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Post-hatching parental care by a wild male *Crocodylus porosus* Schneider, 1801 in Australia

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Crocodilians typically exhibit extensive parental care behaviours during the incubation, hatching, and post-hatching periods (Somaweera et al., 2013; Grigg and Kirshner, 2015; Murray et al., 2020). The vast majority of parental care prior to hatching, which includes attending and defending nests, is almost exclusively maternal (Garrick and Lang, 1977; Somaweera et al., 2013; Murray et al., 2020). However, post-hatching parental care, including establishing nurseries (also known as creches or pods) and defending hatchlings, may involve males in some cases (Somaweera et al., 2013). For example, a dominant male *Crocodylus moreletii* in captivity did not exclude hatchlings in a creche from the water and allowed the hatchlings to bask on his back (Hunt, 1975). A male *C. moreletii* in the wild showed aggressive behaviour against researchers when they were collecting hatchlings near the nesting site in response to the hatchlings' vocalization (Rainwater et al., 2000). The territorial defence by a male *C. niloticus* was observed in captivity while a female was transporting unhatched eggs and live young (Pooley, 1977).

In *C. porosus*, which is considered one of the most aggressive species (Brien et al., 2013a, b), it is widely accepted that males do not engage in parental care, including protecting hatchlings (Webb et al., 1977; Webb and Manolis, 1989), with a possible exception seen in captivity, when a very large (> 5.4 m) male shared his pen with a hatchling for 12 years (Toody Scott, pers. comm.). In the natural environment, females migrate during the breeding season, which occurs during the Austral wet season (November–April), from their dry-season (May–October) home ranges to nesting sites (Webb et al., 1977; Campbell et al., 2013; Baker et al., 2019). Here, they remain with their hatchlings, while males generally remain in the main channel of the river. We here report on rare observations of a wild male *C. porosus* participating in post-hatching parental care. These observations, obtained from a 28-year dataset compiled through ecotourism cruising tours conducted both during the day and at night for approximately 8 h daily, five days a week, year-round, recorded individual crocodiles' locations, home ranges, and behaviours, including dispersal, migration, mating, nesting, predation, and survival.

Observation 1. Between 19:00 and 01:00 h on 26 and 27 February 2025, observations were made from a 7.3-m vessel equipped with an electric motor (48 V, 5 kW), while monitoring a female *C. porosus* (age 26 yrs, marked as a 3-yr-old juvenile in 2002, total length 3.2 m measured by Queensland Department of the Environment, Tourism, Science and Innovation in September 2025) and her three-day-old hatchlings within an approximately 800 m-long tidal tributary of the Daintree River, Queensland, Australia (16.2630°S, 145.3780°E), approximately 10 km upstream from the river mouth. This segment is characterised by brackish water and a low density of *C. porosus* (approximately 1.44 non-hatchlings sighted per km; Taplin et al., 2022). The long-term observational dataset indicated that the female's reproductive history included four recorded nesting events, with the first nest in 2020 (age 21 yrs, estimated total length 3.2 m) producing 26 hatchlings (hatched on 2 March 2021) and the most recent nest producing 35 hatchlings (hatched on 23 February 2025). During the observation, the hatchlings were clustered as a creche near the nest under the female's vigilance, with occasional maternal relocation of the group within the tributary.

A dominant male *C. porosus* (unknown age, present in this river system since at least 2015, maintaining an approximately 10-km home range and entering the tributary about once or twice weekly) visited the creche

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in the presence of the first author. Given that females rarely exceed 3.5 m in Australia (Webb and Manolis, 1989; Grigg and Kirshner, 2015), this individual, with an approximate total length of 4.6 m, was likely a male. Upon the male's arrival, the female emitted a loud roar, to which the hatchlings responded with loud chirping. However, she did not attempt to expel the male and within minutes the hatchlings ceased their alarm behaviours and resumed normal activity, including swimming around the male. The male responded to the hatchlings' vocalisations by moving quietly and non-disruptively, possibly taking care not to disturb them. With the 35 hatchlings grouped at the water's edge, the male approached and individually inspected approximately 10 of them over the 5-h observation period. This behaviour has been often reported in females, but not males (Webb et al., 1977; Webb and Manolis, 1989). On two occasions, hatchlings climbed onto the male's snout, and he responded by gently shaking them off; at no point did the male display aggression or attempt predation toward the hatchlings (Fig. 1; video available here), and he remained in the tributary for at least 6 h until the observer departed, with his absence confirmed the following morning.

Observation 2. At 20:00 h on 30 March 2025, observers reported that the same female as in Observation 1 had relocated her creche to an area approximately 50 m upstream within the creek, resulting in the dispersal of the hatchlings along a 100-m stretch. The same male as above entered the creek from the downstream connection with the main river while the same observer was present. The male proceeded to swim slowly and gently along the entire length of the creche, periodically stopping to observe several hatchlings, as described in Observation 1. He remained at the upstream end of the hatchlings' distribution while the female occupied the downstream end and showed no signs of disturbance in response to the male's proximity. After approximately 48 min, the male continued upstream and exited the creche.

