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Review of the Colubrid Snake Genus *Spalerosophis*

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This report is a study of populations of a group of snakes having a very large range, from northwestern Africa into northern India. The relationships of these populations become evident with the availability of representative samples.

I wish to thank Mr. Charles M. Bogert, American Museum of Natural History (AMNH), Mr. Arthur Loveridge, Museum of Comparative Zoology (MCZ), and Dr. Doris Cochran, United States National Museum (USNM), for the loan of material in their respective institutions. Also I wish to express my gratitude to Dr. Charles Domergue, Service Géologique, Tunis, for donating to Chicago Natural History Museum a topotype of *Coluber choumowitchi* and photographs of the Tunisian form. The large sample of Egyptian material collected by Mr. Harry Hoogstraal, United States Naval Medical Research Unit No. 3, Cairo, Egypt, was most useful in this study of *Spalerosophis*. Unless otherwise designated, the specimens examined are in the collection of Chicago Natural History Museum. The distribution map contains localities of the material examined and localities mentioned in the literature.

Spalerosophis Jan

Chilolepis Fitzinger, 1843, Syst. Rept., p. 26.

Spalerosophis Jan, 1865, *in* De Filippi, Viagg. Pers., p. 356.

Type species.—*Spalerosophis microlepis* Jan, 1865.

The three species of *Spalerosophis* have the following characters in common:

1. Orbit completely surrounded by oculars, excluding the upper labials from the orbit (fig. 59, A).

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2. Prefrontals and loreals broken up into small scales (fig. 59, A).

3. High number of temporal scales (fig. 59, A).

4. Anal plate entire. I have examined only two specimens from Egypt and two from India with the anal plate divided. One other specimen from Egypt has a partly divided anal plate.

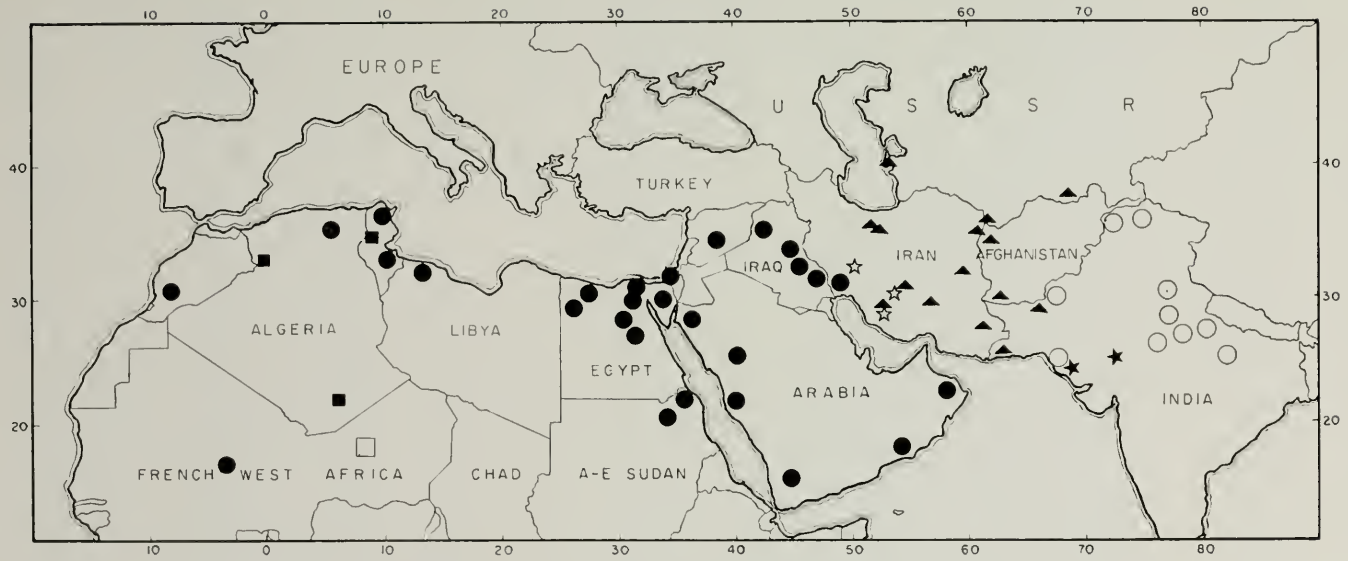
I therefore agree with Schmidt (1930) in maintaining this genus as valid.

