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A NEW SPECIES OF THE KLIPFISH GENUS *SPRINGERATUS* (CLINIDAE) FROM THE INDIAN OCEAN

BY

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INTRODUCTION

Klipfishes of the subfamily Clininae are among the dominant intertidal fishes in southern Africa. Except for a few tropical clinine members such as *Clinus xanthosoma* Bleeker, *Clinus ekloniae* McKay and *Petraites roseus* (Günther), these diverse temperate forms seem to be replaced by members of the Blenniidae in the intertidal zone of the tropical Indo-Pacific. Klipfishes have not been collected often in the tropical Indo-Pacific, but often enough to indicate a distribution for *C. xanthosoma* from Japan through the Philippines to Indonesia and Ceylon. In a recent publication Shen (1971 b) has brought our knowledge of *C. xanthosoma* up to date and described a new genus, *Springeratus* to house this species. The status of *C. halei* has been and still remains uncertain since Day described it in 1888.

While collecting fishes at Mauritius, an undescribed intertidal clinid was obtained. This population of live-bearing klipfish contributes to our understanding of the zoogeography and possible relationships of Australian and southern African Clininae. Penrith (1969: 114) hypothesized sea-weed transport of a clinid ancestor from Australia to South Africa. The Mauritian species favours her hypothesis as well as casting some doubt on the validity of *Springeratus* as a genus different from *Clinus* (*sensu* Penrith, 1969).

METHODS

Counts and measurements were made according to Hubbs and Lagler (1958), except that body depth is measured from the anal fin origin to the base of the dorsal fin to avoid variation caused by full or empty visceral cavities. Measurements were made with dial calipers. The mandibular pore formula (10+9, for example) indicates bilateral counts of the pores from the mandibular symphysis to the base of the preopercle (Fig. 2) but does not indicate which count is from the right or left side. Head pores were examined with the aid of a small jet of air. Vertebral counts were taken from radiographs. Line drawings were made using a Wild M-5 dissecting microscope with camera lucida attachment.

Springeratus polyporatus new species

DIAGNOSIS. A small species not exceeding 50 mm SL with a low dorsal fin crest (first three dorsal spines 7-10% SL), poorly developed genital valves, multiple cirri near tips of third and fourth dorsal spines, paired pores in anterior part of lateral line and high number of pores in cephalic lateralis system.

DESCRIPTION. For body shape see Figure 1. Proportions (as a percentage of standard length): orbit length 6-8%; bony interorbital width 2-3%; pectoral fin length 14-21%; snout to dorsal fin origin 15-18%; snout to anal fin origin 43-49%; caudal peduncle depth 5-7%; fourth dorsal spine length 4-6%. Ranges and frequencies of other proportions are given in Table 1.

Ranges and frequencies of meristic character are given in Table 2 except for the following: pored lateral-line scales 45-52; gillrakers 7-11; pectoral fin 12-14; pelvic fin I,3; principal caudal rays 7+6; palatine teeth 1-12, usually 6 or less. All fin rays unbranched.

Disposition of head pores is shown in Figure 2. Anterior 17-21 pored lateral-line scales bear vertical pairs of pores (ventral pores sometimes difficult to see), followed by scales with single pores opening dorsally and finally scales with short, separate, horizontal tubes with a pore at each end.

Nasal tentacle simple; supraorbital tentacle a flattened tab with three or more cirri on fringe; cirri present on tips of up to first nine dorsal fin spines, usually one cirrus per spine except for the third and fourth spines, which often have two or more cirri.

Intromittent organ of male has a short, narrow tip without lateral lips, basal portion thick, not very long when everted; genital valves very low (Fig. 3). Ovaries of one 37 mm female with young developed to eyed stage, no other females examined for this condition.

COLOURATION. Body a brownish red with gold spots on sides. Vertical banding absent on freshly killed specimens, although colour pattern of dorsal and anal fins indicates such patterns may exist. In 40% n-propyl alcohol colour is pale yellow-orange with lighter areas replacing gold spots.

OSTEOLOGY. All of the bones described by Shen (1971a) for *S. xanthosoma* are present in *S. polyporatus*. Some bones appear to differ in shape from those illustrated by Shen but no detailed comparison was made.

