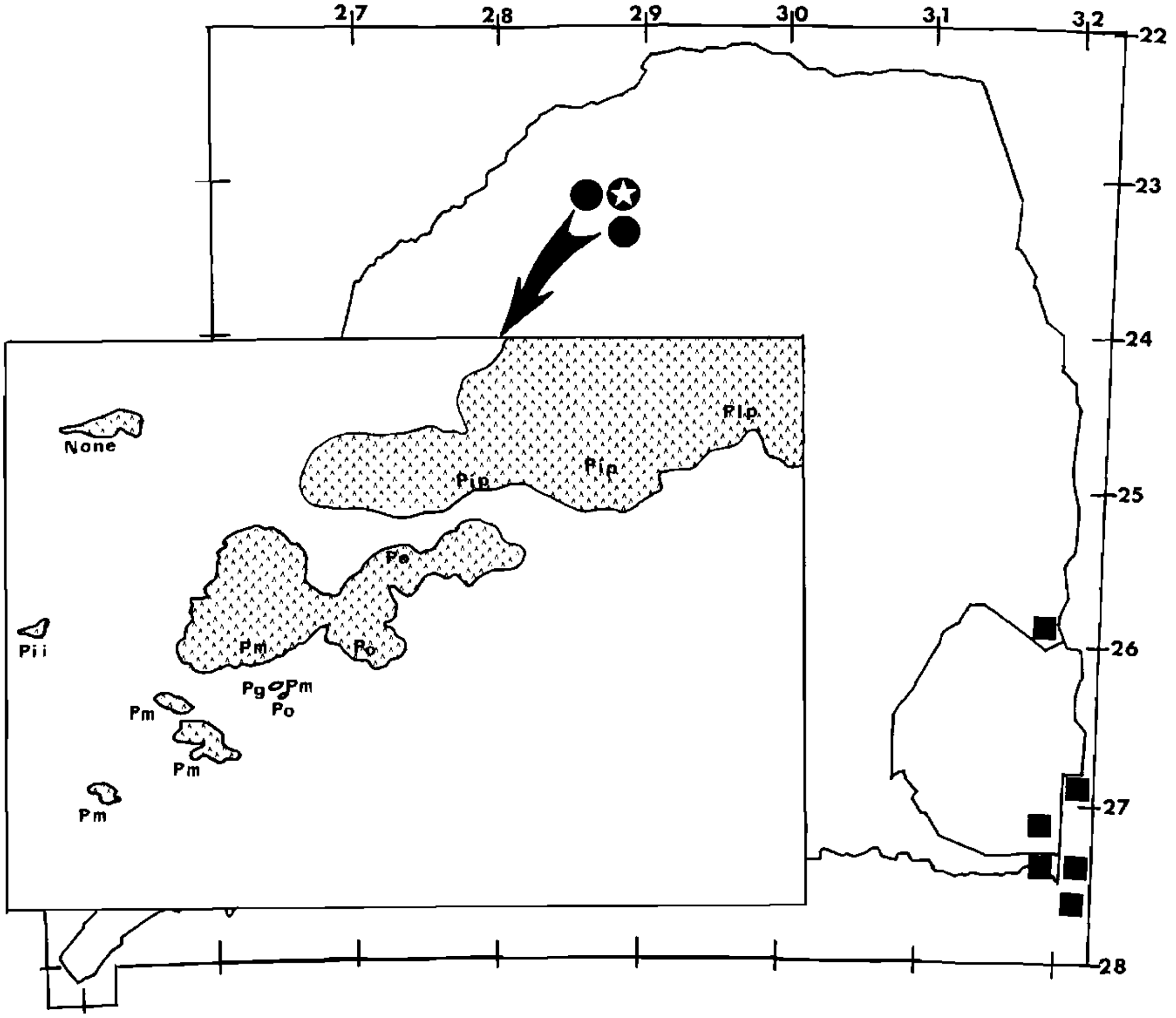

Figure 7 Distribution of three new *Platysaurus* taxa in the Transvaal. ● *P. i. inopinus;* ✪ parapatry — *P. i. inopinus* and *P. monotropis;* ■ *P. lebomboensis*. Inset: Distribution of five *Platysaurus* taxa in area of 2328BB. Abbreviations: Pip = *P. i. parvus;* Pii = *P. i. inopinus;* Pg = *P. guttatus;* Pm = *P. minor;* Po = *P. monotropis*. Hatched area indicates major mountains and rocky outcrops (after Jacobsen & Newbery 1989).

rarely absent. The females resemble the allotype, with younger females less darkly marked ventrally. Juveniles appear to be more boldly striped dorsally.

