

Description of *Pelonia africana* n. g., n. sp. (Pentastomida: Sebekidae) from the lungs of *Pelomedusa subrufa* and *Pelusios sinuatus* (Chelonia) in South Africa

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ABSTRACT

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The terrapins *Pelomedusa subrufa* and *Pelusios sinuatus* taken from a water reservoir in the Northern Province, South Africa, were examined for pentastome infections. Two immature specimens, a patent female and a mature male, were obtained from the lungs of four hosts, each of which harboured a single specimen. Based on the morphology of the specimens the new monospecific genus, *Pelonia africana* n. g., n. sp., is described. It is characterized by smooth, dorsally convex hooks with sharply bent blades. The oral cadre is more or less U-shaped. Delicate chitinous fibres, which can be difficult to see, connect the lateral prongs anteriorly. In this, as well as the morphology of the copulatory spicules, it is most like *Sebekia wedli*. The latter, however, possesses spinous hooks, which are absent in *P. africana*. The hooks are slightly and the copulatory spicules markedly larger in *P. africana* than in *S. wedli*. The lack of a double-hooked collar at the terminal end of the cowry-shell shaped base of each copulatory spicule and the absence of a peg-like extension of the oral cadre into the oesophagus, distinguishes *P. africana* from members of the genus *Alofia*.

The oral cadre of the South American species *Diesingia megastoma*, from aquatic chelonians, is more than twice the size than that of *Pelonia* and there is a distinct difference in shape. The hooks of the genus *Diesingia* are flat-topped, and both the anterior as well as the posterior fulcra carry cowl-like extensions. The number of annuli, 55–60 in *D. megastoma* and approximately 30 in *P. africana*, further separates the two genera. The most striking feature of *Diesingia* which sets it apart from *Pelonia* and the other genera of the family Sebekidae, is the configuration of its copulatory spicules.

Pelonia and *Diesingia* share morphological features with all the other sebekiids, but it is the unique combination of diagnostic characters that separates the two genera from those, as well as from each other.

Keywords: Chelonia, *Pelomedusa*, *Pelonia africana*, *Pelusios*, pentastomes, terrapins

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INTRODUCTION

The majority of the six genera comprising the family Sebekidae Fain, 1961 occur exclusively in crocodilians. However, it has been speculated that a single species of the genus *Sebekia* Sambon, 1922 may also reach maturity in piscivorous turtles (Dukes, Shealy & Rogers 1971). Until now, only the South American genus *Diesingia* Sambon, 1922 has been known to be exclusive to a chelonian definitive host (Sambon 1922; Heymons 1941; Over-

street, Self & Vliet 1985; Riley 1994) and, generally speaking, information on the pentastome fauna of tortoises, terrapins and turtles is scarce.

Fain (1961) refers to a nymphal pentastome found encysted in the liver of *Kachuga lineata*, a semi-aquatic oriental tortoise, which Hett (1924) assumed to be the infective larva of *Subtriquetra megacephala* (Baird, 1853) Sambon, 1922. The latter genus belongs to the family Subtriquetridae Fain, 1961, which is also believed to be exclusive to crocodilians (Riley 1986; Winch & Riley 1986; Junker, Boomker & Booyse 1998a). In addition, some five genera of terrapins from North America have been reported to harbour nymphs of *Sebekia mississippiensis* Overstreet, Self & Vliet, 1985, a crocodilian pentastome described from the American alligator, *Alligator mississippiensis* (Dukes *et al.* 1971; Boyce 1985; Overstreet *et al.* 1985). Significantly, all the literature cited above pertains to nymphal developmental stages of pentastomes.

It would appear that *Diesingia megastoma* (Diesing, 1836) (Sambon, 1922) is currently the only pentastome of which mature specimens have been recovered from the chelonian hosts, *Hydromedusa tectifera* and *Phrynops Geoffroyana* (= *Hydraspis Geoffroyana*) from Brazil (Diesing 1836; Heymons 1941; Self & Rego 1985; Da Fonseca & Ruiz 1956). The authors are not aware of any publications dealing with adult pentastomid parasites of chelonians from any other continent.