The spelling of the generic name has been in question. In the original description of the genus (Jan, 1865) the name is given as *Spalerosophis*, but in the following description of the type species the generic name is spelled *Sphalerosophis*. The first spelling, *Spalerosophis*, is here retained, due to page priority; this spelling is most familiar in the literature.

Unfortunately an older name preoccupies *Spalerosophis* Jan, 1865, i.e., *Chilolepis* Fitzinger, 1843. I retain Jan's name for the following reasons: (1) Fitzinger did not give a diagnosis of *Chilolepis* but used this name in his list of species. (2) *Chilolepis* has not been used to refer to any species in this genus since 1843. The name was used last by Cope (1886) in a generic key. Boulenger (1893) placed *Chilolepis* in the synonymy of *Zamenis*. (3) Since Schmidt (1930) resurrected *Spalerosophis* this name has been used in many papers. In the interest of stability and to retain a name familiar in the literature, I reject the name *Chilolepis* in favor of *Spalerosophis*. This is a case in which application should be made to the International Commission on Nomenclature for the suspension of the rules in favor of the latter name. For a statement of the principles governing the choice of a later name see the discussion by de la Torre and Starrett (1959).

Key to Forms of *Spalerosophis*

1. Mid-body scale rows 41 or more ..... *microlepis*
   Mid-body scale rows 35 or less 2
2. Rostral very long, wedged between but not completely separating internasals. *arenarius*
   Rostral not greatly enlarged 3
3. Narrow dorsal markings on back with irregular margins (fig. 58) 4
   Dorsal markings on back with large, uniformly margined oval spots (fig. 59, B). *diadema dolichospila*
4. Subcaudals 80 or more 5
   Subcaudals less than 80 ..... *diadema cliffordi*
5. Subcaudals usually less than 100 ..... *diadema schiraziana*
   Subcaudals usually 100 or more ..... *diadema diadema*



MAP SHOWING DISTRIBUTION OF *SPALEROSOPHIS*

●=*S. diadema cliffordi*; ■=*S. diadema dolichospila*; ▲=*S. diadema schiraziana*; ○=*S. diadema diadema*; ☆=*S. microlepis*
★=*S. arenarius*; □=*S. diadema cliffordi* or *diadema dolichospila*.

Spalerosophis microlepis Jan

Sphalerosophis microlepis Jan, 1865, *in* De Filippi, Viagg. Pers., p. 356—Laristan, Iran (restricted by Schmidt, 1939).

Loxodon microlepis Jan, 1867, Icon. Gen., **20**, pl. iii.

Zamenis microlepis Boulenger, 1891, Proc. Zool. Soc. London, **1891**: 633.

Spalerosophis microlepis is by far the most highly specialized of the three species of *Spalerosophis*. This species has a greater number of mid-body scale rows (41–45, compared to 25–31), more temporals (anterior, 6–7, compared to 3–6; posterior, 7–8, compared to 3–6), more upper and lower labials, more scales in the ocular ring (12–15, mean 13.3, compared to 7–14), and more dorsal markings on the body.

Werner (1895) recorded a specimen (without locality and unsexed) having 43 mid-body scale rows, 248 ventrals, anal entire, and 101 subcaudals. Wall (1908) recorded two specimens from Maidan Mihaftan, southwestern Iran. These two specimens (also unsexed) have mid-body scale rows 41–45, ventrals 244–258, anal entire, subcaudals 97–109, and 16–17 upper labials.