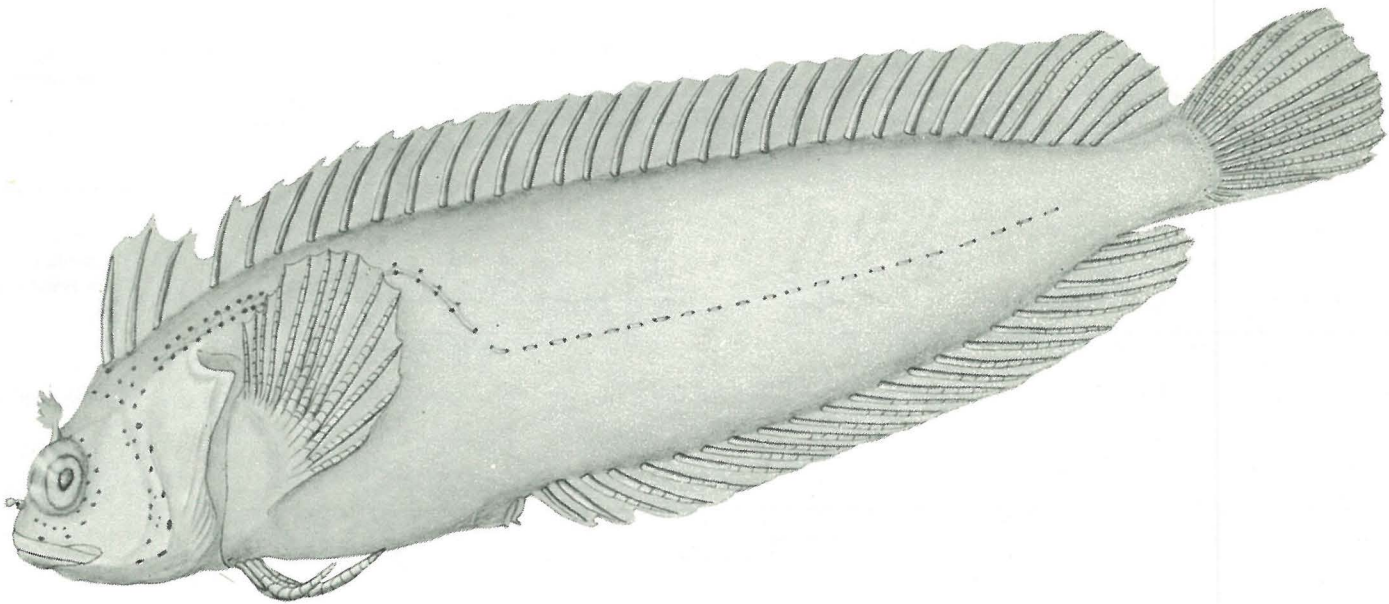

FIGURE 1.
Springeratus polyporatus, lateral view of the holotype. Scale = 10,0 mm.

TABLE 1.

FREQUENCY DISTRIBUTIONS OF MORPHOMETRIC CHARACTERS EXPRESSED AS A PERCENTAGE OF STANDARD LENGTH FOR TWO SPECIES OF *SPRINGERATUS*.

	Snout Length						Upper jaw length								Head length								
	3	4	5	6	7	8	7	8	9	10	11	12	13	14	23	24	25	26	27	28	29	30	31
S. xanthosoma																							
Typical	–	8*	14*	10	1	2	1*	–	4	11*	5	11	2	1	–	1*	1*	3*	4	8	10	6	2
Ceylon	–	3	4	–	–	–	–	3	3	1	–	–	–	–	2	1	1	2	1	–	–	–	–
S. polyporatus	2	17†	2	–	–	–	1	10	9†	1	–	–	–	–	–	–	8	10†	3	–	–	–	–

	Body depth									First dorsal spine length													
	19	20	21	22	23	24	25	26	27	7	8	9	10	11	12	13	14	15	16	17	18	19
S. xanthosoma																						
Typical	1*	–	2*	4*	6	9	5	5	3	–	–	1	3	6*	5	4*	3	2*	3	3	3	2
Ceylon	–	2	2	3	–	–	–	–	–	–	1	2	1	–	1	–	–	1	–	–	–	–
S. polyporatus	–	5	11†	1	2	–	–	–	–	3	12†	4	2	–	–	–	–	–	–	–	–	–

