Polystomoides bourgati (Monogenea: Polystomatidae) infecting *Pelusios castaneus* in southern Nigeria

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Received 25 July 2011. Accepted 6 December 2011

***Pelusios* spp. procured from four locations in southern Nigeria were investigated for polystomatid infection. None of the *P. niger* examined haboured monogeneans. *Pelusios castaneus* from Sapele, Ossisa and Abeokuta were infected with *P. bourgati* in the urinary bladder. The morphometrics of the parasites from the infected Nigerian terrapins were in the same range as those previously described from Togo and Senegal, except that the Senegalese specimens were slightly smaller with respect to the body size. While the testes of the specimens recovered from Ossisa and Abeokuta were ovoid to round in shape, those in parasites recovered from turtles purchased from Sapele were lobed and laterally elongated. Two of the parasite specimens recovered from turtles purchased in Ossisa had seven haptoral suckers. This is the first report of such an occurrence among polystomes.**

Key words: ***Pelusios castaneus, P. niger, Polystomoides bourgati,* Nigeria.**

INTRODUCTION

Polystomoides species of chelonian species in Africa are represented by *Polystomoides chabaudi* Euzet & Combes, 1965, *P. bourgati* Combes & Kulo, 1978 and *P. nabedei* Kulo, 1980. *Polystomoides bourgati* was described from *Pelusios castaneus derbianus* in Togo (Combes & Kulo 1978) and also from *Pelusios adansoni* in Senegal (Combes & Justine 1982). In *P. chabaudi* and *P. nabedei* the vitelline follicles are distributed from the anterior to the posterior part of the body, the follicles in *P. bourgati* are concentrated at the mid region of the parasite.

In Nigeria, *Pelusios* spp. are widespread, and along with other chelonians are sold in local markets for food. In the course of our investigation of monogeneans in market-derived terrapins in Nigeria, we found *P. bourgati* in specimens of *Pelusios castaneus* procured from three locations in southern Nigeria. In this paper we provide information on the prevalence and morphometric characters of the parasites encountered, comparing them with *Polystomoides bourgati* previously reported from other locations in West Africa.

MATERIALS & METHODS

Pelusios spp.were purchased from local markets in various parts of Nigeria. *Pelusios niger* was purchased from markets in Benin City (Edo State: 05°44′ – 07°34′N, 05°04′ – 06°45′E), Sapele (Delta State: 05°00′ – 06°31′N & 05°00′ – 06°45′ E) and Oroma (Anambra State: 06°30′ – 06°50′N, 06°50′ – 07°10′E); specimens of *P. castaneus* were purchased in Sapele and Ossissa (Delta State) and Abeokuta (Ogun State: 06°02′ – 07°08′N, 03°00′ – 05°00′E) in Nigeria. The turtles were transported to the laboratory, killed by injection of Euthapent, dissected, the urinary bladder removed and examined for polystome parasites. The accessory bladder and the cloaca were also examined for these parasites. Parasites were transferred to individual Petri dishes, flattened under cover slip pressure on microscope slides and fixed with 5% formol-saline for approximately 45 min. Fixed specimens were then transferred to specimen bottles and preserved in 5% formol-saline. Prior to staining, the parasites were washed in several changes of tap water to remove the preservative, and then stained overnight in a dilute solution of acetocarmine. Thereafter, the parasites were washed in water to remove excess stain and then dehydrated in ethanol series, cleared in xylene and mounted *in toto* in Canada balsam. Specimens were also stored in 96% ethanol for molecular analysis. Voucher specimens were deposited in the Professor A.B.M. Egborge Museum, University of Benin, Benin City, Nigeria (ABME-M-2011.1.TP.1–4).

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Table 1. Distribution of monogeneans in *Pelusios* spp. examined from locations in southern Nigeria.