In this paper a pentastome from the lungs of two South African terrapins, *Pelomedusa subrufa* and *Pelusios sinuatus*, is described. *P. subrufa* occurs in pans, marshy areas and slow moving waters throughout southern Africa, and *P. sinuatus* inhabits large rivers and pans in the north-east of southern Africa. Both terrapins are omnivorous and fish form part of their diet (Patterson 1991).

Pelonia africana n. g., n. sp. shares morphological similarities with all the other genera of the family Sebekidae, but nevertheless possesses a unique combination of diagnostic criteria. Slide mounted specimens of *D. megastoma* were re-examined and found to be distinctly different from the pentastomes recovered from the South African terrapins. We thus consider it appropriate to erect a new genus to accommodate these specimens.

MATERIAL AND METHODS

In 2000 five *P. sinuatus* (host numbers Psin1–5) and a single *P. subrufa* (host number Psub1), with

carapace lengths varying from 15–25 cm, were obtained from pans or marshy areas near the Arabie Dam, Northern Province. This dam is fed mainly by the Olifants River, but the Elands, Moses and Motsiphiri Rivers also feed into it (A. Hoffman, personal communication 2000).

Terrapins were either killed by intraperitoneal injection with sodium pentobarbitone (Eutha-naze™) or decapitated. The plastron and carapace were removed and the trachea, as well as the nasopharynx, were examined for pentastomes. The liver and heart were transferred into separate vials containing tap water, and the soft and delicate lungs were placed into a Petri dish, also containing tap water. Pentastomes were either dissected from the organs or collected from the tap water after they had migrated out of the organs. For morphological studies, pentastomes were fixed and preserved in 70% ethanol and subsequently mounted in Hoyer's medium.

Three more pentastomid specimens, WIII/1, and Psub2/1 and Psub3/1 from the lungs of *P. sinuatus* and *P. subrufa* respectively, were collected during another unrelated study at the same locality and made available to us.

RESULTS

The nasopharynx and trachea of all hosts examined were free of pentastomes and hosts number Psin1, 3, 4 and 5 and Psub1 harboured no pentastomes at all. Single specimens of *P. africana* were recovered from the lungs of each of the remaining hosts. Premature females, without eggs in the uterus, were obtained from hosts WIII and Psin2. A gravid female collected from Psub2 contained eggs with fully developed primary larvae. A mature male was present in the lungs of Psub3.

Description of *Pelonia africana* n. g., n. sp. (Table 1)

TYPE HOSTS AND LOCALITY

Pelusios sinuatus and *Pelomedusa subrufa* from the Arabie Dam (24°53'S, 29°22'E), Northern Province, South Africa.

TYPE MATERIAL

Holotype male, no. T 2186 from *Pelomedusa subrufa*, allotype female, no. T 2187 from *Pelomedusa subrufa* and paratypes (immature) from *Pelomedusa subrufa* and *Pelusios sinuatus*, no. T 2188. All spec-

TABLE 1 Comparative measurements of *Pelonia africana* n. g., n. sp., *Diesingia megastoma* and *Sebekia wedli*. All measurements are given in micrometres unless otherwise stated

Specimen number	Body length (mm)	Number of annuli	Mouth dimensions			Hook dimensions		Copulatory spicules		
			Overall length	Cadre length	Width	Hook length	Fulcrum length	Total length	Cowry shell length	Width
WIII/1 (Paratype F, T 2188)	15	28	322	248	127	NM	NM	NA	NA	NA
Psin2/1 (Paratype F, T 2188)	13	27	313	216	133	115	239	NA	NA	NA
Psub2/1 (Allotype F, T 2187)	27	30a	380	301	182	NM	NM	NA	NA	NA
Psub3/1 (Holotype M, T 2186)	9	27	265	207	150	NM	NM	515	324	214
<i>Diesingia megastoma</i> M (After Heymons 1941)	7	70	NM	524	205	NM	NM	NM	NM	NM
<i>Diesingia megastoma</i> M (After Heymons 1941)	6	70	NM	496	180	140	NM	NM	NM	NM
<i>Diesingia megastoma</i> F (After Self & Rego 1985)	10	65	NM	670	380	140*	520	NA	NA	NA
<i>Sebekia wedli</i> F (After Riley & Huchzermeyer 1995a)	15–19	NC	355	229	121	80	176	NA	NA	NA
<i>Sebekia wedli</i> M (After Riley & Huchzermeyer 1995a)	8	NC	212	136	76	59	134	310	213	115