Distribution: Restricted to rocky outcrops on three farms in the northern Transvaal (Figure 7).

Habitat: Confined to several rocky outcrops of Waterberg sandstone at the foot of the Blouberg Mountain, where it inhabits vertical and horizontal crevices usually only 5–6 mm wide. They are known to occur on a rocky hill only 50 m from another one which is inhabited by two other *Platysaurus* species but appear unable to cross this stretch of sandy terrain.

Reproduction: Oviparous, the females laying two eggs during midsummer.

Discussion

Jacobsen (1989) briefly discussed the importance of colour to flat lizards. Most Transvaal taxa exhibit what could be construed as ancestral colours such as green and blue to black under the chin and gular region as these colours appear most frequently in the genus in the Transvaal. Deviation from this, as in the case of *P. monotropis*, is exceptional. The importance of the ventral colour in male to male confrontation has been documented (Broadley 1978; Newbery 1981; Haacke pers. comm.). Newbery (op cit) also observed that gular and upper chest colour were used during male/female interactions including a successful mating. It is likely that these colours and areas of the body may be important for specific mate recognition. Hence the shift from the more common black, blue or green to orange is significant and warrants species status. Only three other *Platysaurus* taxa (*maculatus, subniger, nyasae*) exhibit an orange gular (Broadley 1978), but these differ morphologically from *monotropis*. Apart from colour, *Platysaurus monotropis* differs from its closest geographical relative *P. i.*

parvus Broadley in having a higher mean number of ventrals (*monotropis* 19,5 ± 1,37; *parvus* 18,42 ± 1,12) and from another as yet undescribed subspecies of *intermedius* (this paper) in a lower mean number of ventrals (22,45 ± 1,54) (Jacobsen 1989; Figure 1). Significant differences are also apparent in the number of femoral pores and mean tail length as a percentage of total length. The former is mostly 17–18 (80%) with a mean of 17,7 ± 0,82, n = 10 in *monotropis* while in *parvus* it is mostly 15–16 (60%), mean 15,88 ± 1,51, n = 25 (t(33) = 3,5968; p = >0,002). *P. monotropis* has a mean tail length of 58,05% ± 1,35, n = 9 while *parvus* has a mean of 61,43% ± 1,79, n = 13 (t(20) = 4,767; p = >0,001).

The relatively homogeneous dorsal scalation and septate lower eyelid of *monotropis* indicates an affiliation to the *intermedius* group. This species is parapatric to four other *Platysaurus* taxa (Figure 4) and in one instance is only narrowly separated from two other species (see Habitat). This illustrates the absolute bond between these lizards and their habitat, a viewpoint supported by Broadley (1978). Mayr (1959) and Paterson (1985) state that allopatry is one of the most important initiators of speciation: a viewpoint which appears to be supported here.

Platysaurus intermedius inopinus subsp. nov. (Figures 6c & 6d)

Platysaurus intermedius **(Glen Alpine), Jacobsen & Newbery 1989.**

Material examined. Twenty specimens. Holotype: TM 70018, adult male, Farm Glen Alpine 304LR, Potgietersrust district (2328BA), Transvaal, collector N.H.G. Jacobsen, 30 March, 1979. Allotype: TM 70012, adult female, Farm Goedgelegen 194LR, Potgietersrust district (2328AD), Transvaal, collector N.H.G. Jacobsen, 22 April, 1979. Paratypes: TM 70007–8, 70010–1, 70013–5, 70020, same data as for holotype; TM 70009, 70016–7, 70019, 70021, same data as for allotype; TM 70023–6, Farm La Rochelle 310LR, Potgietersrust district (2328BB), Transvaal, collectors N.H.G. Jacobsen and R.E. Newbery, 24 May – 23 June 1983.