	Second dorsal spine length											Third dorsal spine length						
	7	8	9	10	11	12	13	14	15	16	17	5	6	7	8	9	10	11
S. xanthosoma																		
Typical	–	–	–	6*	8	5*	1	4*	4	6	2	–	3*	14*	4	6	7	1
Ceylon	–	–	1	2	2	–	–	1	–	–	–	–	2	4	–	1	–	–
S. polyporatus	2	9	7†	3	–	–	–	–	–	–	–	1	13†	7	–	–	–	–

*includes syntypes of *S. xanthosoma*.

†includes holotype of *S. polyporatus*.

MATERIAL EXAMINED. Holotype. J. L. B. Smith Institute of Ichthyology, Rhodes University. RUSI 664 (46,3 mm SL) a male, Mauritius, 1,7 miles west of Riambel at a rocky prominence, rock tide pool, depth 0-2′, THF-SA-43, 26 March 1970, Thomas H. Fraser. Paratypes. RUSI 3378 (15, 20,4-49,7), RUSI 2428 (2, 37,0-37,5) cleared and stained, USNM 206173 (2, 45,5-46,5), Mauritius, same data as holotype. RUSI 2070 (3, 19,2-29,4) Mauritius, 1,0 miles east of Beauchamp near Jacotet Bay, rock tide pool, depth 0-3′, THF-SA-27, 6 March 1970, Thomas H. Fraser. RUSI 2181 (3, 25,5-48,4) Mauritius, 1,0 miles east of Beauchamp near Jacotet Bay, rock tide pool, depth 0-5′ THF-SA-30, 7 March 1970, Thomas H. Fraser.

ETYMOLOGY. *Polyporatus* – from the noun (pore or passage), the adjective *poly* (many), and the suffix – *atus* (provided with) an adjective; referring to the numerous cephalic head pores.

DISTRIBUTION AND ECOLOGY. This species is known only from Mauritius, where it is common on volcanic rock that is densely covered with macro-algae and unprotected seaward by fringing coral reefs. Large swells cause a heavy surge making fish collecting difficult even at spring low tides and with a relatively calm sea. Where the coral reef is absent or poorly developed especially on the south coast, the full force of the sea strikes these rocky points and macro-algae thrive. Luxurious growths of algae may be partly due to a decrease in grazing from the larger tropical herbivores that are present but restricted by the heavy surf. These habitats are strongly reminiscent of intertidal clinid habitats in South Africa. Restriction of suitable habitats makes it unlikely that *S. polyporatus* will be found on any of the low islands in the western Indian Ocean. It may occur at Rodgriquez and Reunion and possibly the southern tip of Madagascar.

REMARKS. *Springeratus polyporatus* is similar to *S. xanthosoma*. There are no meristic differences except for lateralis-pore counts. Only the mandibular system was examined in detail (Table 2 and 3) but other meristic differences are present in the number of pores of the preopercular and supratemporal canals. In addition there are two pores on each anterior lateral-line scale but only one pore per scale in *S. xanthosoma*. Some morphological differences are obvious. Snout length and upper jaw length are shorter in *S. polyporatus* and the species also has a lower dorsal crest composed of the first three spines (Table 1). The second dorsal spine is usually equal to or slightly longer than the first spine in *S. polyporatus* whereas in *S. xanthosoma* the second dorsal spine is usually much shorter than the first.

Variation in the number of mandibular pores occurs only in the fourth, fifth and sixth groups (Fig. 2 and Table 3). Most variation occurs in the fifth group (2-5 pores) while the fourth group almost always has two pores and the sixth group either one or two pores. *S. xanthosoma* almost always has one pore at position six and shows most frequent variation at the fourth and fifth positions.

Whereas Shen (1971b) reports sexual dimorphism for the lengths of upper jaw and first dorsal spine (and hence the crest) as well as for other characters he analysed for *S. xanthosoma*, none is found for these characters in *S. polyporatus*. The Mauritian klipfish is a smaller species, reaching about 50 mm SL, whereas *S. xanthosoma* attains a standard length of at least 70 mm.