This rare and distinct form appears to be known only from seven specimens. In the following description the data from the two specimens I have examined are combined with the data available in the literature. Sex data are not available for the specimens listed in the literature.

Mid-body scale rows 41–45; ventrals 240–263; anal entire; subcaudals 97–109; upper labials 13–17; lower labials 14–16; scales in ocular ring 12–15; anterior temporals 6–7; posterior temporals 7–8.

Range.—Apparently restricted to the mountains of southwestern Iran.

Recorded localities.—Iran: Laristan (type locality); Shiraz; Persepolis; Maidan Mihaftan, 30 miles east of Shustar.

Material examined.—Iran: Persepolis (20923, 20929).

Spalerosophis diadema cliffordi (Schlegel). Figure 58.

Coluber versicolor Wagler, 1830 (preoccupied by *Coluber versicolor* Razoumowsky, 1789), Syst. Amph., p. 189.

Coluber cliffordi Schlegel, 1837, Physion. Serp., **2**: 163—type locality Tripoli, Libya.

Chilolepis cliffordi Fitzinger, 1843, Syst. Rept., p. 26.

Periops parallelus Dumeril and Bibron, 1854, Erp. Gén., **7**: 678.

Zamenis cliffordi Günther, 1858, Cat. Snakes Brit. Mus., p. 104.

Zamenis (Periops) versicolor Boettger, 1885, Kobelt, Reisen Alg. Tunis, p. 458.

Spalerosophis cliffordi Schmidt, 1939, Field Mus. Nat. Hist., Zool. Ser., **24**: 77.
Spalerosophis diadema cliffordi Mertens, 1956, Senck. biol., **37**: 225.

With the acquisition of a large series of *cliffordi* from Egypt, collected by the United States Naval Medical Research Unit No. 3, at

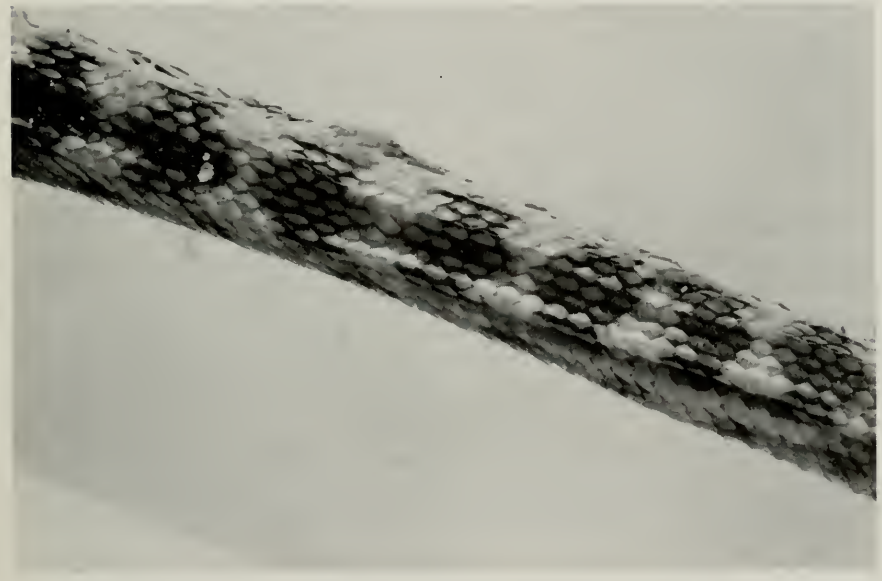


FIG. 58. Dorsal color pattern of *Spalerosophis diadema cliffordi;* CNHM 82671. Photograph by H. Marx.

Cairo, Egypt, it has become possible to evaluate the variation of this form and to clarify its relationship with other populations.