F Female

M Male

NA Not applicable

NC Not counted

NM Not measured

* Only the length of the blade was measured

imens are mounted in Hoyer's medium and deposited in the National Animal Helminth Collection, ARC-OVI, Onderstepoort, South Africa.

ETYMOLOGY

Pelonia has been named after its two host species that belong to the family Pelomedusidae which comprises freshwater chelonians from Africa, Madagascar and southern Australia.

DESCRIPTION

The body is claviform, the abdomen being widest in the anterior third and tapering to a bluntly rounded caudal tip. Ventrally the small trapezoid cephalothorax is continuous with the ventrally flattened abdomen but dorsally demarcated from the remainder of the body. A small number of wide annuli are present.

FEMALE

The strongly chitinised oral cadre is more or less U-shaped, the gap between the lateral prongs only slightly narrowing anteriorly. Muscle contraction or the amount of pressure applied when mounting, can result in a more ovoid profile. The oral cadre appeared to be open anteriorly as the delicate chitinous fibres connecting the two sides were difficult to see. A heavily chitinised, bowl-shaped base unites the two lateral prongs posteriorly (Fig. 1B, C). The oral cadre of the allotype female was slightly larger than that of the two immature specimens, WIII/1 and Psin2/1.

The smooth hooks are dorsally convex with a slight dorsal notch where the strongly curved blade emerges from the base (Fig. 1F). The configurations of the posterior and anterior hooks appear to be identical and are supported by strong fulcra. Unfortunately, measurements could only be made from a single hook from an immature female.

It was not possible to decide whether the females were heterogynous, with the utero-vaginal pore being situated one or two annuli anteriorly from the anus, or ophistogynous. The eggs of *P. africana* consist of a spherical outer membrane, 183 ± 8 μm in diameter that surrounds a hyaline substance and an ovoid inner eggshell, 96 ± 7 μm long and 70 ± 4 μm wide (Fig. 1G), that encloses the primary larva.

MALE

Although the oral cadre of the male is slightly smaller than those of the two immature females (Fig.

1A), its general morphology, as well as that of the hooks and the fulcra, is similar to that of the females. The paired copulatory spicules are heavily sclerotised and cowry-shell shaped (Fig. 1D). The anterior spatulate extension carries rows of rounded, chitinous teeth, which become progressively indistinct towards the tip (Fig. 1E).

DISCUSSION

The body-shape of *P. africana* corresponds closely to the illustration of a mature female of *D. megastoma* from *H. tectifera* (Self & Rego 1985). One of the main differences between *P. africana* and *D. megastoma* lies in the oral cadre. That of *D. megastoma* is more than twice the length and width than that of the African species. Own observations show the oral cadre of *Diesingia* to carry a small peg-like extension into the oesophagus, not unlike that of the genus *Alofia* Giglioli, 1922, which is absent in specimens of *Pelonia*. Furthermore, the prominent bowl-shaped chitinous structure at the base of the oral cadre of the latter genus is absent in *Diesingia*.

Both genera of chelonian pentastomes possess smooth hooks. However, the fulcra of *Pelonia* are devoid of any extensions, while the fulcra of *Diesingia* are furnished with cowl-like extensions, similar to those seen in the genus *Selfia* (Riley 1994). The hooks of *D. megastoma* appear to be flat-topped with a sharply curved blade, demarcated from the shank by a single notch (Self & Rego 1985), while those of *P. africana* are dorsally convex and marked by a slight dorsal notch.