Locations	Host examined	No. examined	Prevalence (%)	Mean intensity
Benin City	*P. niger*	10	–	–
Sapele	*P. niger*	23	–	–
Oroma	*P. niger*	04	–	–
Sapele	*P. castaneus*	24	4.2	24
Ossisa	*P. castaneus*	15	33.3	10
Abeokuta	*P. castaneus*	6	33.3	6

Prevalence of parasites was calculated as a percentage of the number of infected host divided by the total number of host examined. The mean intensity of infection refers to the number of parasites per infected host.

RESULTS

None of the 37 *P. niger* purchased from markets in Benin City, Sapele and Oroma were infected with monogeneans (Table 1). In contrast, *P. castaneus* procured from Sapele, Ossisa and Abeokuta were infected with *Polystomoides bourgati* and the parasites were recovered only from the urinary bladder. The prevalence and mean intensity values for *P. bourgati* in these turtles are presented in Table 1. Worms recovered from *P. castaneus* purchased from Sapele and Ossisa were mature and egg-producing. Turtles purchased from Abeokuta were infected with subadult parasites. The mean dimensions (μm) followed by range for the parasites are presented in Table 2.

The morphological features of the recovered parasites were typical of those described for *P. bourgati,* except that the testis of the specimens recovered from turtles procured from Sapele were lobed and transversely elongated (Fig. 1A,B). In contrast, the testis in *P. bourgati* recovered from the Ossisa and Abeokuta turtles were ovoid to round (Figs 2A,B & 3). The gastrointestinal canal opened into the intestinal branch on the ovarian side, occasionally coiled and passing into the intestine above the level of the vaginae (Figs 1A & 3) but in

Table 2. Morphometric data for *Polystomoides bourgati* infecting *Pelusios castaneus* in three locations in Nigeria.

Parameters	Sapele		Ossisa		Abeokuta*	
	Mean ± S.D.	Range	Mean ± S.D.	Range	Mean ± S.D.	Range
Body length	2544 ± 290.85	1933–3060	2703 ± 371.05	2233–3556	2265 ± 65.26	1972–2577
Greatest width	813 ± 88.66	658–939	947 ± 186.02	633–1267	762 ± 78.13	684–886
Haptor length	616 ± 69.69	470–711	668 ± 73.13	590–805	529 ± 63.34	443–604
Haptor width	818 ± 81.01	725–1033	886 ± 81.61	800–1060	714 ± 101.28	564–832
Oral sucker diam.	332 ± 26.41	268–376	360 ± 42.32	309–429	314 ± 20.71	295–336
Pharynx length	140 ± 16.42	107–161	153 ± 16.73	134–188	150 ± 14.79	134–161
Pharynx width	155 ± 11.03	134–175	159 ± 9.63	134–175	142 ± 15.31	121–161
Haptoral suckers	140 ± 7.26	128–154	142 ± 10.09	127–161	131 ± 9.98	121–146
Ovary length	128 ± 11.12	109–146	124 ± 24.99	84–164	100 ± 9.04	91–109
Ovary width	81 ± 9.95	55–91	78 ± 14.80	55–98	77 ± 15.77	66–102
Testis length	273 ± 47.28	215–349	229 ± 67.88	175–336	183 ± 30.75	148–228
Testis width	186 ± 34.35	134–255	196 ± 40.71	121–268	150 ± 34.73	94–188
Genital bulb	112 ± 6.63	106–127	119 ± 11.24	98–138	102 ± 7.66	91–109
Genital coronet	27.8	26–29	27.7	26–29	26.4	26–27
Egg length	307 ± 31.84	242–336	302 ± 35.43	228–362	–	–
Egg width	219 ± 14.98	188–242	208 ± 27.65	161–255	–	–
External hamulus	322 ± 21.69	275–349	311 ± 27.65	268–343	270 ± 15.18	255–295
Internal hamulus	108 ± 10.23	87–121	105 ± 10.78	76–117	77 ± 7.54	68–88
Marginal hooklet C1	32	29–33	32	29–33	30	26–33

*Subadults.

