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A REVIEW OF GEOGRAPHICAL VARIATION IN *GERRHOSAURUS MAJOR* DUMÉRIL (SAURIA : CORDYLIDAE)

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ABSTRACT

Examination of most of the available material of *Gerrhosaurus major* indicates that only two geographical races should be recognised, the typical form (with *grandis* Boulenger as a synonym) in eastern Africa and *G.m. bottegoi* Del Prato (with *zechi* Tornier as a synonym) ranging from northern Somalia west to Ghana.

In the last revision of the genus, Loveridge (1942) recognised four races, but did not realise that the name *bottegoi* was applicable to the dark form which he called *zechi*. The range of variation in the typical form includes all the material that Loveridge assigned to *bottegoi* and *grandis*.

INTRODUCTION

When the genus *Gerrhosaurus* was last reviewed by Loveridge (1942) most of the available material of *G. major* was from East Africa, and he assigned it to three races based on colour pattern, using the following key:

'7. Head above, buff, each scale spotted with black . . 8

Head above, uniform buff or fulvous brown . . . 9

8. Above head, body and tail almost black, each scale with a small buff spot or streak arranged to form interrupted lines on back and sides; belly streaked with dusky; range Belgian Congo and Togo *m. zechi*

Above, head and body buff, each scale (except those forming an ill-defined, buff, dorsolateral line) heavily streaked with black or dark brown in regular lines on back and sides with a tendency to

coalesce posteriorly and on tail where the buff survives only as spots; belly streaked with dusky; range: Central Tanganyika north through Kenya to Ethiopia and Eritrea *m. bottegoi*

9. Above, head only buff through back anteriorly largely so, while posteriorly, as also on sides and tail, many scales are streaked with black or dark brown among which large buff blotches or spots are prominent; belly usually streaked with dusky; range Zululand and Transvaal north to Morogoro, Tanganyika Territory *m. grandis*

Above, head and body uniform buff or fulvous brown; belly uniform yellowish; range Northern Rhodesia (?) and Mozambique north to Zanzibar along eastern Tanganyika Territory and eastern Kenya Colony *m. major*'

Later in 1942, H. W. Parker published his monograph on the lizards of British Somaliland and independently reviewed the geographical races of *Gerrhosaurus major*. He regarded *zechi* as a synonym of *bottegoi* and, after examining the 'rather scanty' material in the British Museum, recognised three races as follows:

I. Uniform brownish above, or with only irregular dark markings; tail with alternating darker and lighter annuli. This form is confined to Kenya Colony, Zanzibar and northeastern Tanganyika Territory and is the typical form. *G. major major* Duméril.

II. Black above, with longitudinal series of yellow spots between the dorsal scales; a more or less distinct yellow dorsolateral stripe; flanks brown with longitudinal light flecks forming regular series. Head black above with small yellow spots. This is a northern Sudanese subspecies, ranging from the Gold Coast to Eritrea and Somaliland. It enters the savannahs of the Congo around Garamba (Schmidt, 1919), Uganda (Kyagwe and Kaiso) and probably northeastern Kenya (? USNM 42216 recorded by Loveridge, 1929, p.66). In British Somaliland it appears to be confined to the mountains from the Boroma district as far east as the Golis Range: *G. major bottegoi* del Prato.

III. Similar in colour posteriorly to the preceding, but anteriorly the light markings are more extensive, obliterating the darker colour and the whole of the upper surface of the head is pale brown, uniform or with small black or chocolate-brown spots. This race occurs in Zululand, Transvaal, Mozambique and Tanganyika Territory and should apparently be known as *G. major grandis* Boul'.

Loveridge (1957) persevered with his own arrangement, although admitting that there was a wide zone of overlap between *grandis* and typical *major*.

I have long regarded *grandis* as a synonym of the typical form (Broadley, 1971), but it was not until I began work on a checklist of the reptiles of Tanzania that the divergent views of Loveridge and Parker with regard to the status of *G.m. bottegoi* attracted my attention. It was obviously desirable to establish the correct application of this name and to update Schmidt's 1919 distribution map.

MATERIALS AND METHODS

The Natural History Museum of Zimbabwe has a series of 60 specimens of *G.m. major* from Zimbabwe, Moçambique and Zambia. During a three month tour of museums in the United States in 1985, I took the opportunity to examine additional material of *G. major* and I was also able to check the specimens in the British Museum (Nat. Hist.) during a brief stopover on my way back to Zimbabwe. Subsequently I was supplied with data for an additional 115 specimens of *G. major* by several other museums in Europe, the United States and South Africa.