So far, no conclusive description of the copulatory spicules of *Diesingia* has been given, and the two male specimens we examined, possess copulatory spicules that are unique among the members of the family Sebekidae. The cowry-shell shaped base and the long spatulate extension of the open side are reminiscent of other sebekiid genera (Riley, Spratt & Winch 1990), but the shorter of the two anterior extensions has been transformed into a tiller-like, chitinous spike.

The genus *Pelonia* is distinct from the genus *Diesingia*, and represents the first record of a new genus of pentastomes exclusive to chelonian final hosts from the African continent.

Pelonia africana is similar to the African crocodilian pentastome *Sebekia wedli* Giglioli, 1922 in Sambon, 1922. This is especially true for the oral cadre, which in the latter species is also approximately U-

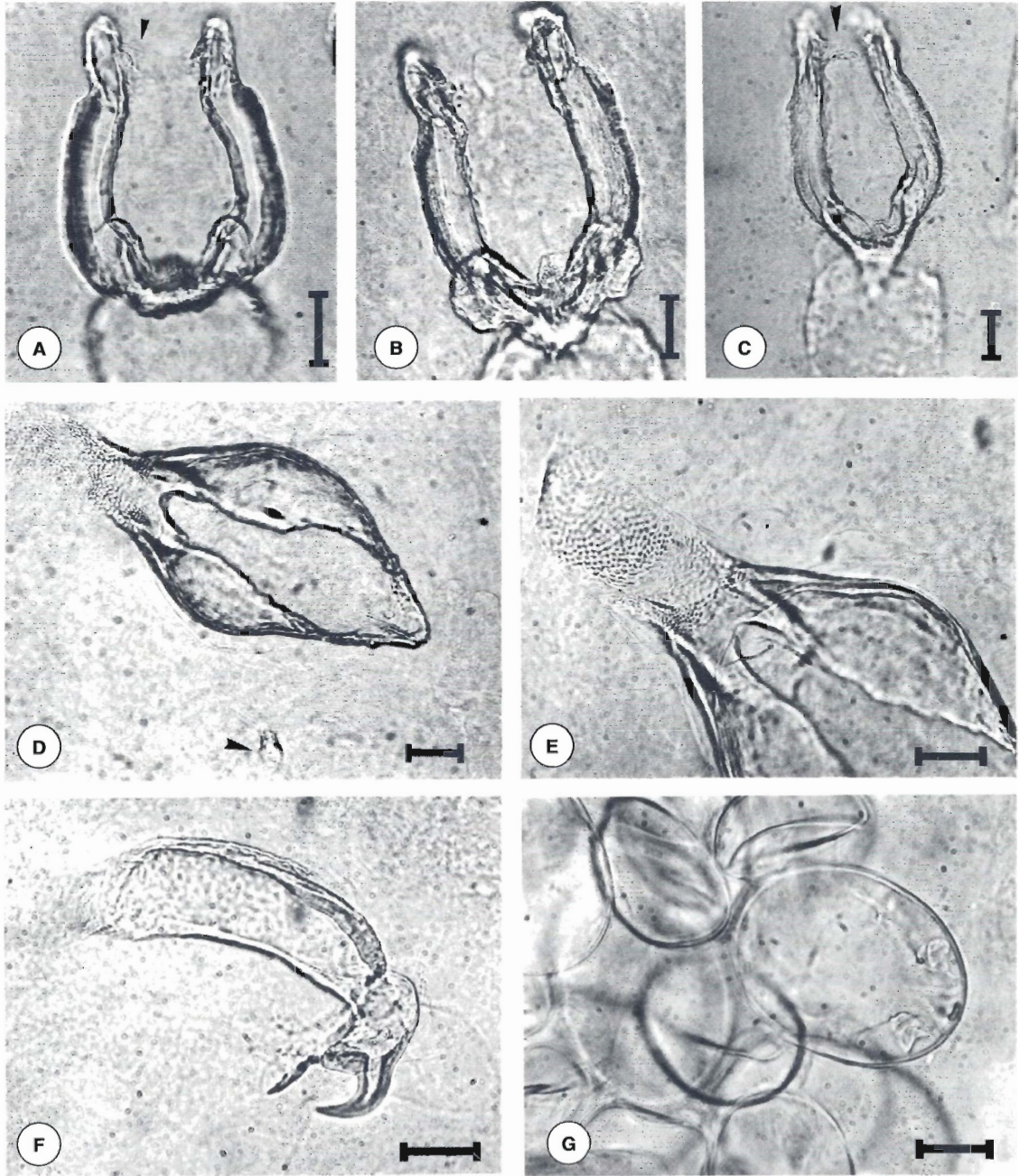


FIG. 1 *Pelonia africana* n. g., n. sp.