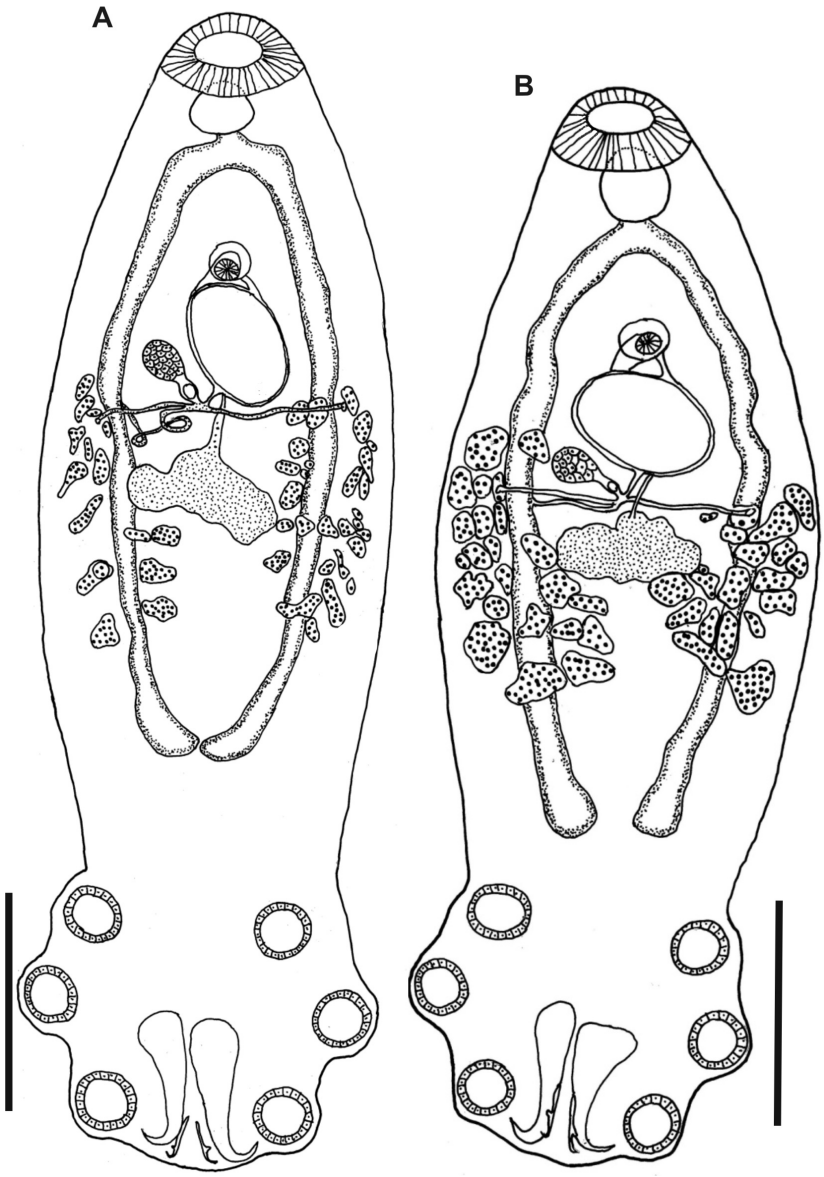

Fig. 1. *Polystomoides bourgati* infecting *Pelusios castaneus* from Sapele (Delta State, Nigeria). Entire worm showing lobular testis; **A**, fine vitelline follicles; **B**, coarse vitelline follicles. Scale bar: A, B = 0.5 mm.

most instances were uncoiled and passing into the intestine below the level of the vaginae (Figs 1B & 2A,B). The vitelline follicles of the parasites recovered were varied in their structure. In some specimens (Figs 1A & 2A), the vitelline follicles were 'fine' while some others they were coarser (Figs 1B, 2B & 3). Two of the parasite specimens recovered from turtles procured from Ossisa had seven haptoral suckers (Fig. 2B) instead of six normally found in polystomes.