Type Locality. Farm Glen Alpine 304LR, 23°12'S, 28°40'E, Potgietersrust district, Transvaal.

Etymology. The subspecific epithet refers to the unexpected occurrence of this form in an area where four other forms occur.

Diagnosis. Closely related to *Platysaurus intermedius parvus*, exhibiting in part of its distribution a similar colour pattern but differing in having mostly 20–21 lamellae under the 4th toe (*parvus* 17–19), ventrals in 22–26 (mostly 18–20 in *parvus*) longitudinal rows and femoral pores mostly 17 or 19 (15–17 in *parvus*).

Description. Holotype: TM 70018, adult male. Snout/vent length 77,5 mm; tail 106,0 mm (regenerating); mass 8,3 g. Head triangular and as wide as the neck. Flanges on neck with rounded to slightly conical scales larger than those on the dorsum. Rostral wider than deep and deeply indented by the nasals, roughly hexagonal. Nostril near posterior margin of nasal but well separated from 1st upper labial, frontonasal and posterior nasal. Nasal in contact with 1st upper labial, posterior nasal, frontonasal and rostral. Nasals separated by frontonasal and rostral. Frontonasal large, wider than deep and in contact with rostral, prefrontals, loreal and nasals. Frontal small and hexagonal, longer than broad, tapering posteriorly. Frontoparietals in broad median contact as well as with posterior supraoculars. Anterior parietals in broad contact anteriorly but widely separated posteriorly by the interparietal. Interparietal diamond-shaped and pentagonal, in contact with the occipital. Posterior parietals large and separated by the interparietal. Supratemporals three. Supraoculars four, and supraciliaries four. A single loreal present in contact with the posterior nasal, 2nd upper labial, preocular, prefrontals and frontonasal. Suboculars four, the 2nd and 3rd in contact with the lip. Temporals in two rows, uppermost larger than the lower. Lower eyelid divided by vertical septae. Upper labials four anterior to the subocular. Mental deeper than wide. Lower labials five. Sublabials in five pairs of which the most anterior is in contact behind the mental. Median row of gulars enlarged and number 14. Gulars between posterior sublabials 19.

Dorsum covered in more or less uniform granules with the exception of those along the vertebrae and number 90 at midbody. Lateral scales slightly larger than those on dorsum.

Ventrals in 20 longitudinal rows at midbody and 43 transverse rows between collar and groin. Feet pentadactyl; heels moderately spinose and subpedal scales strongly keeled to conical. Subdigital lamellae 21 under 4th toe. Two rows of glandular scales anterior to a row of 18/19 femoral pores. Caudal scales in whorls with 22 scales, eight rows from the vent. At midtail ventral scales smooth becoming keeled and spinose ventro- to dorso-laterally. Dorsally caudal scales keeled.

Colour. Head blackish-green, this colour extending down the back to the base of the tail. Labials blue-green as are the lower temporals. Three green stripes, one median from the snout extends down the back to the base of the tail, while the other two stripes, one on either side, extend from just anterior to the eye through the supraciliaries and supratemporals dorsolaterally along the back in a broken line to the base of the tail. These dorsolateral lines separate the darker dorsum from the paler but green sides. Between the green stripes on the back are irregular double rows of pale green spots while a single row of the same colour is found on the outside of the dorso-lateral stripes. At the base of the tail the blackish-green merges into the brick-red colour of the tail. Limbs blackish-green above, becoming blue-green ventrally. Ventrally, chin, throat and underside of forelimbs pale blue, merging posteriorly on the chest with ultramarine, which continues to the vent and undersides of the hindlimbs. The scales anterior to the vent are black or edged with black. The underside of the tail is coral red.

Allotype. TM 70012, adult female. Snout/vent length 69,0 mm, tail 114,0 mm; mass 6,15 g. Similar in lepidosis to the holotype, differing only in having 12 enlarged gulars and 21 gulars between the posterior sublabials, 76 dorsals at midbody, 36 transverse rows of ventrals and 20 lamellae under the 4th toe. No apparent generation gland scales and 16/17 non-glandular femoral pores.