- A Oral cadre of holotype male. The delicate chitinous fibres connecting the lateral prongs of the oral cadre anteriorly are partly visible (arrow). Scale bar: 50 mm
- B Oral cadre of the allotype female. The anterior chitinous bridge is not visible in this photograph. Scale bar: 50 mm
- C Oral cadre of an immature female. The chitinous fibres connecting the lateral prongs are clearly visible (arrow). Scale bar: 25 mm
- D Ventral view of the right copulatory spicule of the holotype male. It is obpyriform and the spatulate extension carries small chitinous teeth. The arrow marks a chitinous part of the cirrus. Scale bar: 50 mm
- E Detail of the left copulatory spicule
- F Right posterior hook of an immature female. Scale bar: 50 mm
- G Egg with fully developed primary larva. Scale bar: 50 mm

shaped, and because of an almost invisible, very delicate anterior bridge of chitin, it seems to be open anteriorly (Riley & Huchzermeyer 1995a). A comparison of measurements, however, shows the buccal complex of *S. wedli* to be slightly smaller than that of *P. africana* (Riley & Huchzermeyer 1995a, Junker, Boomker & Booyse 1998b). The copulatory spicules of male *P. africana* are strongly reminiscent of *S. wedli*, and they could easily be confused, in that both are obpyriform and carry chitinous teeth on the spatulate extensions. Nevertheless, the spicules of *P. africana* are markedly larger than those of *S. wedli* (Riley & Huchzermeyer 1995a).

The main distinguishing character between *P. africana* and *S. wedli* is the absence of the prominent spines on the dorsal hook surface. The lack of anterior extensions to the fulcra further serves to separate *Pelonia* from the other species of the genus *Sebekia* as defined by Riley *et al.* (1990).

Superficially, the aspinose hooks, the curve of the blade and the shape of the oral cadre might lead to confusion of *P. africana* with the *Alofia* spp. The copulatory spicules of *P. africana*, however, lack the double-hooked collar diagnostic for *Alofia* and the genus *Selfia* Riley, 1994 (Riley 1994). Moreover, the oral cadre neither possesses the distinct, open *Alofian* U-shape nor the peg-like extension into the oesophagus (Riley & Huchzermeyer 1995a, b; Junker, Boomker & Bolton 1999).

Recently *Agema* Riley, Hill & Huchzermeyer, 1997, a new pentastomid genus, has been described from African dwarf crocodiles, *Osteolaemus tetraspis osborni*, and slender-snouted crocodiles, *Crocodylus cataphractus* (Riley, Hill & Huchzermeyer 1997). While the hooks of *P. africana* exhibit the already mentioned abrupt right-angle bend near the base, those of *Agema* are very smoothly curved and the ovoid oral cadre of the latter genus is closed anteriorly by prominent chitinous crescents (Riley *et al.* 1997).

Pelonia africana morphologically resembles especially the genus *Sebekia* and to a lesser extent the genus *Alofia*. Heymons (1941) pointed out the similarity between *D. megastoma* and its South American sebekian and alofian counterparts. Therefore there is a strong case for the inclusion of the genera *Pelonia* and *Diesingia* into the family Sebekidae, as was suggested for the latter genus by Riley (1993). The fact that all sebekiid genera have a similar life-cycle using fish as intermediate hosts and semi-aquatic definitive hosts (Fain 1961; Riley

1986, 1994; Riley *et al.* 1997) indicates a close relationship between the two genera parasitising chelonians and those of crocodilians.

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