As no geographical variation in morphological characters has been detected in *G. major*, this study was restricted to colour pattern.

The following acronyms were used to indicate the institutions holding *G. major* material for each listed locality: AMNH = American Museum of Natural History, New York; BM = British Museum (Natural History), London; CAS = California Academy of Sciences, San Francisco; CM = Carnegie Museum, Pittsburgh; FMNH = Field Museum of Natural History, Chicago; JPT = J.P. Tello Collection, Maputo, Moçambique; MCZ = Museum of Comparative Zoology, Harvard; MHNH = Museum National d'Histoire Naturelle, Paris; MZUF = Museo Zoologico de 'La Specola', Florence; NMZB (+ UM) = Natural History Museum of Zimbabwe, Bulawayo; TM = Transvaal Museum, Pretoria.

RESULTS

Loveridge (1942, 1953) regarded the uniform buff or tawny typical form (Fig. 1, above) as an 'East African coastal form' replaced by the black streaked *grandis* inland, but even one of the Zanzibar syntypes of *major* (MHNH 6539) has black infuscations in the mid-dorsal region, increasing posteriorly. I have examined 27 of the Tanzanian specimens from Mangasini (= Kwa Mtoro) and Dodoma which Loveridge identified initially (1933) as *zechi* and subsequently (1942) as *bottegoi*, because of the black markings on head and body. These vary in extent from 5 to 50 per cent on the head, from 10 to 50 per cent on the body anteriorly and from 50 to 90 per cent posteriorly.

The lizards from Zimbabwe show almost the full range of colour patterns found in Tanzania. The most extensive dark markings are found in juveniles. UM 17904 from Tanganda Bridge, with a snout-vent length of 78mm, has symmetrical black head markings, most extensive on the frontal, frontoparietals and parietals. UM 18705, a 100mm SVL juvenile from Mahenya, and UM 27553, a 128mm SVL subadult from Mutare, also show these markings in a reduced form. Most adult specimens have no dark head markings, but the body is more or less streaked with black, increasing posteriorly, there is much variation within a population. The only specimens with no dark markings on the body are two from Kapami in Hwange District (the most westerly locality), one from Triangle and one from Mahenya, where most adults are heavily streaked with black. Most Moçambique

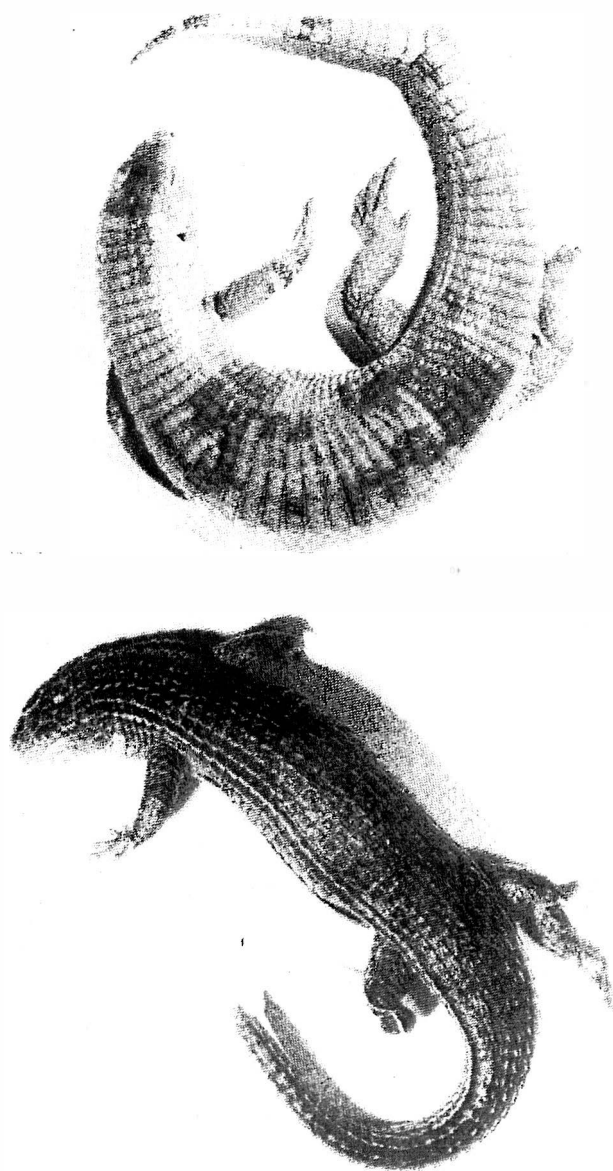


Fig. 1 Dorsal views of (above) *Gerrhosaurus major major* (CAS 123161 Laisamis, Marsabit District, Kenya) and (below) *G. major bottegoi* (CAS 140367 Kampi-ya-Samaki, Lake Baringo, Kenya). These are the nearest adjacent localities for the two subspecies. Photos by courtesy of R. C. Drewes.