Observation 3. At 21:25 h on the same night as Observation 2, after departing the creche of the 3-m female, the same male entered the creche of a second female. This creche measured approximately 30 m in length and was situated about 800 m from the downstream entrance to the tributary. This second female is estimated to be 2.7 m in total length and 19 yrs old, with a documented reproductive history that includes a first nesting event in 2020 (age 14 yrs, estimated total length 2.5 m) resulting in 24 hatchlings that emerged on 8 March 2021, and a second nesting producing 26 hatchlings that hatched on 28 February 2025; both nests were within 500 m of the site where this female hatched 19 yrs ago. During the observation, the male closely approached the 26 hatchlings in the creche, engaging in visual inspection and occasionally making gentle physical contact with several individuals using his snout, mirroring behaviours previously observed with the other female's clutch. Both the hatchlings and the adult female displayed no overt alarm or avoidance behaviours in response to the male's presence. The male remained within the creche for at least 30 min until the observer's departure from the site. As no other males are currently known in this section of the river, this male is likely associated with both observed females. However, paternity for these hatchlings remains unconfirmed. The occurrence of multiple paternity within clutches has been documented in several species of crocodilians, including *C. porosus* (Lewis et al., 2013; Isberg, 2022).

These observations are contrary to previous reports and suggest that parental care of hatchlings in *C. porosus* is not exclusive to females. Instead, males may also play an important role in this process. The 2.7-m and 3-m females maintained vigilance over their creches for 41 and 80 days, respectively. During that time, the females immediately responded to the hatchlings' chirping or any splashing sounds to chase away potential predators such as barramundi (*Lates calcarifer*), grey goshawk (*Tachyspiza novaehollandiae*), and nankeen night heron (*Nycticorax caledonicus*). The mere presence of a large adult male within the creche may further deter such predators, suggesting that deterrence or protection may represent important functional aspects of male parental care. To our knowledge, this constitutes the first documentation of male parental care among wild *C. porosus*. It remains uncertain whether this behaviour occurs in other regions or how frequently it manifests, warranting further field investigations.

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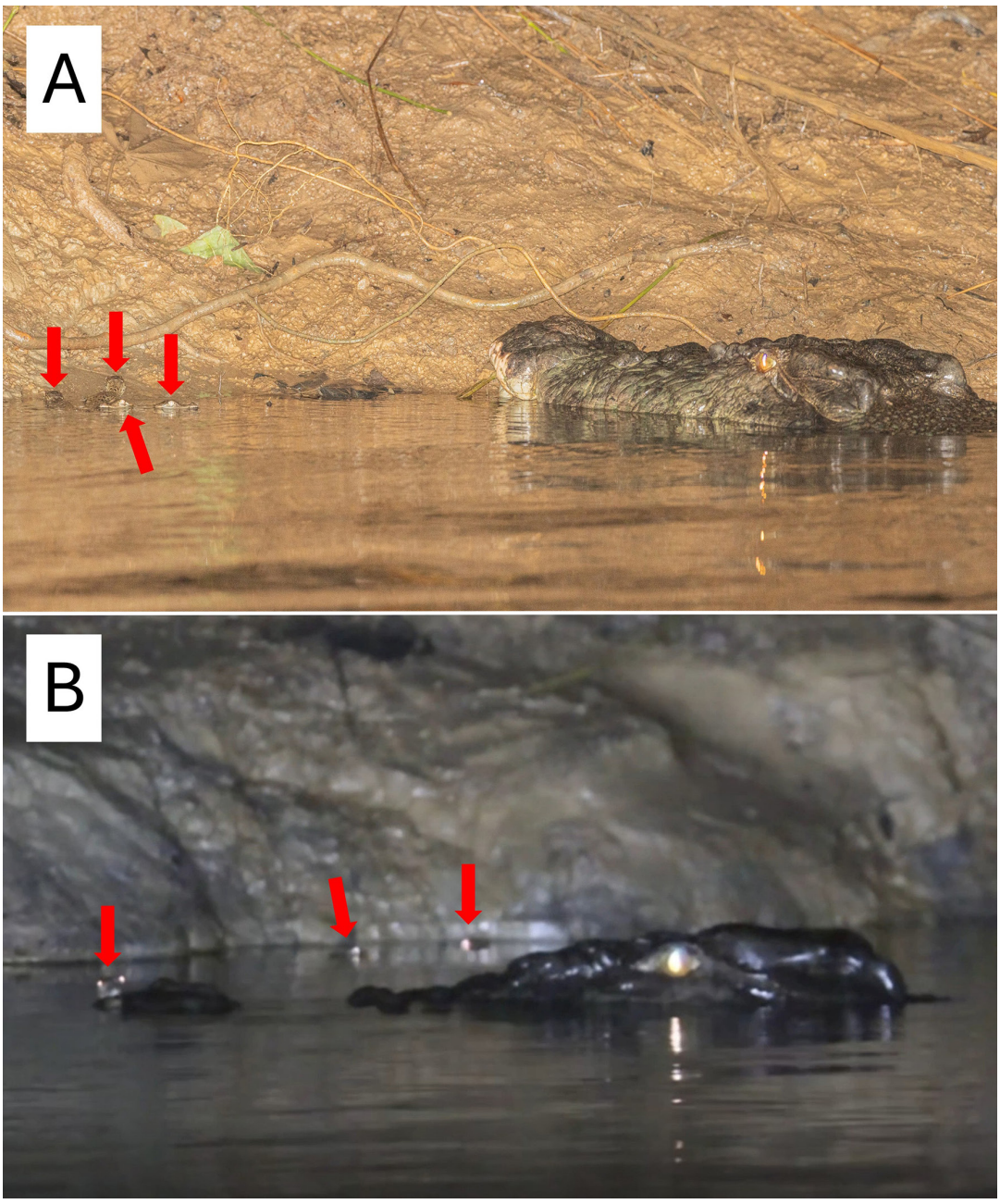

Figure 1. Apparent parental care by male *Crocodylus porosus* in the lower Daintree River, Australia. (A) A 4.6-m male attending hatchlings, indicated by red arrows, in a creche maintained by a 3-m female. (B) A hatchling climbing on the tip of the snout of the male. Also see the video linked in the text.

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