Although *S. d. cliffordi* is distributed from coastal northwestern Africa eastward into the Tigris–Euphrates Valley, its local populations do not differ appreciably (see Table 1). Tunisian, Sudanese, Arabian, Iraqi, and extreme western Iranian material all fall into the range of variation of characters of the material from Egypt. The material from the Tigris–Euphrates Valley is indistinguishable from the material from Egypt. This valley extends into a small portion of extreme western Iran.

The relationship of *cliffordi* to *diadema* from India has long been in question. Its subspecific relationship is now evident with the presence of a geographically intermediate and morphologically intermediate population (*schiraziana*) in Iran, Afghanistan, and western India (see Table 1).

Angel (1933) recorded a specimen from Goundam, French Sudan, as *diadema*. Dr. Jean Guibé of the Paris Museum was kind enough to examine this specimen for me. The data are as follows (Paris Mus. no. 32–15): loreals and prefrontals divided into many scales; dorsals 26; ventrals 210; anal entire; subcaudals 79; tail mutilated; female; upper labials 10 on right side and 11 on left side; lower labials 11; many temporals; scales in ocular ring 11; dorsal spots 51, more or less quadrangular transversely, not rounded. This animal belongs in the genus *Spalerosophis* and its characters agree with the range of variation and color pattern of *S. diadema cliffordi* except that the number of ventrals is slightly low for females.

One specimen of *cliffordi* from Wadi Natroum, Egypt (75982), has an aberrant color pattern. This animal has longitudinal stripes along the entire length of the body. In no other character does it differ from typical *cliffordi*. This female has 31 mid-body scale rows, 239 ventrals, anal plate partly divided, 77 subcaudals, 10 supralabials, 12 infralabials, 10–11 scales in ocular ring, temporals 4–3, total length 894 mm., and tail 0.17 of total length. I interpret this specimen as a mutation.

Range.—North Africa from Morocco and French West Africa (excluding mountains) eastward along the coast of North Africa into Asia, where it extends into the Tigris–Euphrates Valley of Iraq and extreme western Iran.

MATERIAL EXAMINED

Tunisia: Tunis (AMNH 21793).

Libya: Tripolitania; Wadi Talah (82964); Tripolitania, no other data (83056).

Anglo-Egyptian Sudan: No other data (22931, 35421).

Egypt: No other data (63134).

Sudan Government Administrative Area: 2 miles north of Bir Kansisrob (73539).

Beni Suef Province: Beni Suef (63982–83, 63985–88, 73984).

Faiyum Province: No other data (73241, 75244–45); Kom-O-Shim and Bait el Asfar (58487).

Giza Province: Abu Rawash (63133–36, 63989–90, 65928); Sakkara (63132–33, 63993, 63995); near Giza Pyramid (63130–31); Imbaba, Minshat el Bakkari (75243); Abu Sir (69257).

Cairo: Abassia (72087).

Western Desert Governorate: Mariut, Burg el Arab (67248, 75242, 75249); Mariut, El Amiriya (68821); Mersa Matruh (68822–23, 75246); Wadi Natrun (63991–92, 63994, 75982); 5 miles east of Wadi Natrun (79147); Siwa Oasis, Siwa (65924–27).

Beheria Province: El Amiriya (63126–29).

Minufiya Province: Quweisna (69258).

Canal Zone: 4 miles west of Ismailia (72084–85).

Sharqiya Province: Zagazig, Tell Basta (75247–48); Tell el Kabir (69259–60).

Sinai Peninsula: Feiran Oasis (72086); St. Catherine's Monastery (USNM 133644).

ARABIA: Hulaifa (31650); Jidda (31651).

PALESTINE: Near Gaza (48505).

IRAQ: No other data (19580); Baghdad (20857, 28314); Beled Sinjar (19596); Halfayah (19625); Kish (11066–67); Nasinyah (22718–19).

IRAN: Ahwaz (USNM 121592).

Spalerosophis diadema dolichospila (Werner). Figure 59.

Zamenis diadema Schlegel, var. *dolichospila* Werner, 1923, An. nat. Mus. Wien, **36**: 166.