lizards have black streaks on the body at least posteriorly (including MCZ 50997 from Tete, identified as *G.m. major* by Loveridge, 1953), the only uniform buff specimen is UMMZ 61418 from Lumbo. Specimens from Zululand (Pooley, 1965, pl. 5) and the Transvaal (Pienaar, 1978, pl. 37, 37A) are usually heavily streaked with black on the body.

At the northern end of its range, specimens of *G.m. major* from southern Somalia vary from having the dorsum heavily streaked with black to completely devoid of dark markings (photos supplied by B. Lanza).

G. major bottegoi does not show appreciable geographical variation in colour pattern. The head is about 70 per cent and the dorsum 80 per cent dark brown or black with symmetrical yellow spots on the dorsal head shields, lines of yellow spots on the back

and usually a continuous yellow dorsolateral stripe; the flanks and ventrum are usually light brown, sometimes with yellow streaks (Fig. 1, below). Dunger (1967) reports that males from Jos, Nigeria, have a distinctive slate-blue chin and throat.

GERRHOSAURUS MAJOR BOTTEGOI Del Prato

Gerrhosaurus Bottegoi Del Prato, 1895, *Atti. Soc. ital. Sci. nat.*, **35**: 19, fig. 1-1a. Type locality: Valley of Ghinda, Eritrea (= Ethiopia). Reprinted in 1929 by the Instituto di Zoologia, Museo Bottego, Regia Università di Parma, with an additional plate.

Gerrhosaurus major var. *zechi* Tornier, 1901, *Arch. Naturgesch.*, **67**: 74, fig. 1. Type locality: Kete Kratje, Togo (= Ghana).

Gerrhosaurus zechi Schmidt, 1919: 509, fig. 21, pl. xx, fig. 2.

Gerrhosaurus major Loveridge, 1929: 66 (part, Kenya); Böhme, 1975: 36.

Gerrhosaurus major bottegoi Loveridge, 1942: 498 (part); Parker, 1942: 77; Wermuth 1968: 12 (part); Lanza, 1983: 214 (part).

Gerrhosaurus major zechi Loveridge, 1952: 241; Dunger, 1967: 176, pl. 3; Wermuth, 1968: 12.

Habitat. Rock outcrops (Dunger, 1967; Böhme, 1975) and open savanna, where they live in burrows (Schmidt, 1919).

Distribution. Northern Ethiopia, northwestern Somalia and western Kenya west to Ghana (Fig. 2).

Recorded localities. GHANA: Kete Kratje (ex Togo) (Tornier, 1901), Mole National Park (BM), Wa (BM, CAS, NMZB). BENIN: Koussokoingu (Loveridge, 1952). NIGERIA: Bauchi (Dunger, 1967), Jos Plateau (Dunger, 1967; BM), Waka (Dunger, 1967). CAMEROON: Mokolo (Böhme, 1975). CENTRAL AFRICAN REPUBLIC: Bozo (MHNP). ZAIRE: Garamba (AMNH). SUDAN: Ngangala (FMNH), Torit (FMNH). UGANDA: Bagungu (BM), Kaiso (BM), Mabira Forest (BM). KENYA: no locality (Loveridge, 1929: USNM 42216); 8km SSW of Amaler (MCZ), Kampi-ya-Samaki, Lake Baringo (CAS). ETHIOPIA: Valley of Ghinda (Del Prato, 1895). SOMALIA: Borama District (BM), Wagar, Golis Mts (BM).

GERRHOSAURUS MAJOR MAJOR Duméril

Gerrhosaurus Major A. Duméril, 1851, *Cat. méthod. Coll. Rept. Mus. Paris*: 139. Type locality: Zanzibar; Loveridge, 1929: 66 (part).

Gerrhosaurus zanzibaricus Pfeffer, 1889, *Jahrb. hamburg. wiss. Anst.*, **6**: 7. Type locality: Kibueni, Zanzibar.