Colour. Top of head blackish, becoming blackish-brown dorsolaterally. The dorsal colour extends paravertebrally down the back on to the base of the tail, fading out posteriorly. Three white stripes extend down the back and fade out on the tail. The median stripe extends from the snout tip posteriorly while the two dorsolateral stripes begin on the anterior supraoculars. Between and below these stripes are irregular rows of spots extending along the back to the groin and onto the base of the tail. Laterally the body colour is grey-brown. Limbs blackish-brown with paler spots. Tail buffy brown, but darker mesially. Ventrally bluish under the throat and gular region with irregular darker spots and vermiculations merging into the salmon chest and abdomen. Some ventral scales have black corners. Underside of tail coral red.

Paratypes. Similar in scalation to the holotype and allotype. Most specimens (85,7%) have the 3rd subocular in contact with the lip. Enlarged gular row with 14–15 scales and gulars between posterior sublabials varying from 18–23. Interparietal in contact with occipital, exceptionally separated by posterior parietals. Upper labials usually four, exceptionally 3 anterior to the 2nd subocular. Dorsals small, 76–92 scales at midbody. Ventrals in 20–26 (mostly 22–24) longitudinal and 36–41 transverse rows. Lamellae under the 4th toe 18–22. Femoral pores in males 16–22 (mostly 17 or 19), with a mean of 17,89 (Figure 5).

Colour. Variable, the dorsal stripes partial in some specimens and even totally absent in others. The number and arrangement of the pale spots are also variable, some males showing scattered spots while others exhibit a linear arrangement. In older specimens the brick-red of the tail merges with the green of the lower back. Ventrally the chin and gular region are green in some mature specimens, this colour also extending onto the labials and upper chest. Lower chest and abdomen dark blue, mesially with dark patches towards the cloaca. The females vary mostly in the number and arrangement of the pale spots which range from an irregular single row to many spots between the lines. Juveniles have fewer definitive spots between the stripes, appearing more contrasted. Ventrally only the intensity of the blue and of the salmon on the chest and abdomen change with maturity, becoming brighter. The number of ventral scales with black corners or margins also appears to increase in older animals.

Distribution. This subspecies has been recorded only from three farms in the north-western Transvaal (Figure 7).

Habitat. Appears to be confined to low sandstone ridges and outcrops at an altitude of 1000 m to the south-west of the Blouberg Mountain which is about 9 km from the nearest population of this subspecies. Inhabits vertical and horizontal crevices only wide enough to permit the entry of the depressed bodies.

Reproduction. This subspecies is probably oviparous like the other species. The specimens examined had all been collected from March to June and the females contained only ovarian follicles.

Discussion

Closely related to *P. i. parvus; P. i. inopinus* differs in the increased number of ventrals (Figure 4) (mean 22,35; $t(67) = 9{,}554$; $p = >0{,}001$), a greater number of dorsals at midbody and a higher mean number of femoral pores (Figure 3) in males (mean 17,89; $t(32) = 3{,}254$; $p = >0{,}01$). *P. i. inopinus* also exhibits a greater number of subdigital lamellae under the 4th toe ranging from 18–22 with a mean of 20,0 ± 1,21 (1 *SD*); $n = 20$. In contrast, *parvus* has a range of 17–21 with a mean of 18,18 ± 1,2; $n = 49$. The differences are significant ($t(67) = 5{,}711$; $p = >0{,}001$). Although generally different in colour, some *inopinus* individuals show a similarity to *parvus* in this respect. This is particularly the case with specimens from the farm La Rochelle 310LR, the closest population to *parvus*. Despite this, the populations are widely separated and show no other intergradation.

