Description of a new species of *Cordylus* Laurenti (Reptilia: Cordylidae) from the south-western Cape, South Africa

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A new species of girdled lizard in the *Cordylus* genus is described from the south-western Cape, South Africa. Unlike other *Cordylus* taxa the new form usually has only two supraciliaries per side, the posterior parietals are usually separated mesially by a small post-interparietal scale and the lateral body scales are larger than the dorsal scales. The relationships of this new form to other members of the *Cordylus* group are discussed.
S. Afr. J. Zool. 1986, 21: 319 – 324

'n Nuwe suidwes-Kaapse gordelakkedis-spesie van die genus *Cordylus* word beskryf uit Suid-Afrika. Die nuwe vorm verskil van ander *Cordylus*-soorte daarin dat normaalweg slegs twee suprasiliêre skubbe per kant voorkom, dat die agterste parietale skubbe normaalweg mediaan deur 'n klein postinterparietale skub geskei word en dat die laterale liggaamskubbe groter as die dorsale skubbe is. Verwantskappe tussen die nuwe vorm en ander lede van die *Cordylus*-groep word bespreek.
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Cordylus Laurenti is one of four genera comprising the subfamily Cordylinae and with the genus *Pseudocordylus* are commonly known as girdled lizards. For a long time the taxon was known by the generic name of *Zonurus* (Merrem 1820) until Stejneger (1936) set forth the reasons for recognizing *Cordylus* Laurenti as having priority over *Zonurus* Merrem.

The genus occurs mainly in southern Africa, with only one taxon, *Cordylus cordylus rivae*, extending as far north as Ethiopia (Loveridge 1944). There is a fair amount of disagreement as regards the number of taxa comprising the genus. Loveridge (1944), for example, lists 29 taxa, whilst Wermuth (1968) and Welch (1982) mention 31, including three new taxa described after 1944 (FitzSimons 1958; Broadley 1962; Laurent 1964), but omitting *C. cordylus rivae* listed by Loveridge. FitzSimons (1943) considers *C. cordylus niger* a colour variant of *C. cordylus cordylus* and two *Pseudocordylus* taxa, *P. capensis capensis* and *P. c. robertsi*, as belonging to the genus *Cordylus*. Broadley (1971) is furthermore of the opinion that *C. cordylus angolensis* is a synonym of *C. tropidosternum jonesii*.

A fair amount of disagreement also exists as far as the taxonomic status of many taxa is concerned. Loveridge (1944), Wermuth (1968), and Welch (1982), for example, recognize 10 subspecies of *C. cordylus*, but many of these are regarded as distinct species by other authors (FitzSimons 1943; Broadley 1971; Branch 1981). It is accordingly clear that many taxa will have to be realigned after re-examination.

The last new taxon was described by Laurent (1964) and since then only a few superficial attempts have been made towards solving the numerous taxonomic problems within the genus (Broadley 1971; Visser 1971; De Waal 1978; Olmo & Odierna 1980; Mouton 1985, 1986). The purpose of this paper is to describe a new species of *Cordylus* from the south-western Cape, South Africa, and to discuss its possible bearing on intrageneric relationships.

Systematics

Cordylus mclachlani sp. nov. (Figures 1 – 5).

TYPE MATERIAL. Ten specimens, all collected by the author at the type locality. *Holotype*: SAM – 47100, adult male. *Allotype*: SAM – 47101, adult female. *Paratypes*: SAM – 47102 – 47109, three adult males, one subadult male and four adult females. SAM – 47101 and SAM – 47109 collected 14 April 1985, all other specimens collected 8 May 1985. The type specimens were deposited in the collection of the South African Museum, Cape Town.

TYPE LOCALITY. The farm, Zonder Water, in the Koue

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Bokkeveld, 32°49'03"S / 19°27'58"E (3219 CD De Meul), Cape Province, South Africa, at an altitude of 1065 m.

ETYMOLOGY. Named after Dr. G.R. McLachlan, herpetologist at the South African Museum, Cape Town, in appreciation of his contribution towards herpetology in South Africa.