Gerrhosaurus bergi Werner, 1906, *Zool. Anz.*, **30**: 54, fig. 1-3. Type locality: Usambara Mts., Tanzania.

Gerrhosaurus grandis Boulenger, 1908, *Ann. Natal Mus.*, **1**: 225, 233, pl. xxxvi. Type locality: Ubombo, Zululand.

Gerrhosaurus major major Loveridge, 1933: 311, 1936: 64, 1942: 502, 1953: 225 and 1957: 224; Wermuth, 1968: 11; Broadley, 1971: 59; Broadley & Blake,

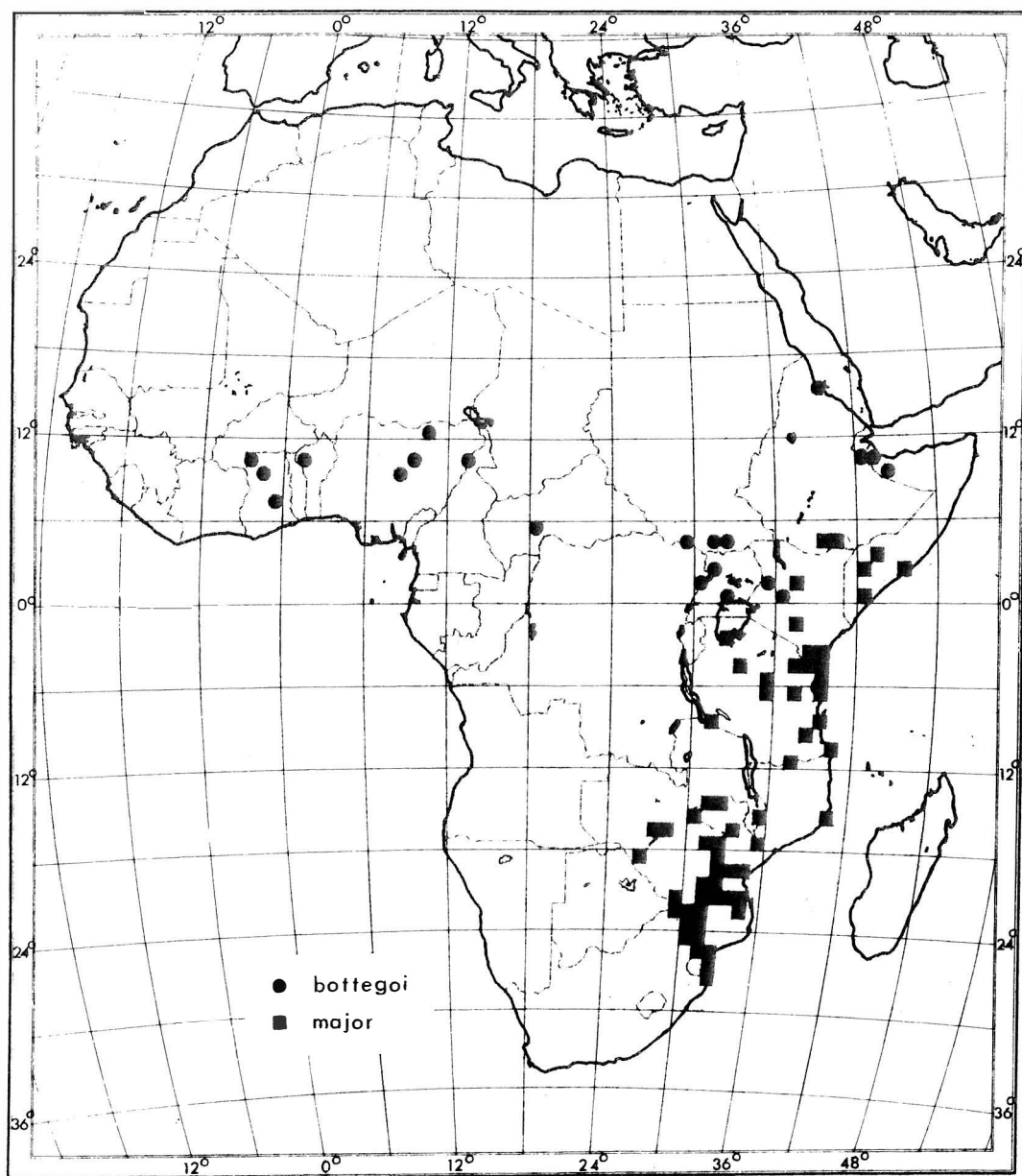


Fig. 2 Distribution of *Gerrhosaurus major* by degree squares.