***Platysaurus lebomboensis* sp. nov. (Figures 6e & 6f)**

***Platysaurus intermedius wilhelmi* (part), Broadley, 1978: 163**

***Platysaurus intermedius* (Lebombo), Jacobsen & Newbery, 1989.**

Material examined. Fifty-six specimens. Holotype: TM 70037, adult male, Mananga hill, Barberton district (2531DD), Transvaal, collector N.H.G. Jacobsen, 28 January, 1981. Allotype: TM 70028, adult female, same data as holotype. Paratypes: TM 70027, 70030, same locality as holotype, collector R.E. Newbery, 24 March, 1983; TM 70029, 70031–3, same data as holotype; TM 70034, 70038, 70040, Othobotini, KwaZulu (2732AC), collector R.E. Newbery, 25 May, 1981; TM 70035–6, 70039, Bhokweni, KwaZulu (2732AC), collector R.E. Newbery, 25 May, 1981. Other material: TM 604–5, Ubombo, KwaZulu (2732-CA), January, 1910; TM 13643–8, Ubombo, KwaZulu (2732CA), November, 1929; TM 19353, same locality, 30 November, 1938; TM 27506–8, 27510–19, west side of Lebombo Mountains above Gwaliweni, KwaZulu (2731-BD), April, 1961; TM 19263–4, Ingwavuma, KwaZulu (2731BB), October, 1938; TM 28757–8, Ndumu Game Reserve, KwaZulu (2632CC), October, 1963; TM 31239, Namachaa, Swaziland (2532CC), 23 December, 1964; TM 42540, 43977–8, 13 km south of Jozini (2732AC), 4 September, 1972; TM 56560–4 Farm Verlore 501JU, Barberton district (2531DD), Transvaal, 11 April, 1983; TM 56670–2, same data as previous numbers, 23 August, 1983; TM 52317–8, 52320–1, Lomahasha, Swaziland (2531DD), 10 November, 1978.

Type Locality. Mananga hill, 25°58′S, 31°52′E, Barberton district, Transvaal.

Etymology. The species is restricted to the southern Lebombo mountain range, after which it is named.

Diagnosis. This taxon differs from its closest relative *P. i. wilhelmi* Hewitt in colour, being blackish-brown to black dorsally with or without red lateral stripes, and in having the nasals mostly (64%) in contact.

Description. Holotype: TM 70037, adult male. Snout/vent length 75,0 mm; tail 128,0 mm; mass 6,9 g. Head elongate, triangular about as wide as the neck. Neck with two flanges on either side covered by enlarged conical scales. Rostral much broader than deep and pentagonal. Nostril near posterior margin of nasal, but well separated from posterior nasal and 1st upper labial. Nasals in narrow contact behind rostral. Frontonasal broader than long and in contact with nasals, posterior nasals, loreals and prefrontals. Prefrontals large and in broad median contact. Frontal hexagonal, longer than broad and tapering posteriorly. Frontoparietals in broad median contact and with three supraoculars. Anterior parietals in contact, well separated posteriorly by the interparietal. Interparietal diamond-shaped and pentagonal, in narrow contact with the occipital. Posterior parietals larger than anterior parietals and separated from each other by the interparietal and occipital. Superior temporals three with the second very elongate. Laterally a single loreal present, in contact with the posterior nasal and preocular. Suboculars four, second and third in contact with the lip. Lower eyelid septate. Temporals large and vertically elongate, almost to the exclusion of a lower row of three scales. Upper labials four anterior to the subocular. Mental large and slightly wider than deep. Lower labials five and sublabials five, the anterior pair in narrow contact. Median row of 12 enlarged gulars and 17 rows between posterior sublabials. Sublabials mostly enlarged and rectangular. Dorsum covered with relatively heterogeneous scales, largest dorsolaterally becoming smaller dorsally and slightly larger vertebrally and number 73 at midbody. Ventrals in 16 longitudinal and 38 transverse rows, the latter from collar to groin. Feet pentadactyl with spinose heels and three enlarged sharp trihedral to tetrahedral scales along the outer edge of the sole, and 18 lamellae under the 4th toe. A single row of glandular scales followed by a row of 18/19 femoral pores along posterior margin of thighs. Caudal scales in whorls with 18 scales per whorl, eight whorls posterior to cloaca. Caudal scales smooth ventrally, becoming spinose laterally and weakly keeled to striated dorsally.

Colour. Dorsally head blackish, this colour extending paravertebrally down the back to the base of the tail. A brownish stripe extends from the rostral via the occipital down the back to the base of the tail. A faded brownish stripe extends from the posterior supraoculars, through the superior temporals dorsolaterally down the back to the base of the tail. A series of irregular off-white spots extend paravertebrally from behind the head to the base of the tail. Limbs blackish-brown heavily blotched with black. Tail orange-red. Laterally the head is blackish with green infusions on the labials. Side of neck blackish with orange-red spots. An orange-red stripe extends from anterior to the shoulder posteriorly to the inguinal region. Laterally the tail is orange-red. Ventrally chin, gular, chest, abdomen and underside of limbs pitch black, with the exception of the soles of the feet and the rows of glandular scales. The former are brown and the latter pinkish to pale orange-brown. The underside of the tail is bright orange-red.