DIAGNOSIS. A rupicolous form with the head and body strongly depressed; distinguishable from other *Cordylus* taxa in that usually only two supraciliaries per side occur, in that the posterior parietals are usually completely separated by a post-interparietal scale mesially, and in that the lateral body scales are larger than the dorsal body scales. In other *Cordylus* taxa the number of supraciliaries ranges from 3–5, the posterior parietals are always in contact mesially, and the lateral body scales subequal to the dorsal body scales. Like in *C. polyzonus polyzonus* and *C. p. jordani* supranasals are present, but unlike in these taxa semi-transparency of the lower eyelid is lacking.

DESCRIPTION

Holotype. SAM – 47100, adult male (Figure 1). Head-body length 64 mm, tail 54 mm. Head and body strongly depressed.

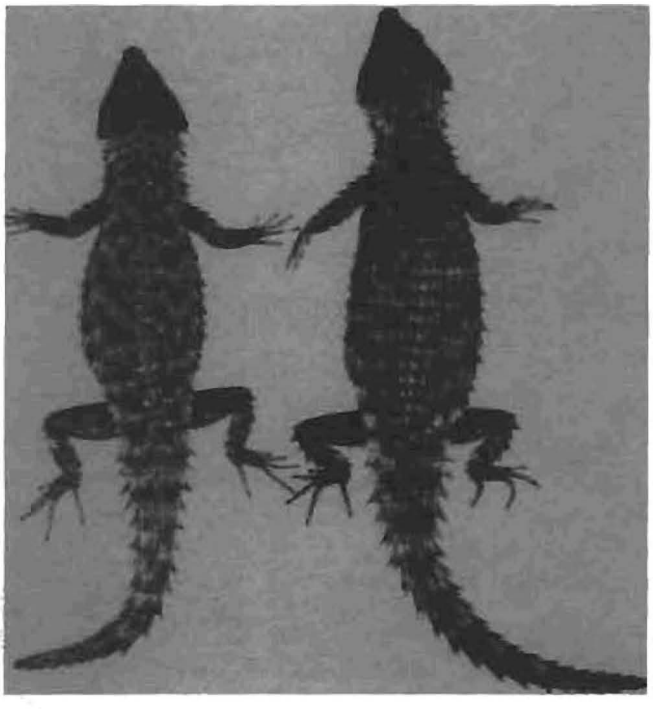

Figure 1 *Cordylus mclachlani* sp. nov. Dorsal view of the holotype SAM – 47100 (left) and the allotype SAM – 47101 (right).

Head triangular, only slightly longer than broad. Upper head shields strongly rugose and pitted. Frontonasal subhexagonal, separated from rostral and frontal, but in good contact on sides with loreals. Nasals small and tubular; nostril pierced in about middle of nasal and directed outwards and slightly upwards. A pair of large swollen supranasals in good contact behind rostral (Figure 2). Prefrontals in contact mesially. Frontal six-sided, slightly broader in front than behind, longer than broad. Four parietals; anterior pair slightly larger than posterior pair; posterior pair completely separated by a post-interparietal scale, irregularly four-sided in shape (Figure 2).

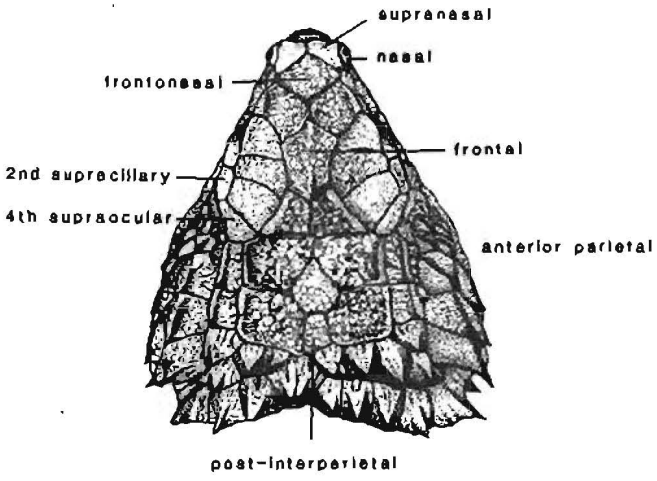

Figure 2 Dorsal view of the head of the holotype SAM – 47100.