DISCUSSION

The recovery of *Polystomoides bourgati* in *Pelusios castaneus* from Nigeria represents the third record of this parasite in West Africa. The parasite was first reported by Combes & Kulo (1978) from *Pelusios castaneus derbianus* from Togo and from *P. adansoni* collected in Senegal (Combes & Justine 1982). The specimens recovered from *P. castaneus* in Nigeria have the characteristic distinguishing feature of the original specimens described by

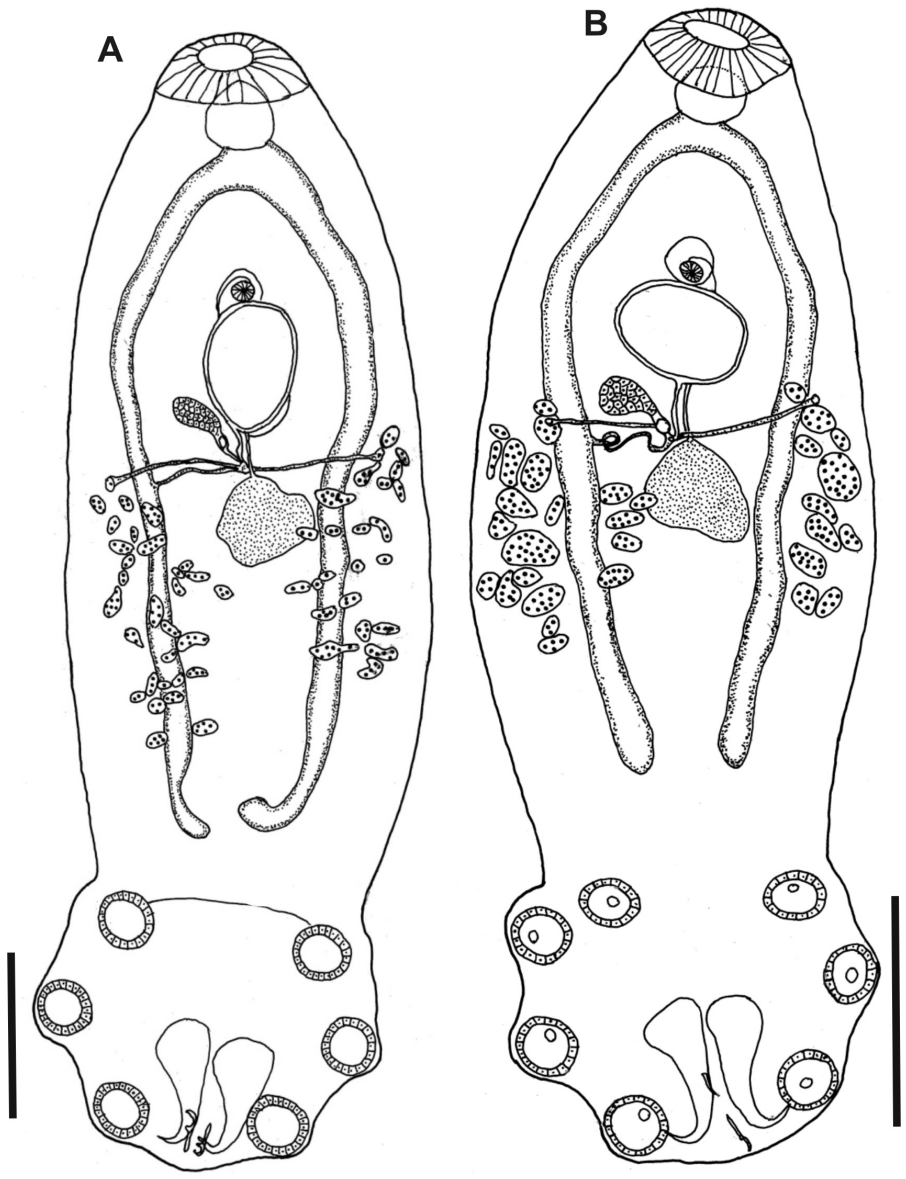

Fig. 2. *Polystomoides bourgati* infecting *Pelusios castaneus* from Ossisa (Delta State, Nigeria). Entire worm showing round to oval testis; **A**, fine vitelline follicles; **B**, coarse vitelline follicles and seven suckers. Scale bar: A, B = 0.5 mm.

