

Size at hatching and incubation period of *Sympterygia bonapartii* (Müller & Henle, 1841) (Chondrichthyes, Rajidae) bred in captivity at the Temaiken Aquarium

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Two mature *Sympterygia bonapartii* held in captivity laid a total of 136 egg cases, 33 of them were incubated at constant temperature (16.5° C), salinity (36) and photoperiod (12L:12D). The hatching rate was 100%. Juvenile fish hatched after 135 ± 10 days (mean \pm s.d.) and the mean total length, disc width and mass at hatching were 140 mm, 86 mm and 15.1 g respectively.

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Numerous studies have examined the reproductive biology in several species of the family Rajidae (Holden *et al.*, 1971; Luer & Gilbert, 1985; Ellis & Shackley, 1995; Koop, 2005). Previous studies, however, on the smallnose fanskate *Sympterygia bonapartii* (Müller & Henle, 1841) an endemic species in South American temperate waters, distributed from Rio Grande do Sul, Brazil (32° S) to Rawson, Argentina (44° S) (McEachran, 1982) have focused on taxonomy (McEachran, 1982), distribution (Menni & Stehmann, 2000) and trophic ecology (Barrera Oro & Maranta, 1996). Though recent studies have further examined its abundance and reproductive biology (Mabragaña *et al.*, 2002; Oddone & Velasco, 2004), the incubation period and size at hatching are poorly known.

Two matures female *S. bonapartii* (female 1: total body length, L_T , 65 cm, disc width, W_D , 42 cm; female 2: L_T 65 cm, W_D 47 cm) were caught by demersal otter trawls off Mar del Plata City, Argentina (38°0' S; 57°33' W) in July 2002. Following capture, the individuals were maintained in a tank (1000 m³) with at least one mature male, at the Temaiken Aquarium, Buenos Aires. Egg cases were collected from these captive adults during an arbitrary period of time which was from August 2005 to February 2006. Between the capture and the beginning of this study data about egg-laying are lacking. Measurements of

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egg cases were taken according to Clark (1922). In order to register the incubation period and size at hatching, the first egg cases laid during the first weeks were removed shortly after deposition and maintained in an incubation box (0.8 × 0.5 × 0.4 m) placed in a tank (15 m³) under constant temperature (16.5° C), salinity (36) and photoperiod (12L:12D). The viability of the egg cases was checked daily. Within a day of hatching the neonatal fish were removed and L_T , W_D , mass, M , and sex recorded.

Over a period of 224 days, the two fish laid a total of 136 eggs, with only two of them being empty (1.5%). Egg cases ranged in length from 73 to 85 mm (mean ± s.d., 77.5 ± 2.7 mm) and from 41 to 48 mm in width (45.4 ± 2.2 mm). The period between successive egg laying ranged from 2 to 14 days (mean ± s.d. 4.3 ± 3.2 days).

The incubation period evaluated on the first 33 egg cases was 135 ± 10 days. The rest of the egg cases laid ($n = 103$) continued to develop normally but data on them are not included in this paper. Fully developed smallnose fanskates (Fig. 1) always emerged from the end of the egg cases that had two long horns. A small yolk sac 2–4 mm in diameter was often present at hatching but was reabsorbed completely during the first post-hatching week.

Of the 33 egg cases laid in the first weeks, 33 (100%) [13 females (F) and 20 males (M)] hatched and developed successfully. The sex ratio (F:M) of juveniles (1:1.5) was not statistically different from a 1:1 sex ratio (χ^2 , $n = 33$, $P > 0.05$). Values of L_T , W_D and M on hatching are given in Table I. There were no significant differences in these variables between sexes (t -test, $n = 33$, $P > 0.05$), (Table I). The mean clasper length of males was 3.0 ± 0.5 mm ($n = 20$).

Mabragaña *et al.* (2002) sampled *S. bonapartii* egg cases on the northern continental shelf of Argentina reporting the dimensions for eight egg cases (length: 76.75 ± 3.92, width: 48.37 ± 0.74 mm), which are not significantly different from the results reported here.

Just 11 species of the family Rajidae have completed their reproductive cycle in captivity (Henningsen *et al.*, 2004), and this is the first record of *S. bonapartii*

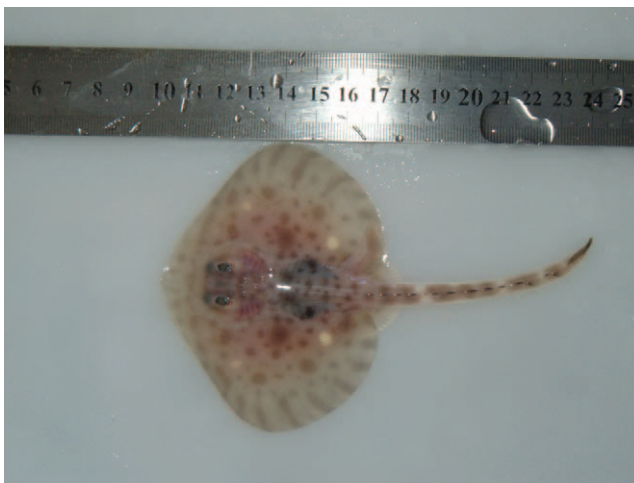


FIG. 1. Newly hatched young of *Sympterygia bonapartii*.

TABLE I. Mean \pm s.d. and range (in parenthesis) of total body length (L_T), disc width (W_D) and mass (M) of newly hatched *Sympterygia bonapartii*

	Males ($n = 20$)	Females ($n = 13$)	Total ($n = 33$)
L_T (mm)	140 \pm 5 (124–148)	140 \pm 8 (127–150)	140 \pm 6 (124–150)
W_D (mm)	86 \pm 3 (79–90)	87 \pm 4 (81–95)	86 \pm 4 (79–95)
M (g)	14.9 \pm 2.0 (11.8–19.0)	15.5 \pm 2.6 (11.9–22.0)	15.1 \pm 2.2 (11.8–22.0)

breeding in captivity. The results indicate that *S. bonapartii* has a high hatching success rate under captivity conditions.

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