Interparietal pentagonal and produced anteriorly, but not reaching frontoparietals. Eight occipitals, triangular to pentagonal in shape, keeled and spinose; the fourth one from the left appears to be fused with a nuchal scale (Figure 2). Temporal scales strongly keeled, four temporal spines posteriorly (Figure 3), the two median spines well developed and partly covering the ear opening.

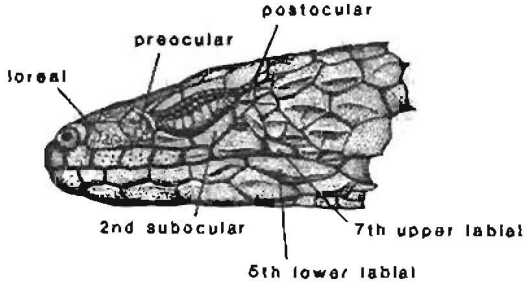

Figure 3 Lateral view of the head of the holotype SAM – 47100.

Four supraoculars and two supraciliaries (Figure 2). Lower eyelid scaly. Loreal similar in size to preocular. Two subloculars, not reaching lip. One postocular, separated from the last upper labial by a small scale. Rostral three times as broad as deep. Upper labials seven, the second last one the largest and the last the smallest; the third and second last ones keeled and all sharply edged below. Lower labials five, the last two strongly keeled; the sides of anterior three bordering sublabials sharply edged. Five large sublabials bordering lower labials below; the fifth sublabial the smallest and keeled (Figures 3 & 4).

Mental 2,25 times as broad as long. No distinct chin shields. Sublingual scales slightly sculptured, imbricate, polygonal to rounded anteriorly, quadrangular, flattened and smooth and arranged in regular transverse rows posteriorly; two to three rows of sublinguals bordering sublabials three to five, smaller and much longer than broad; a single anterior sublingual partly separating first pair of sublabials (Figure 4). Scales on side of neck strongly keeled and spinose; gulars strongly imbricate; 14 gulars between the angles of the jaw.

Vertebral rows of dorsal scales not or only slightly enlarged, trapezoid to rectangular and longitudinally keeled, other dorsals rectangular and obliquely keeled outwardly. All dorsals

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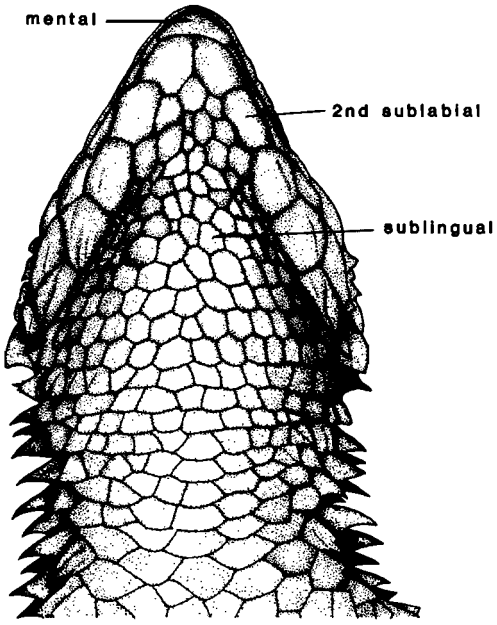

Figure 4 Ventral view of the head of the holotype SAM – 47100.

imbricate, feebly serrated to smooth posteriorly and with the lateral sides faintly ribbed; dorsals strongly keeled and sharply spinose towards sides of body; dorsals and laterals arranged in 28 transverse and 22 longitudinal rows. Lateral scales larger than dorsal scales. Ventral scales smooth, quadrangular, broader than long except the two outer rows which are longer than broad, with the outermost row very narrow; arranged in 12 longitudinal and 24 transverse series. A pair of feebly enlarged preanal plates present, the one plate larger than the other (Figure 5).

Scales on limbs above large, imbricate, strongly keeled and sharply spinose. Scales under fourth toe 13, and 11 under fourth finger. Femoral pores 10 on each side; as many as three rows of glandular scales in front of pore-bearing scales; a pair of postcloacal swellings present (Figure 5). Tail with whorls of large, elongate, mucronate, strongly keeled and sharply spinose scales; spines directed backwards and longest superolaterally.