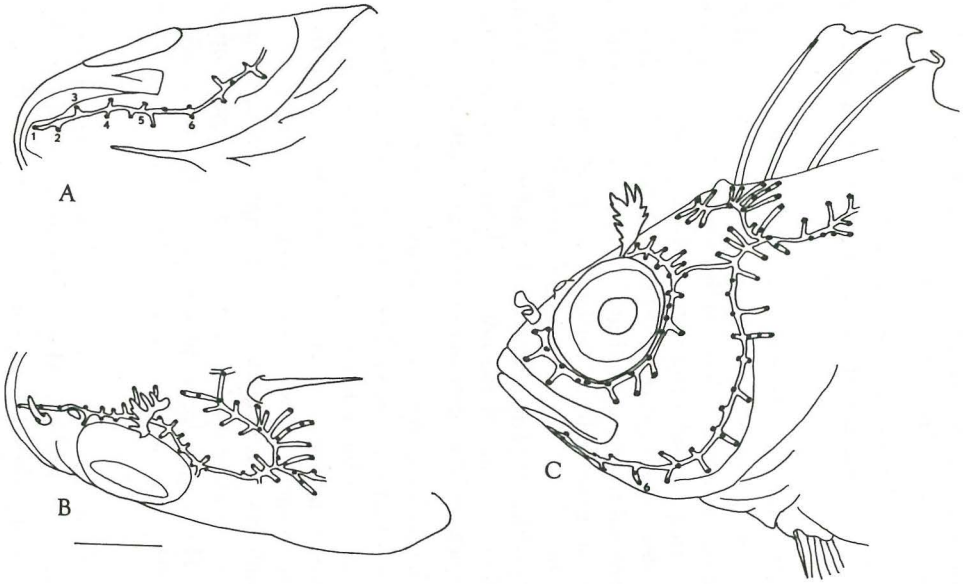

FIGURE 2.

Springeratus polyporatus, head pore pattern, 37,0 mm male paratype, with position of the mandibular pores indicated. **A.** Ventral view, **B.** dorsal view, **C.** lateral view. Scale = 2,0 mm.

Springeratus xanthosoma (Bleeker)

REMARKS. I have little to add to Shen's (1971b) description of *S. xanthosoma*. Comparisons of some characters are given in Tables 1-3. The material examined is essentially the same as Shen's.

Shen (1971b) had only one specimen of *Springeratus* from the India-Ceylon area and it differs in certain meristic characters from other populations of *S. xanthosoma:* 12 pectoral rays, 28 dorsal spines and six soft dorsal rays, and the reduced number of mandibular pores (pers. obs.). The genital valves (or flaps) are also reduced in this specimen (Fig. 3). I examined six additional specimens from Ceylon but was unable to determine the significance of the differences they exhibited from other *S. xanthosoma.* More variation occurs in the number of dorsal fin elements (Table 2) and the genital valves are more reduced than in other specimens. Head length and first and second dorsal spine lengths appear to be shorter in the Ceylon specimens than in other specimens of *S. xanthosoma* but the data (Table 1) are not conclusive. Ceylon specimens of *Springeratus* differ more from Java and Bali specimens of *S. xanthosoma* in these respects than these specimens differ from Okinawa specimens of *S. xanthosoma.*

Day's (1888: 799) description of *Clinus halei* (type locality: Ceylon) agrees with the specimens examined from Ceylon except that these have palatine teeth. The palatine dentition was probably overlooked by Day. The holotype of *C. halei* appears to be lost, but there is no overriding reason to doubt that this name applies to these specimens.

The question of what taxonomic status should be awarded the Ceylon population in relation to other populations of *S. xanthosoma* remains. Unfortunately, the data are insufficient to solve this question. Shen (1971b) questionably synonomized *C. halei* with *S. xanthosoma*, and so it should remain until more data indicate otherwise.

MATERIAL EXAMINED. *Springeratus xanthosoma* (Bleeker), 1857 Syntypes. RMNH 4798 (3, 45,4-68,0) Java, Karangbolong, ca 1850, P. Bleeker.