Coluber diadema dolichospila Werner, 1929, S.-B. Akad. Wien, math. nat., **138**: 7—type locality, Ain Sefra, Algeria.

Spalerosophis diadema dolichospila Schmidt, 1930, Field Mus. Nat. Hist., Zool. Ser., **17**: 226.

Coluber choumowitchi Domergue, 1954, Bull. Soc. Sci. Nat. Tunisie, **7**: 37, figs. 1–15—type locality, Redeyeff, Tunisia.

Comparing a topotype of *Coluber choumowitchi* collected by Domergue with the specimen examined by Werner I find that they are identical. Mertens' (1956, p. 225) allocation of *choumowitchi* to *diadema dolichospila* is unquestionable.

The unique color pattern (fig. 59, B) is the only character distinguishing *dolichospila* from the populations to the north and east. *S. d. dolichospila* has large, smooth-edged dorsal spots, whereas all other forms of *diadema* have narrow, irregularly bordered transverse bands and spots. All specimens examined, together with those listed by Domergue (1954), show no variation in this color pattern. I also find no suggestion of this color pattern in the other populations of this species. The occurrence of specimens over a wide range and their agreement in the striking color pattern provide the attributes of a population. This southern mountain population, *dolichospila*, is here recognized as a distinct subspecies on the basis of its strikingly uniform and different coloration and apparent isolation.

Werner (1937) recorded a specimen of *dolichospila* from Ghar, in the Hoggar Mountains of southern Algeria. Angel and Lhote (1938) recorded from Tamanrasset, also in the Hoggar Mountains, a specimen of *diadema* which is probably the same subspecies, *dolichospila*. They also recorded a specimen of *diadema* from the vicinity of Agadez, French Niger, a town at the foot of the Air Mountains; whether

"vicinity" means lowlands or mountains is not stated. The exact altitude and the color pattern are needed to assign this animal either to *diadema cliffordi* or *diadema dolichospila* (see Map).

Range.—Atlas Mountains of Tunisia and Algeria and the Hoggar Mountains of southern Algeria.

Material examined.—Algeria: Ain Sefra (MCZ 27495; this specimen was used by Werner to establish type locality). Tunisia: Redeyeff (75963; topotype of *choumowitchi*).

Spalerosophis diadema schiraziana Jan

Periops parallelus var. *schiraziana* Jan, 1865, *in* De Filippi, Viagg. Pers., p. 356—type locality, Shiraz, Iran.

Spalerosophis schirazianus Schmidt, 1939, Field Mus. Nat. Hist., Zool. Ser., **24**: 77.

Spalerosophis maximus Clark and Inger, 1942, Copeia, **1942**: 166.

Spalerosophis diadema schirazianus Mertens, 1956, Jh. Ver. vaterl. Naturk. Württemberg, **111**: 96.

Jan (1865) did not give scale counts in the original description of *schiraziana*. Boulenger (1893) recorded a specimen from Deh Bid, Iran, which is near the type locality of *schiraziana*. Boulenger's scale counts are similar to the material examined; therefore the name *schiraziana* is applicable to the intermediate populations.

S. d. schiraziana is morphologically intermediate between *d. cliffordi* to the west and *d. diadema* of Pakistan and India (see Table 1) in ventral and caudal counts of both sexes and the relative length of the male tails. It is also geographically intermediate; it forms a natural boundary in the west for it is found in the Zagros Mountains of western Iran eastward through southern Turkmen and Afghanistan into Pakistan and India, where it meets with *d. diadema* (see Map for distribution).

Material examined.—Iran: Teheran (20894, 20959, 20969); Ray (20895, 20908, 20912–13, 20951, 20960–62, 20966).