Combes & Kulo (1978), namely, the possession of fewer vitelline follicles, which are concentrated in the mid region of the parasite (Figs 1–3). This feature clearly distinguishes *P. bourgati* from the other *Polystomoides* spp. (*P. chabaudi* and *P. nabedei*) described from *Pelomedusa subrufa* (see Euzet & Combes 1965; Tinsley 1973; Kulo 1980). Morphometric data of the *P. bourgati* from three locations were remarkably similar except that we observed that while the vitelline follicles were 'fine' in some specimens (Figs 1A & 2A), they were much coarser in others (Figs 1B, 2B & 3). This difference occurred even in specimens sourced from the same locality (Fig. 1A,B).

A comparison of the morphometrics of the parasites from *P. castaneus* in Nigeria with those of *P. castaneus derbianus* (Togo) and *P. adansoni* (Senegal), showed that the dimension of the specimens from Togo were in the same range with those from turtles in Nigeria (Table 3). The parasites from

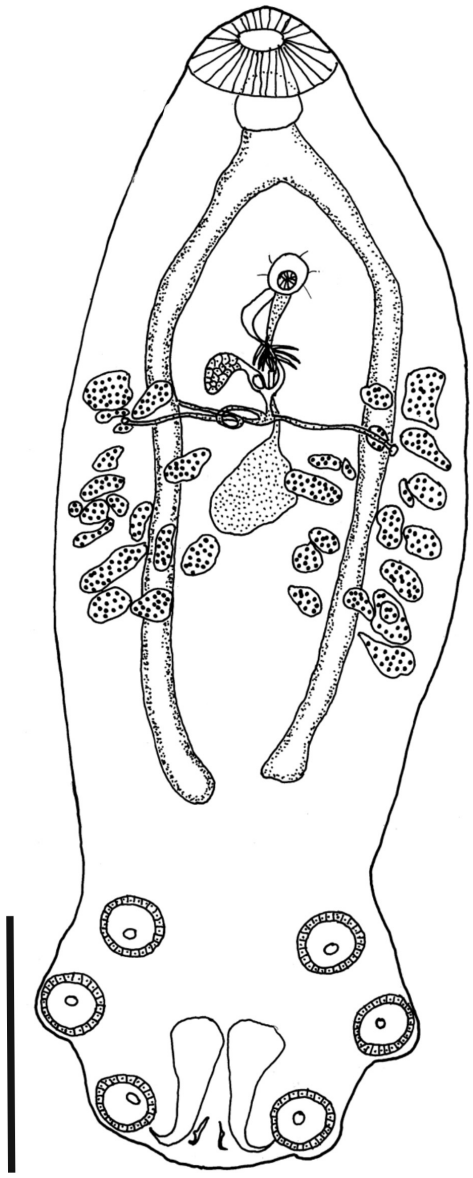

Fig. 3. *Polystomoides bourgati* (subadult) infecting *Pelusios castaneus* from Abeokuta, Ogun State, Nigeria. Entire worm showing oval testis and coarse vitelline follicles. Scale bar = 0.5 mm.