Other specimens. CAS 24740 (4, 24,9-46,2) Philippine Islands, Negros Oriental, Dumaquete Beach 17 July 1958. CAS 24739 (3, 48,6-56,9) same data as CAS 24740. SU 29569 (1, 61,7) Philippine Islands. La Union Province, Paraorr, 1933. AMNH 14796 (25, 32,0-70,8). Indonesia, Bali Island, Lerner Expedition, 1939. USNM 71507 (42, 26,5-52,6) Ryuku Islands, Okinawa, Albatross Expedition, 1906. USNM uncat. (18, 49,1-68,7) Taiwan, VGS 68-25. Uncat. (1, 43,5) India, Gulf of Mannar, 24 Dec. 1969, Central Marine Fisheries Research Institute, Mandapam Camp. FMNH 71358 (1, 55,9) Ceylon, Pamban Pass, Single Is., 20 Jan. 1964. FMNH 71359 (5, 25,7-59,3) Ceylon, Galle, 5 March 1964.

Petraites antinectes (Günther), 1861. P6764 (1, 37,6) Australia, Triggs Island, 25 Jan. 1957.

Petraites heptaeolus Ogilby, 1885. P19222-3 (2, 68,7-75,9) Australia, Perth, Nov. 1959.

Petraites roseus (Günther), 1861. P885-6 (2, 108,1-111,4) Australia, Cottesloe, 24 July 1923.

TABLE 2.

FREQUENCY DISTRIBUTIONS OF MERISTIC CHARACTERS IN TWO SPECIES OF *SPRINGERATUS*.

	Dorsal spines					Dorsal rays					Anal rays						Pectoral rays[1] (both fins)			
	27	28	29	30	31	3	4	5	6	7	17	18	19	20	21	22	24	25	26	27
S. xanthosoma																				
Typical	–	–	9	27*	–	–	24*	12*	–	–	–	–	1	12	21*	2	–	3	66*	2
Ceylon	1	1	2	2	1	–	3	2	1	1	–	–	–	2	5	–	1	–	6	–
S. polyporatus	–	–	12	14*	–	1	21	4*	–	–	2‡	–	3	15	6†	–	–	1	25†	–

	Mandibular pores[1]												
	6 · 6	6 · 7	7 · 7	8 · 7	8 · 8	(7 · 9)	8 · 9	(7 · 10)	9 · 9	10 · 9	10 · 10	11 · 10	11 · 11
S. xanthosoma													
Typical	–	–	6*	12*	13	5	24	–	33	1	–	–	–
Ceylon	1	–	2	1	1	–	1	–	1	–	–	–	–
S. polyporatus	–	–	–	–	–	–	1	1	4†	1	10	2	1

	Vertebrae[2]				
	38	39	40	41	42
S. xanthosoma					
Typical	3	9	74*	46*	6
Ceylon	–	1	3	3	–
S. polyporatus	–	4	9†	2	1

[1] includes counts on Taiwan and Okinawa specimens of *S. xanthosoma*.
[2] includes Shen's counts on *S. xanthosoma*.
* includes syntypes of *S. xanthosoma*.
† includes holotype of *S. polyporatus*.
‡ two fin rays not developed externally.

TABLE 3.

ANALYSIS OF MANDIBULAR PORE VARIATION (BOTH SIDES) IN *SPRINGERATUS* BY PORE GROUP.

Number of pores per group	*S. xanthosoma*												*S. polyporatus*					
	Typical						Ceylon											
	Pore Group						Pore Group						Pore Group					
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
0	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
1	189*	190*	189*	58*	2*	189*	14	14	14	11	2	14	40†	40†	40†	2	–	21†
2	–	–	1	132*	65*	1	–	–	–	3	5	–	–	–	–	38†	1	19
3	–	–	–	–	123*	–	–	–	–	–	7	–	–	–	–	–	29†	–
4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	9	–
5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–

* includes syntypes of *S. xanthosoma*.

† includes holotype of *S. polyporatus*.