Spalerosophis diadema diadema (Schlegel)

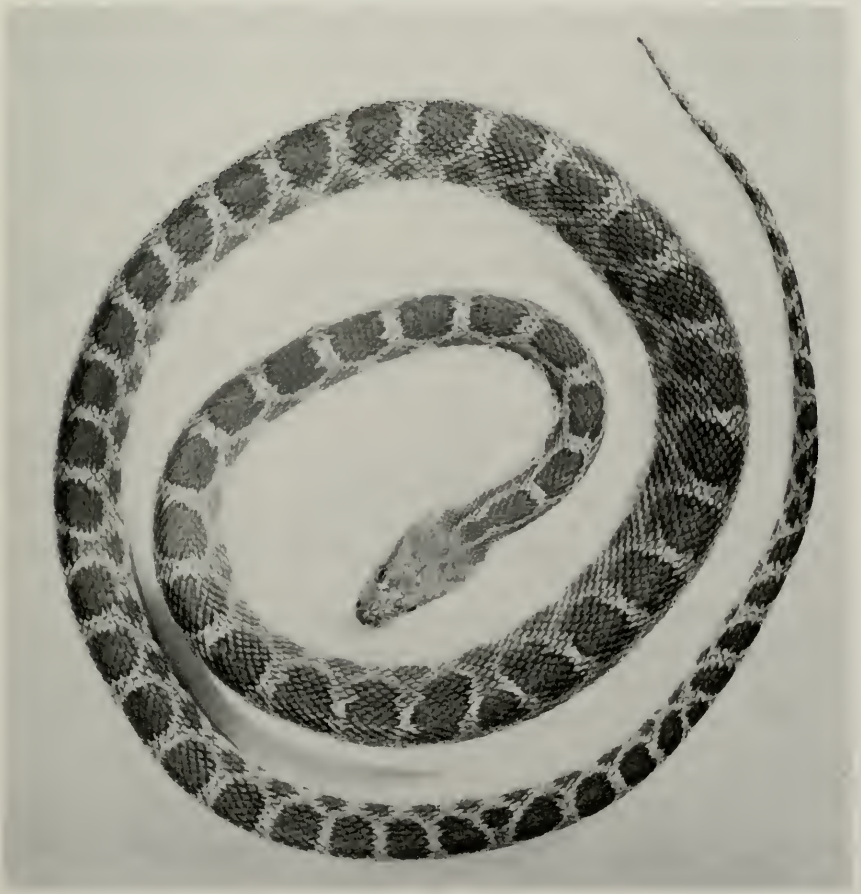
Russell, 1801, Ind. Serp., **2**: 34, pl. 30.

Coluber diadema Schlegel, 1837, Phys. Serp., **2**: 148—type locality, near Bombay, India.

Zamenis diadema Günther, 1864, Rept. Brit. Ind., p. 252, pl. 21, fig. G.

FIG. 59. *Spalerosophis diadema dolichospila*. A, lateral view of head; B, color pattern. Photographs by Ch. Domergue.

A



B

Zamenis diadema var. *atriceps* Fischer, 1885, Jahrb. Hamburg Wiss. Anst., **2**: 102.

Zamenis diadema melanoides Wall, 1911, Jour. Bombay Nat. Hist. Soc., **23**: 211.

Spalerosophis diadema Schmidt, 1930, Field Mus. Nat. Hist., Zool. Ser., **17**: 226.

This eastern form of *diadema* has the highest number of ventrals and subcaudals found in the species. It also tends to have a relatively longer tail compared to the other subspecies.

Smith (1943) may be consulted for a discussion of this form and its color varieties. Wall (1914) has an excellent plate illustrating the color varieties of *d. diadema*. The material examined clearly proves that the strikingly different color variety "*atriceps*" is a synonym of *d. diadema*. The only difference besides color in the "*atriceps*" examined, is that they are all more heavy-bodied and longer (see Table 1) than typical *d. diadema*. This size difference does not necessarily reflect age, for size may also reflect food supply, temperature, etc. I have examined both varieties from the same locality.