Allotype: TM 70028, adult female. Snout/vent length 70,0 mm; tail 116,0 mm; mass 4,7 g. Rostral wider than deep and pentagonal with the nasals deeply indenting the rostral. Mostly similar in lepidosis to that of the holotype, but differing in the length of the frontal, and the interparietal and occipital are in broad contact. In addition the 3rd subocular is excluded from the lip and the temporals form two distinct rows. The scales on the side of the neck are bluntly conical to trihedral. Ventrally a median row of 13 enlarged gulars and 18 gulars between the posterior sublabials. Dorsals at midbody 71 and ventrals in 16 longitudinal and 36 transverse rows. Subdigital lamellae 19 under 4th toe and only two enlarged spinose scales under edge of feet. A row of 17 indented scales at posterior margin of the thighs.

Colour. Dorsally blackish with three distinct stripes extending down the back to the base of the tail. The median stripe extends from the frontonasal over the occipital down the back becoming interrupted posteriorly. The dorsolateral stripes originate on the supraoculars and are well developed posteriorly. An obscure line of indistinct brownish spots occurs in the areas between the stripes down the back. Limbs grey-black mottled with greyish-brown. The tail is anteriorly greyish-black, mesially becoming greyish-brown distally. Ventrally bluish-white with darker mottling under the chin and throat. Chest and abdomen more bluish becoming very dark posteriorly. Underside of limbs bluish. Underside of tail pale orange-brown.

Paratypes: Similar in lepidosis to that of the holotype and allotype, with the exception of TM 70038–40 which have the nasals separate. Frontonasal as wide as, to wider than, deep. Gulars between posterior sublabials 16–19 and enlarged row of gulars 9–15. Dorsal scales at midbody 68–87. Ventrals in 15–20 longitudinal and 34–36 transverse rows. Digits slender with 16–20 subdigital lamellae under the 4th toe. Femoral pores in males 14–19 (mostly 15–18), with a mean of 16,74 (Figure 5).

Colour. Males mostly as for the holotype, although some apparently mature males totally black above and below. Some males exhibit blue on the lower abdomen and under the hindlimbs. In some males there is also blue ventrolaterally.The labials and mental are variable in the amount of green present, while the chin and gular region can be variously mottled with greenish-blue. The females vary only in the intensity of the ventral colours, with blue predominating. Some females have a black lower abdomen.

Distribution. Along the middle Lebombo range from Ubombo to the Farm Verlore, south of Komatipoort (Figure 7).

Habitat. Rocky outcrops and rhyolite dwalas or whalebacks, living in crevices between and under rocks including those formed by exfoliating rock. It appears to inhabit only the more rocky stretches of the Lebombos, being absent from areas where the outcrops are small. Found at altitudes of 600–800 m.

Reproduction: Oviparous, one to two eggs being laid at a time. Fully developed ova have been recorded ***in situ*** in females during September, November and April, possibly indicating more than one clutch and a prolonged breeding season.

Discussion

This species is related to *P. i. wilhelmi* on the basis of morphological similarity, including heterogeneous dorsals, lepidosis and black ventral colouration in mature males. It differs in that most individuals (64%) have the nasals in contact whereas in *wilhelmi sensu stricto* 93% of the specimens examined (n = 74) had the nasals separated. Broadley (in litt.) mentions that this also holds up in a series of 70 specimens from Mozambique with 55 (78%) in contact and only 15 separated but that in a series of 54 from KwaZulu, 25 (46%) were in contact and 29 (54%) separated. KwaZulu material is widely separated from *P. i. wilhelmi*. Apart from the black ventrum which is common to mature males of both races, few of the remaining head and dorsal colours show an affinity between the two forms. In fact these colours are very different, supporting the recognition of a separate race on the Lebombo Mountains. *P. lebomboensis* has a dorsal colour in immature males comprised of stripes and spots similar to that of the females, but differing in the red flanks. Broadley (1978) regarded this dorsal pattern as being primitive, which places the Lebombo taxon as an ancestral outlier of the *intermedius* group. In appearance, it is also similar to *P. minor* from the Waterberg but differs in the subdivision of the lower eyelid scale and the ventral colour. The ventral colour of *lebomboensis* males is black with a little blue mesially while in *wilhelmi* the ventrum is blue becoming black mesially. The two taxa are allopatric, the closest populations being 50 km apart, separated by apparently unsuitable habitat.