1979; 8; Pienaar, 1978: 94, pl. 37, 37A; Pakenham, 1983: 20; Pienaar, Haacke & Jacobsen, 1983; 85, pl. 30, 30A.

Gerrhosaurus major zechi (not Tornier) Loveridge, 1933: 311 and 1936: 64.

Gerrhosaurus major bottegoid (not Del Prato) Loveridge, 1942: 498 (part); Witte, 1952: 16; Loveridge, 1957: 224 (part); Wermuth, 1968: 12 (part); Lanza, 1983: 214 (part).

Gerrhosaurus major grandis Loveridge, 1942: 500; FitzSimons, 1943: 280, fig. 162-4; Loveridge, 1953: 224, 1955: 175, 1956: 6, 1957: 224 and 1959: 34; Broadley, 1962: 819; Pooley, 1965: 45, pl. v; Pienaar, 1966: 79, pl. 27, 27A; Rowe-Rowe, 1968: 32, pl.; Wermuth, 1968: 12.

Habitat. Savannas, usually living in rock crevices or old termitaria.

Distribution. Southern Ethiopia and southern Somalia south to Zululand, reaching its western limits in the Hwange District of Zimbabwe (Fig. 2).

Recorded localities. ETHIOPIA: Bisan River (FMNH). SOMALIA: Afgoi (MZUF), Alessandra Island (MZUF), Baidoa (Lanza-photo); Belad (MZUF), Dinsor (MZUF); Giohar (= Villaggio Duca degli Abruzzi: Scortecci 1931); Mareri (CAS). KENYA: Ithanga Hills (MCZ); Ithumba (BM), Kilibasi (AMNH), Kilifi (BM), Laisamis (CAS), Lukenya Hills (USNM), Maji ya Chumvi (MCZ, USNM), Mariakani (NMZB), Mazeras (USNM), Merelle River (USNM), Mt. Mbololo (MCZ), Mt. Sagalla (MCZ, USNM), Murri (BM), Sokoke Forest (Loveridge, 1936b), Taita (Peters, 1878), Takaungu (BM), Tiwi (FMNH), Voi (MCZ, FMNH), Yatta Plain (BM). TANZANIA: Dodoma (MCZ), Kasanga (Witte, 1952), Kilosa (Loveridge, 1923), Kilwa (MCZ), Kwa Mtoro = Mangasini (MCZ, UMMZ), Liwale (MCZ), Luguo & Mkindo River (Loveridge, 1923), Morogoro (AMNH, BM, UMMZ), Mount Kirui (Loveridge, 1923), Mwanza (Loveridge, 1933), Tunduru (MCZ), Ulugu (Loveridge, 1923), Wembere (NMZB), Zanzibar (BM, MCZ). ZAMBIA: Feira District (Boulenger, 1907),

Gwembe Valley (NMZB), 30km West of Katete (NMZB). MALAWI: Lake Chilwa (TM), Libabula River (AMNH, MCZ). MOÇAMBIQUE: Amatongas (BM), Caia (Cott, 1934), Jorge (NMZB), Lumbo (UMMZ), Mkurumbane, Morera and Muabsa (JPT), Muda-Lamego (NMZB), 10km SSE and 25km SE of Ressano Garcia (NMZB), Tete (MCZ, NMZB), Xiluvo (NMZB), Zinave (JPT). ZIMBABWE: Bangala Ranch (NMZB), Birchenough Bridge (TM) and 30km West (NMZB), Chipoli Farm, Doddieburn Ranch, Hot Springs-Chimanmani District, Jemembi Hill, Kapami, Lake Kariba, Mahenya, Malonga Bridge, Matowa, Mutare, Odzi, Ruenya River Drift, Rupisi Hot Springs, Ruware, Sabi Experimental Station, Siyanje, Tanganda Bridge, Triangle (NMZB). TRANSVAAL: Epsom Farm (TM), Griffin Mine and Hectorspruit (MCZ, TM), Kaapmuiden (TM), Komatipoort (CM), Klaserie (TM), Kruger National Park (Pienaar, 1966), Leydsdorp, Malelane (TM), Messina (FitzSimons, 1943), Middlesex Farm (TM), Newington (FitzSimons, 1943), Schelm & Malta Farms, Sekororo, Thulamila (TM), Waterpoort (FitzSimons, 1943). ZULULAND: Ndumu Game Reserve (TM), Ubombo (BM).

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