The range of variation of male ventrals is 234–246. Boulenger (1893) records a male from Gilgit, India, with 278 ventrals.

Range.—Pakistan and India.

Material examined.—Pakistan: Baluchistan; Quetta (USNM 52142–43); 10 miles from Ambala (MCZ 3766, 9913); Karachi (USNM 13490). India: United Province, Fatchgarb District, Farrakhabad (44980). "India": No other data (AMNH 31705, 36718, 44978).

Spalerosophis arenarius (Boulenger)

Zamenis arenarius Boulenger, 1890, Fauna Brit. India, p. 329—type locality, Karachi and Sind (here restricted to Karachi).

Coluber arenarius Smith, 1943, Fauna Brit. India, **3**: 175.

Spalerosophis arenarius Schmidt, 1930, Field Mus. Nat. Hist., Zool. Ser., **17**: 226.

Spalerosophis arenarius is known only from the two heads and one complete specimen mentioned by Boulenger (1893). These specimens have 25–27 scale rows at mid-body, 10 supralabials, and 9–10 scales in ocular ring. Complete data are not available for the three specimens. Two specimens have 3 anterior temporals and one specimen has 3 posterior temporals.

The only character said to separate *arenarius* from *diadema* is the extremely elongated rostral wedged far between the internasals but not entirely separating the nasals. The scale counts given by Boulenger (1893) do not differentiate this species from *diadema* when the entire range of *diadema* is considered, but *arenarius* does tend to differ

from Indian *diadema* that I have examined in the number of ventrals (*arenarius*, 227; *diadema*, 240–254), subcaudals (*arenarius*, 80; *diadema*, 101–109), and anterior temporals (*arenarius*, 3; *diadema*, 4–5). I therefore consider this population a distinct species. It has also been collected from the same locality as *d. diadema*.

Recorded localities.—India: Rajpootana. Pakistan: Karachi and Sind.

TABLE 1.—VARIATION OF CHARACTERS OF *SPALEROSOPHIS*

	Scale rows		Ventrals (♂)		Ventrals (♀)		Subcaudals (♂)		Subcaudals (♀)	
microlepis	42–43 [42.5]	(2)	240–241 [240.5]	(2)			101	(1)		
diadema dolichospila	31	(2)			227–236 [231.5]	(2)			62–70 [66.0]	(2)
diadema cliffordi										
Tunisia, north	25	(1)	215	(1)			71	(1)		
Anglo-Egyptian Sudan	29	(2)			239–241 [240.0]	(2)			76	(1)
Egypt	25–31 [29.1]	(56)	211–231 [220.6]	(31)	229–246 [238.4]	(24)	70–78 [74.4]	(29)	68–81 [74.3]	(22)
Palestine	31	(1)			239	(1)			81	(1)
Arabia	29	(1)	219	(1)			77	(1)		
Iraq	29–31 [30.3]	(8)	215–228 [219.3]	(4)	223–226 [224.8]	(4)	70–74 [71.8]	(4)	64–67 [65.5]	(4)
Iran, west	33	(1)			233	(1)			73	(1)
diadema schiraziana	25–29 [27.2]	(12)	224–238 [229.0]	(6)	236–245 [239.5]	(6)	81–89 [85.0]	(4)	80–84 [82.4]	(5)
diadema diadema										
"typical"	29	(3)	234–243 [238.5]	(2)	246	(1)	101–108 [104.5]	(2)		
"*atriceps*"	29–31 [29.7]	(6)	240–246 [242.4]	(3)	247–254 [250.5]	(2)	109	(1)	103–104 [103.5]	(2)
arenarius										
data from literature	25–27	(3)	227	(1)			80	(1)		

Numbers in parentheses are numbers of specimens; means are in brackets; plus sign denotes two sides of head.