COLOUR. Above, head dark brown to blackish with lighter brown markings; faint dark line from nostril through eye to occiput. Back, tail and limbs above, olive-brown with numerous black markings and a few yellow specks; sides of body and the limbs and tail underneath, as well as the upper and lower jaw, a lighter reddish brown. Head and body below creamy white.

VARIATION

Allotype. SAM – 47101, adult female (Figure 1). Head-body length 72 mm. Interparietal pentagonal, produced in front and completely separating anterior parietals. Post-interparietal pentagonal. Femoral pores and glandular scales absent, a row of shallow pits in small scales, however, present; post-cloacal swellings absent.

Paratypes. SAM – 47102, adult female. Head-body length 72 mm. Supranasals separated by a small rectangular scale. Post-interparietal pentagonal. No enlarged preanal plates present.

SAM – 47103, adult male. Head-body length 66 mm. Posterior parietals separated by three small granular scales. At four places two adjacent ventrals fused to form transversely elongated scales. Lateral scales strongly serrated posteriorly.

SAM – 47104, adult female. Head-body length 73 mm. A small supernumerary scale occurs wedged between the third and fourth supraocular, the frontoparietal and anterior parietal (Figure 6). Post-interparietal pentagonal. Only one enlarged preanal plate present.

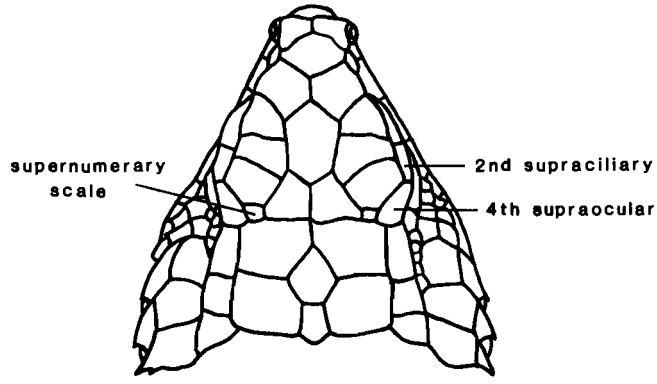

Figure 6 Dorsal view of the head of paratype SAM – 47104.

SAM – 47105, adult male. Head-body length 68 mm. Anterior parietals separated by the interparietal and a small

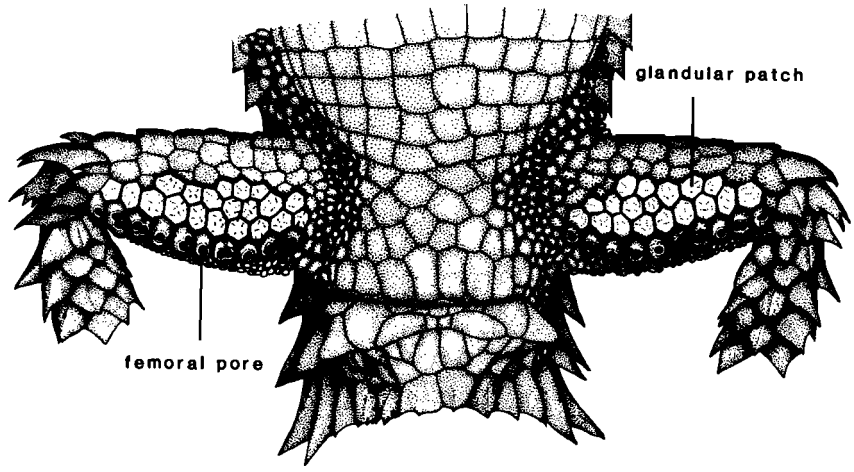

Figure 5 The femoral pores and associated scales in the holotype SAM – 47100.