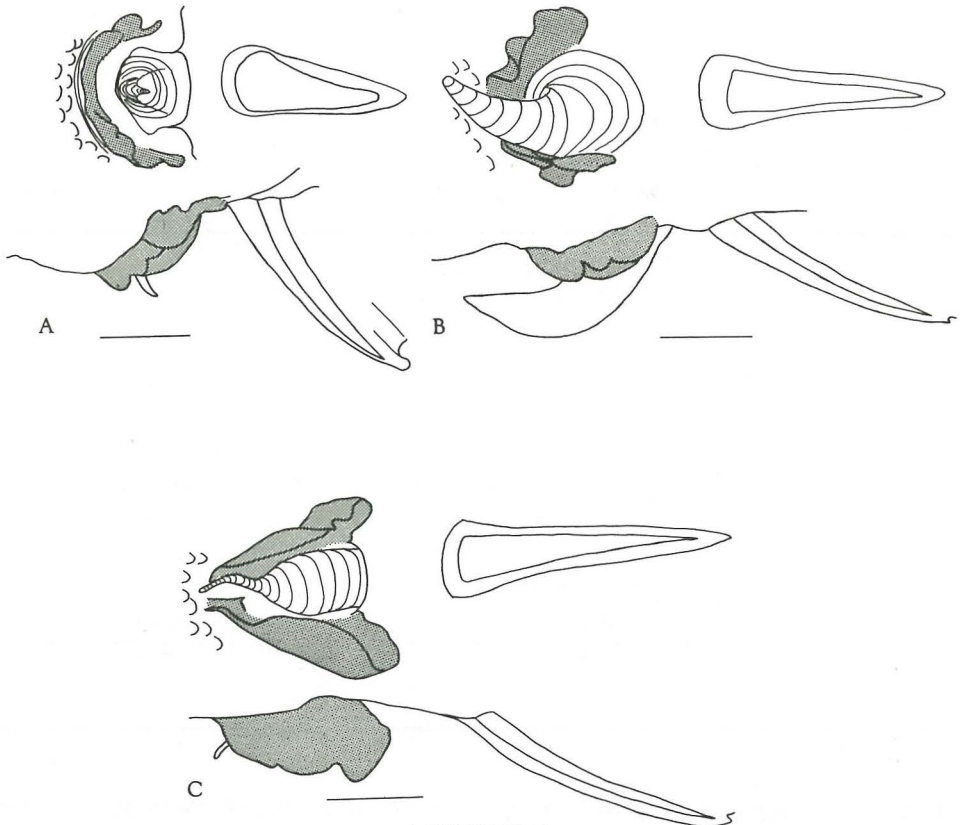

FIGURE 3.

The genital apparatus in three specimens of *Springeratus* in lateral and ventral view. **A.** *Springeratus polyporatus*. Mauritius SL 46,3 mm Holotype. **B.** *Springeratus xanthosoma*. Gulf of Mannar. SL 43,5 mm (Tip of intromittent organ appears to be broken off). **C.** *Springeratus xanthosoma*. Okinawa, SL 48,8 mm. Genital flaps are shaded to indicate the amount of development. Scale= 1,0 mm.

GENERAL REMARKS ON SPRINGERATUS

The two closely related species of *Springeratus* are allopatric and allopatry poses the problem of how to treat such taxa – as a single variable species, a single species with two subspecies or as two different species. Gosline and Brock (1960: 20-26) discuss these problems with reference to isolated islands and concluded that the decision was ultimately arbitrary.

I have no reason to believe that the Mauritian fish fauna is highly isolated, yet the habitat requirements of *Springeratus* suggest that *S. polyporatus* arose as the result of isolation. Present current patterns isolate the Mascarenes in the Indian Ocean except from the northwestern Australian region. There is only one high island between the triangle formed by Australia, South Indonesia (Java is the nearest reported locality up current for *S. xanthosoma*) and the Mascarenes – Christmas Island about 5 000 kilometres to the east-northeast. A low island group, the Cocos-Keeling Atoll is about 800 kilometres closer to Mauritius than Christmas Island but the presence of a suitable algal covered igneous rock habitat at Cocos-Keeling is unlikely (Maes, 1967: 99-101). No specimens of *Springeratus* have yet been recorded from the Seychelle Islands so the likely origin of the Mauritian clinid appears to have been from the Indonesian-Australian region. This distant physical isolation probably contributed to the biological mechanisms that brought about the differentiation of the Mauritian population.