TABLE 1.—VARIATION OF CHARACTERS OF *SPALEROSOPHIS* (*continued*)

	Supralabials	Infralabials	Anterior temporals	Posterior temporals	Scales in ocular ring	Dorsal blotches on body
microlepis	14–15 [14.5] (4)+	14–16 [15.0] (4)	6–7 [6.5] (2)	7–8 [7.5] (2)	12–15 [13.3] (4)	65–72 [68.5] (2)
diadema doliehospila	11–12 [11.8] (4)	12–14 [13.0] (4)	4 (4)	4–5 [4.5] (4)	10–12 [10.8] (4)	38–46 [42.0] (2)
diadema cliffordi						
Tunisia, north	10 (2)	12 (2)	4 (2)	4–5 [4.5] (2)	10–11 [10.5] (2)	53 (1)
Anglo-Egyptian Sudan	12–13 [12.3] (4)	13 (4)	4–5 [4.8] (4)	4–5 [4.3] (4)	10–11 [10.5] (4)	46–49 [47.5] (2)
Egypt	10–14 [11.9] (112)	10–15 [12.2] (112)	3–6 [4.5] (112)	3–6 [4.6] (112)	8–14 [11.0] (112)	40–61 [48.6] (54)
Palestine	12–13 [12.5] (2)	13–14 [13.5] (2)	5–6 [5.5] (2)	6 (2)	11 (2)	49 (1)
Arabia	10–11 [10.8] (4)	12 (4)	4–5 [4.5] (4)	3–4 [3.5] (4)	9–11 [10.3] (4)	55 (1)
Iraq	10–12 [11.1] (18)	11–15 [12.4] (18)	2–5 [3.8] (18)	3–5 [4.2] (18)	6–10 [8.6] (16)	39–46 [41.9] (7)
Iran, west	11 (2)	11 (2)	4 (2)	4 (2)	11 (2)	46 (1)
diadema schiraziana	12–14 [12.4] (24)	12–14 [12.9] (24)	3–5 [4.3] (24)	4–6 [4.8] (24)	7–11 [9.0] (24)	50–65 [58.2] (10)
diadema diadema						
"typical"	10–13 [11.8] (6)	13–14 [13.2] (6)	4–5 [4.5] (6)	4–6 [5.4] (6)	9–11 [9.7] (6)	49–57 [52.3] (3)
"*atriceps*"	10–13 [11.0] (12)	11–14 [12.1] (12)	4–6 [4.6] (12)	4–6 [5.1] (12)	8–10 [8.5] (12)	
arenarius						
data from literature	10 (6)		3 (6)			

TABLE 1.—VARIATION OF CHARACTERS OF *SPALEROSOPHIS* (*continued*)

	Total length (largest ♂)	Total length (largest ♀)	Relative tail length ♂	Relative tail length ♀
microlepis	1005 (1)		0.22 (1)	
diadema doliehospila		728–1020 [874.0] (2)		0.16–0.17 [0.165] (2)
diadema cliffordi				
Tunisia, north	779 (1)		0.18 (1)	
Anglo-Egyptian Sudan		1056 (1)		0.17 (1)
Egypt	832–1143 [949.9] (10)	914–1349 [1063.9] (10)	0.16–0.20 [0.183] (29)	0.15–0.19 [0.17] (22)
Palestine		950 (1)		0.18 (1)
Arabia	322 (1)		0.18 (1)	
Iraq	375–1275 [921.7] (3)	1115–1648 [1302.3] (4)	0.15–0.18 [0.163] (3)	0.15–0.17 [0.158] (4)
Iran, west		1342 (1)		0.18 (1)
diadema schiraziana	378–1200 [966.5] (4)	725–1222 [1097.4] (5)	0.19–0.20 [0.198] (4)	0.18–0.19 [0.186] (5)
diadema diadema				
"typical"	474–755 [624.5] (2)		0.21–0.22 [0.215] (2)	
"*atriceps*"	1571 (1)	1644–1687 [1665.5] (2)	0.24 (1)	0.22 (2)
arenarius				
data from literature	930 (1)		0.188 (1)	

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