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Table 1 Variation in meristic characters among the type specimens of *C. mclachlani* sp. nov. (where applicable counts for both right and left sides are given)

	SAM 47100	SAM 47101	SAM 47102	SAM 47103	SAM 47104	SAM 47105	SAM 47106	SAM 47107	SAM 47108	SAM 47109	Observed range
Sex	m	f	f	m	f	m	f	f	m	m	
Occipitals	8	8	7	8	9	8	8	8	6	8	6–9
Upper labials	7/7	7/7	7/7	7/7	7/7	7/7	6/7	5/6	7/7	6/6	5–7
Lower labials	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/5	5/6	5/5	5–6
Sublabials	5/5	5/5	5/5	5/5	5/5	4/4	6/6	5/5	5/5	5/5	4–6
Supraoculars	4/4	4/4	4/4	4/4	5/5	4/4	4/4	4/4	4/4	4/4	4–5
Supraciliaries	2/2	2/2	2/2	2/2	2/2	2/3	2/2	2/2	2/2	2/3	2–3
Suboculars	2	2	2	2	2	2	2	2	2	2	2
Gulars	14	14	14	14	14	14	13	15	15	15	13–15
Transverse rows of dorsals	28	27	27	28	27	27	27	28	27	27	27–28
Longitudinal rows of dorsolaterals	22	22	22	22	22	22	22	22	22	22	22
Transverse rows of ventrals	24	24	24	25	27	25	23	26	25	24	23–27
Longitudinal rows of ventrals	12	12	12	12	12	12	12	12	12	12	12
Scales under 4th toe	13/13	12/12	12/12	12/12	12/12	12/13	12/13	13/13	12/12	12/12	12–13
Scales under 4th finger	11/11	11/11	11/11	11/11	11/11	11/11	11/11	11/11	11/11	11/11	11
Femoral pores	10/10	–	–	11/11	–	10/10	–	–	10/10	8/9	8–11

scale directly in front of interparietal. Anterior and posterior pairs of parietals equal in size. Three supraciliaries on left side.

SAM–47106, adult female. Head-body length 73 mm. Post-interparietal pentagonal.

SAM–47107, adult female. Head-body length 63 mm. Prefrontals separated mesially by a small scale. Posterior parietals separated by a very narrow post-interparietal.

SAM–47108, adult male. Head-body length 66 mm. Posterior parietals in good contact enclosing a minute granular scale. On both sides the second and third sublabials are fused to form one large scale, thus only four sublabials on each side.

SAM–47109, subadult male. Head-body length 55 mm. Post-interparietal absent and posterior parietals in contact mesially. Three supraciliaries on left side.

Variation in meristic and morphometric characters is summarized in Table 1 and 2 respectively. The definition of the number of upper labials creates some problems as it appears natural that all enlarged scales on the upper lip as far as the gape and overlying the lower labials should be counted. This would mean that the new form has seven upper labials as an additional small scale occurs behind the largest upper labial. The presence of fine granules between that scale and the lip-edge creates uncertainty. The fact that these granules are absent in some paratypes complicates the matter even further.

Table 2 Variation in morphometric characters in the type specimens of *C. mclachlani* sp. nov.

	$\bar{x} \pm SD$ ($n=10$)
Head length / HB-length	0,251 ± 0,011
Head width / HB-length	0,218 ± 0,005
Head depth / HB-length	0,092 ± 0,028
Hindlimb length / HB-length	0,456 ± 0,024
Forelimb length / HB-length	0,349 ± 0,024
Head length / head width	1,151 ± 0,029
Head-body length (= HB-length)	max. = 73 mm

SEXUAL DIMORPHISM. In all females examined femoral pores and glandular patches absent; a row of small scales with shallow pits equivalent to pore-bearing scales in males, however, present. Postcloacal swellings present in all males, but absent in females. Maximum head-body length recorded for males 68 mm and for females 73 mm.

FIELD NOTES. All individuals found in narrow cracks in sandstone outcrops of the Witteberg Formation. In all cases only one individual occupied a specific crack. Other rupicolous lizards found in the area were *Agama atra, Cordylus cataphractus, Pachydactylus bibroni, Pachydactylus rugosus formosus, Pachydactylus serval purcelli* and *Phyllodactylus lineatus lineatus*.

Similar to *Cordylus cataphractus*, the new cordylid seems to prefer the low profile rock formations, as it is absent in adjacent areas of huge piled-up rock formations typical of the Skurweberg and Cedarberg Mountains.

The tail of this new lizard is very easily detached. This phenomenon probably explains the high percentage of incomplete and regenerated tails among the lizards collected.