Conclusion

The genus *Platysaurus* exhibits little polymorphism throughout its distribution. Only in *P. intermedius rhodesianus* and *P. i. subniger* have two colour forms been recorded, in the former occurring together but without apparent intergrades while in the latter occurring in discrete populations (Broadley 1978). Both need more indepth investigation. In the *intermedius* group the paucity of distinguishing and overlapping morphological characters has so far only led to eight subspecies being described from central Mozambique and southern Malawi to northern Natal and west to Botswana. A ninth is described in this paper. In addition, the separation of other species such as *P. relictus* from this group is tenuous on the basis of morphology alone as also is the case with *monotropis* and *lebomboensis*. This paucity leads to greater emphasis on the smaller observed differences such as the similarity in appearance of the enlarged neck scales exhibited by *parvus*, *inopinus*, *monotropis* and *relictus*. It appears also that *P. i. nigrescens* (Broadley 1980) belongs to this group, exhibiting non-spinose scales but retaining the large size of *rhodesianus*. These therefore form a western group in contrast to the more spinose eastern group including *intermedius*, *rhodesianus*, *natalensis*, *wilhelmi* and *lebomboensis* (Figure 3) as well as *subniger* and *nyasae* (Broadley 1978). Of the latter group, *wilhelmi* and *lebomboensis* together appear to be specifically distinct from *intermedius s.s.*, but *P. i. natalensis* seems to bridge the gap. Nevertheless, the differences could be interpreted as being due to three species groups, namely, the *intermedius* group including *intermedius*, *rhodesianus* and *natalensis* as well as *subniger* and *nyasae;* the *relictus* species group including *relictus*, *parvus*, *inopinus*, *monotropis* and *nigrescens; and the wilhelmi* group including *wilhelmi* and *lebomboensis*. Such a division would however require a more indepth study of the genus as a whole and is beyond the scope of this paper.

It is in the light of this that radical differences in colour become more important and need to be recognized. The pronounced sexual dichromatism found in the genus together with observed behaviour advocate the dual role of colour in males, both as an attractant to females and as a deterrent to mature males. Which areas of the body are important to the former need more investigation but current observations indicate the colours of the head, gular region and chest (Newbery 1981) while the colours of the ventrum are important in male to male confrontations (Broadley 1978; Newbery 1981; Haacke pers. comm.; pers. obs.). No intergrades in colour, with the exception of ontogenetic variation, have been observed between species which indicates that colour is an important determinant despite the limitations imposed by preserved specimens.

Three new *Platysaurus* taxa have been described in this paper, based on limited morphological differences and colour. In two of the taxa the colour differences between these and closely related forms are substantial and indicative of significant deviation. In the third (*inopinus*) there is a gradation in colour away from the parent stock, indicating a clinal relationship. However, it differs morphologically in several respects from *P. i. parvus* as well as being parapatric. Broadley (1978) suggested that the movement of the aeolian Kalahari sands during the Pliocene – Pleistocene was responsible for the number of relict populations. The number of relict populations in the north-western Transvaal possibly indicates that this area was more frequently, or for longer periods, partially or totally isolated than was the area further eastwards. The theory of the existence of *Platysaurus* refuges during the Pliocene (Broadley l.c., Figure 15, p. 182) from which re-radiation took place seemingly in a westward direction, is supported by the taxa described in this paper. These populations and the recently described *P. i. nigrescens* Broadley from north-eastern Botswana (Broadley 1980) are all at the periphery of the distribution of *P. intermedius*, which emphasizes the importance of peripheral populations in speciation processes.

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