The merits of recognizing *Springeratus* are open to question. The genital valves and presence of palatine teeth distinguish *Springeratus* from *Clinus* (*sensu* Penrith, 1969) and *Petraites*, an ill-defined genus close to *Clinus*. The significance of the variously developed genital valves has not been demonstrated. *S. polyporatus* has reduced valves, as do the Ceylon and Bali *S. xanthosoma* but these valves are larger in other populations of *S. xanthosoma*. No South African *Clinus* (or other genera) have similar valves but somewhat different valves are present in some Australian species of *Cristiceps* and *Petraites* (Shen 1971b, Fig. 8; Milward, 1967). Unfortunately, McKay (1970) does not mention this character for *Clinus eckloniae* in his discussion where he synonymizes *Petraites* with *Clinus*. *Springeratus polyporatus* has fewer palatine teeth than *S. xanthosoma* and may indicate a trend toward the loss of palatine teeth in Indo-Pacific Clininae. If this is true, then distinguishing characters such as the genital valves and palatine teeth may represent changes of degree not kind.

The origin of the viviparous South African Clininae is obscure. Penrith (1969: 105-106, 110) suggested a "myxodidlike" ancestor in agreement with Hubbs (1952: 55-56). In the same paper, Penrith (1969: 114) contradicted her earlier suggestion and proposed that the oviparous Myxodini were derived most probably from a viviparous Indo-West Pacific clinid. Springer (1970: 434) disagreed with this last proposal, believing that a common oviparous ancestor for the Myxodini and Clinini was more parsimonious. *Springeratus polyporatus* indicates that transport across the Indian Ocean is possible. Whether *Springeratus* or its ancestor gave rise to the rich South African fauna is unknown but it does possess most of the primitive conditions listed by Penrith (1969: 110, Table 8) for the South African Clinini.

LITERATURE CITED

DAY, F.

1888. *Fishes of India. Supplement.* Norman and Son, Printers, London. 779-816, many figs.

GOSLINE, W. A. and BROCK, V. E.

1960. *Handbook of Hawaiian Fishes.* Univ. of Hawaii Press, Honolulu, i-ix, 1-372, 277 figs.

HUBBS, C.

1952. A contribution to the classification of the blennioid fishes of the family Clinidae, with a partial revision of the eastern Pacific forms. *Stanford Ichthyol. Bull.* **4** (2): 41-165, 64 figs, 6 tabs, 79 graphs.

HUBBS, C. L. and LAGLER, K. F.

1958. Fishes of the Great Lakes region. *Cranbrook Inst. Sci. (revised ed.) Bull.* 26: i-lxi, 1-213, 44 Pls, 251 figs.

MAES, V. O.

1967. The littoral marine mollusks of Cocos-Keeling Islands (Indian Ocean). *Proc. Acad. Nat. Sci. Phila.* **119** (4): 93-217, 26 Pls, 4 figs.

McKAY, R. J.

1970. Additions to the fish fauna of western Australia. 5. *Dept. Fish. Fauna Westn. Australia, Fish. Bull.* **9** (5): 3-24, 2 figs, 2 tabs.

MILWARD, N. E.

1967. The Clinidae of western Australia (Teleostei, Blennioidae). *J. Proc. R. Soc. West. Aust.* **50** (1): 1-9, 7 figs, 2 tabs.

PENRITH, M. L.

1969. The systematics of the fishes of the family Clinidae in South Africa. *Ann. S. Afr. Mus.* **55** (1): 1-121, 48 figs, 8 tabs.

SHEN, S. C.

1971a. Osteological study of *Springeratus xanthosoma* (Bleeker) from the Indo-Pacific region exclusive of South Africa, Australia and New Zealand. *Rep. Inst. Fish. Biol., Taiwan,* **2** (4): 16-39, 12 figs.

1971b. A new genus of clinid fishes from the Indo-Pacific with a redescription of *Clinus nematopterus. Copeia* **1971** (4): 697-707, 8 figs, 4 tabs.

SPRINGER, V. G.

1970. The western South Atlantic clinid fish *Ribeiroclinus eigenmanni*, with discussion of the intrarelationships and zoogeography of the Clinidae. *Copeia* **1970** (3): 430-436, 1 fig, 1 tab.

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