Senegal were to some degree smaller with respect to the mean body length. Although the mean values of the external and internal hamuli in the Nigerian specimens were slightly larger than those of the Togolese and the Senegalese materials (Table 3), the ranges overlap. This is indicative of a relatedness among the parasites infecting *Pelusios* spp. in West Africa. Earlier descriptions (Combes & Kulo 1978; Combes & Justine 1982) did not include the dimensions of the marginal hooks of *P. bourgati* from Togo and Senegal, respectively. Murith (1981) has shown that since marginal hooks display little intraspecific variation, they assist in species separation. Since the range of the dimensions of the marginal hooks of the parasites from the three locations in Nigeria (Table 2) were similar: Sapele, 32 (29–33); Ossisa, 32 (29–33) and Abeokuta, 30 (26–33), the parasites from the Nigerian terrapins represent a single species.

The testes of the parasites recovered from Ossisa

Table 3. Morphometric data of *Polystomoides bourgati* specimens from Togo*, Senegal** and Nigeria.

Parameters	Togo	Senegal	Nigeria	
			Sapele	Ossisa
Body length	2.70 (2.34–2.90)	1.93 (1.29–2.35)	2.54 (1.93–3.06)	2.70 (2.23–3.56)
Greatest width	0.90 (0.80–1.06)	0.71 (0.54–0.82)	0.81 (0.66–0.94)	0.95 (0.63–1.27)
Haptor length	0.62 (0.54–0.68)	0.55 (0.40–0.65)	0.62 (0.47–0.71)	0.67 (0.59–0.81)
Haptor width	0.84 (0.72–0.92)	0.69 (0.50–0.83)	0.82 (0.73–1.03)	0.89 (0.80–1.06)
Oral sucker diam.	0.37 (0.34–0.39)	0.32 (0.22–0.38)	0.33 (0.27–0.38)	0.36 (0.31–0.43)
Pharynx length	0.17 (0.14–0.19)	0.15 (0.12–0.18)	0.14 (0.11–0.16)	0.15 (0.13–0.19)
Pharynx width	0.15 (0.13–0.18)	0.17 (0.12–0.21)	0.16 (0.13–0.18)	0.16 (0.13–0.18)
Haptoral suckers	0.16 (0.15–0.17)	0.13 (0.11–0.16)	0.14 (0.13–0.15)	0.14 (0.13–0.16)
Ovary length	0.10 (0.07–0.13)	0.11 (0.10–0.12)	0.13 (0.11–0.15)	0.12 (0.08–0.16)
Ovary width	0.07 (0.05–0.09)	–	0.08 (0.06–0.09)	0.08 (0.06–0.10)
Testis length	0.22 (0.15–0.29)	0.25 (0.21–0.28)	0.27 (0.22–0.35)	0.23 (0.18–0.34)
Testis width	0.21 (0.14–0.26)	–	0.19 (0.13–0.26)	0.20 (0.12–0.27)
Genital bulb	0.11 (0.10–0.12)	0.10 (0.08–0.11)	0.11 (0.11–0.13)	0.12 (0.10–0.14)
Egg length	0.27 (0.24–0.30)	–	0.31 (0.24–0.33)	0.30 (0.23–0.36)
Egg width	0.20 (0.18–0.21)	–	0.22 (0.19–0.24)	0.21 (0.16–0.26)
External hamulus	0.28 (0.26–0.31)	0.27 (0.24–0.30)	0.32 (0.28–0.35)	0.31 (0.27–0.34)
Internal hamulus	0.085 (0.08–0.09)	0.09 (0.07–0.11)	0.11 (0.09–0.12)	0.11 (0.08–0.12)

*Combes & Kulo (1978).
**Combes & Justine (1982).

and Abeokuta, Nigeria (Fig. 2A,B) which are ovoid to round, resembled the testes illustrated for the Togolese materials. In contrast, specimens recovered from turtles purchased in Sapele had lobed testes which were transversely elongated (Fig. 1A,B). The significance of the differences in the testicular shape of these parasites remains to be determined. Among the Polystomatidae, the parasites are known to have six haptorial suckers. An interesting observation among the parasite specimens recovered from turtles purchased from Ossissa, was the occurrence of seven haptoral suckers in two specimens (Fig. 2B). This is the first report of such an occurrence among polystomes.

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Responsible Editor: N.J. Smit