Discussion

Interpretation of the head shields in the ocular region of *Cordylus mclachlani* sp. nov. presents a problem when one has to decide whether this form normally possesses one less supraciliary or one less supraocular than other *Cordylus* species (Figure 2). In all *Cordylus* taxa four supraoculurs per side occur [according to Loveridge (1944) three supraoculars are sometimes found in *C. cordylus cordylus*, but this has not been substantiated] and the posteriormost one is always in good contact with the corresponding anterior parietal (FitzSimons 1943; Loveridge 1944). The number of supraciliaries, on the other hand, varies from 3–5 among the taxa and the posteriormost one is never in contact with the anterior parietal (FitzSimons 1943; Loveridge 1944). There being some

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intrageneric variation in the number of supraciliaries, but as a rule, none in the number of supraoculars, the most parsimonious decision will be that *C. mclachlani*, in line with other *Cordylus* species, also possesses four supraoculars and accordingly normally only two supraciliaries. In *C. mclachlani* the posteriormost scale of the supraocular – supraciliary scale group is in good contact with the corresponding anterior parietal (Figure 2), underscoring the decision that this scale should be considered a supraocular rather than a supraciliary.

Although one will have to consider the posteriormost scale as a supraocular, it appears to be quite clear that this scale normally represents a fusion of the fourth supraocular and the third supraciliary. This is indicated by the fact that in those type specimens with only two supraciliaries the suture between the second supraciliary and the fourth supraocular is in the same position where the suture between supraciliary two and three occurs in paratypes SAM – 47108 and 47109 with three supraciliaries or in other species with three supraciliaries.

In paratype SAM – 47104 the supraciliary-supraocular scale group comprises a small extra scale posteriorly, which touches the corresponding anterior parietal (Figure 6). This small scale could be interpreted as a remnant of the fourth supraocular found in other taxa, implying that the fourth supraocular is normally absent in *C. mclachlani* and that three supraciliaries in fact occur. To conform to the general pattern in the genus it would, however, be best to view the condition in paratype SAM – 47104 as an individual variation and to consider *C. mclachlani* as having four supraoculars and typically only two supraciliaries.

Rupicolous lizard species normally display low vagility and as a consequence could show considerable interpopulation variation (Poynton & Broadley 1978). This aspect should accordingly be borne in mind when new forms are described, particularly when they represent geographical isolates. The form described in the present report, however, has a number of unique features which separate it from all known *Cordylus* taxa and leave one no option than to recognize it as a distinct species. The occurrence of only two supraciliaries is a condition not encountered in any taxon in the subfamily Cordylinae, 3 – 5 being the norm. Furthermore, a small scale separating the posterior pair of parietals has not been recorded in any *Cordylus* taxon; it is, however, characteristic of a few *Platysaurus* species (FitzSimons 1943; Loveridge 1944). Except for these two unique features, *Cordylus mclachlani* sp. nov. exhibits a unique combination of other character states which even further separates it from other known *Cordylus* taxa.

However unique in character *C. mclachlani* might be, a determination of possible affinities to other *Cordylus* taxa is called for. Relationships within the genus are, unfortunately, largely uncertain and to date, few models have been advanced in this regard. The most comprehensive model has been that of Loveridge (1944), whilst more recently, Broadley (1971) and Visser (1971) addressed specific problems regarding affinities among only a few taxa.

In his revision of the subfamily Cordylinae, Loveridge (1944) attempted to arrange the members of the genus *Cordylus* according to probable lines of evolution. In the absence of any other indication on his part, one will have to assume that the criteria on which his model is based, are those contained in his key to the species. If this is the case serious doubts are entertained as to the validity of his model. Not only did he fail to sort out plesiomorphic from apomorphic character states, but his model also contains several unacceptable convergencies. These resulted from the premature grouping of taxa on the basis of single characters, without knowledge of the time of evolution of these characters. A sound hypothesis on intrageneric relationships can only be achieved by a cladistic analysis where plesiomorphic and apomorphic character states are determined by outgroup comparison. The points of branching in the cladogram should be determined by careful consideration of the characters and should reflect the most parsimonious solution, i.e. the one with the fewest convergencies in characters.

Therefore, with a sound hypothesis on intrageneric affinities lacking, it is impossible at this stage to come to any definite conclusions as far as relationships between *C. mclachlani* sp. nov. and other members of the genus are concerned. An analysis based merely on descriptions of the other *Cordylus* taxa by FitzSimons (1943) and Loveridge (1944), however, indicates that this new form might be related to *C. c. lawrenci* and to a lesser extent *C. namaquensis*. In both *C. c. lawrenci* and *C. mclachlani* the head and body are much depressed, the anterior pair of parietals equal to or slightly larger than the posterior pair, the nasals (or supranasals) swollen, the head shields rugose, temporal spines which partly cover the ear

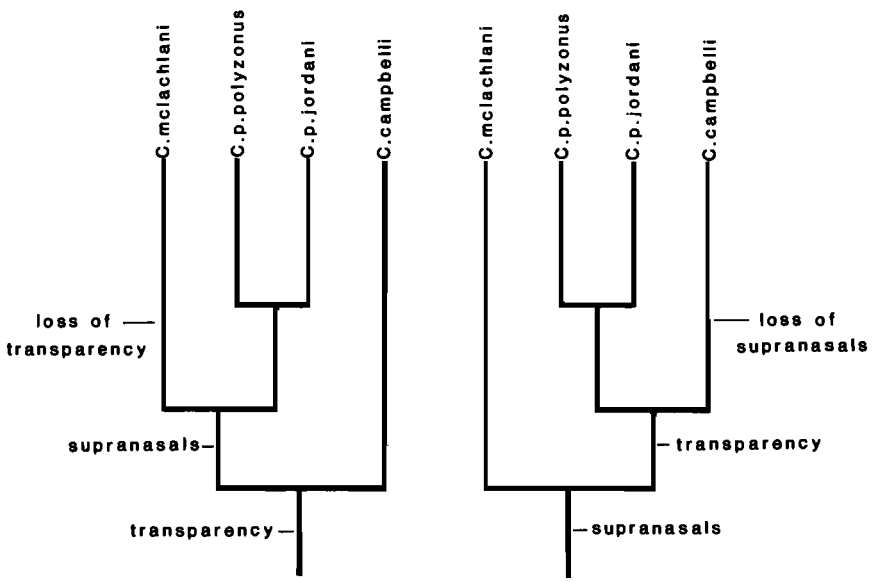

Figure 7 Possibilities of secondary loss of character states in the *campbelli-polyzonus-mclachlani* group.

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opening present, chin shields not readily discernible, the occipitals more or less spinose, 8 – 11 femoral pores present in males only, and 22 longitudinal series of dorsal scales and 12 longitudinal series of ventral scales occur. *C. mclachlani* and *C. namaquensis*, on the other hand, have the following in common: swollen nasals (or supranasals), rugose head shields, 8 – 11 femoral pores in males only, eight occipitals, and the head and body much depressed. Lacking knowledge of possible convergencies, it is impossible to come to firmer conclusions at this stage.

Loveridge (1944) used the presence of a transparent brille in the lower eyelid and supranasals as criteria to divide the *Cordylus* taxa into two groups. In *C. campbelli, C. polyzonus polyzonus* and *C. polyzonus jordani*, which constitute the one group, a transparent brille is present, whilst supranasals are also present in the latter two taxa. *C. mclachlani* lacks transparency of the lower eyelid, but by virtue of the presence of supranasals could be considered as belonging to this group. If this group, however, represents a monophyletic assemblage, secondary loss of either transparency in *C. mclachlani* or supranasals in *C. campbelli* is implied (Figure 7). On the other hand, and probably more likely, the situation might be indicative of parallelism in one or both the character states. This implies that both transparent brilles or supranasals should be used with care when determining intrageneric affinities, as these character states may have evolved more than once in the genus.

Except for the presence of supranasals, the occurrence of femoral pores in males only, and the possession of keeled and striated temporal scales with projecting spines behind, *C. mclachlani* has little in common with the two *C. polyzonus* taxa. In scale counts big differences exist, underscoring the above notion that supranasals probably evolved twice in the genus and that *C. mclachlani* is not closely related to these taxa.

Although no definite conclusions can be reached as far as relationships between *C. mclachlani* and other members of the genus are concerned, there can be no doubt that this new form, displaying a unique combination of character states, represents a distinct species.

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