Successful hatching from eggs carried by females and naturally removed from incubant males in *Belostoma* spp. water bugs (Heteroptera: Belostomatidae)

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Abstract. Within Belostomatinae water bug species (Heteroptera, Belostomatidae) it has been hitherto believed that the completion of embryonic development is successful only if eggs are incubated on male hemelytra. Nevertheless, we found egg successful hatching from a back-brooding *Belostoma elegans* (Mayr) and *B. micantulum* (Stål) females, as well as from fertilized eggs kicked off from four back-brooder *B. elegans* males. One "encumbered" *B. elongatum* Montandon female was also recorded, but eggs did not hatch after she removed them. Rev. Biol. Trop. 54(2): 515-517. Epub 2006 Jun 01.

Key words: belostomatinae, egg brooding, parental investment, sexual roles.

Paternal care in Belostomatidae is widely spread. Females of Lethocerinae deposit the egg masses on emergent vegetation, and brooding male role is aimed at hydrating egg clutches and protecting them against predators, including unrelated females (Ichikawa 1988, 1995). Females of Belostomatinae glue their eggs on the dorsum of males; brooding males aerate egg clutches ascending to the water surface and exposing them to the air (Smith 1976a, b).

Brooding behavior of most of the genera of Belostomatinae species includes three basic patterns: surface – brooding, brooding pumping and brood stroking (Volker 1968, Smith 1976a, b, 1979, 1997, Kopelke 1982, Venkatesan 1983, Jawale and Ranade 1988, Schnack *et al.* 1990). Brood stroking was not observed for *Abedus herberti* Hidalgo and *Abedus indentatus* (Haldeman) (Smith 1997). Provided these patterns are essential for embryonic development, it is assumed that the removal of eggs from males' back leave them without survival chances. Moreover, male "display" is also essential for mating of Belostomatinae species being the complex steps implied within the sequence copulation-oviposition under males' control (Smith 1976a, b, 1979, 1997).

Krusse and Leffler (1984) found two "encumbered females" of *Belostoma flumineum* Say, from Coles County, Illinois, USA, one of them carrying one egg and the other six eggs on its back but at the laboratory they kicked them off and the eggs did not hatch. Schnack and Domizi (1985) found a female of *Belostoma oxyurum* (Dufour) from Pinamar, Buenos Aires, Argentina, preserved in 70% alcohol, carrying six fertilized eggs. Both findings occurred in

spring, the most active reproductive season; therefore, egg laying on females' dorsum was interpreted as a result of intense reproductive activity and to a shortage of the spatial sexual resource, provided that 100% of reported males were encumbered.

In January 1997 we found a gravid female of *Belostoma elongatum* Montandon carrying six eggs which covered its scutellum and part of its clavum. The finding took place in a pond located in Corrientes, Argentina (27º20' S, 57º30' W). The female, kept under laboratory conditions, removed the eggs from her back 15 days after its capture. Although the eggs were kept in a capsule with water they did not hatch.

In October 2000 we captured four brooding males and an "encumbered female" of *Belostoma elegans* (Mayr) with 132 eggs, in Punta Indio, Buenos Aires, Argentina (35º15' S, 56º28' W). The males kicked off the eggs. They were submersed during 24 hours. These egg clutches were put in capsules on a paper soaked with water and started hatching seven days after the males' capture. Once hatching began, the eggs were submersed in water and 100% of them successfully hatched in the following two days. The female kept the eggs on its back; all of them hatched seven days after it was captured.

In November 2004 we found a female of *B. micantulum* (Stål) carrying 12 eggs on its dorsum in Corrientes, Argentina (coordinates given above). Ten of these eggs hatched five days after the encumbered female was captured. All emerged first instar nymphs reached the second instar between the sixth (N=6) and the ninth days (N=4) after hatching. All second instar nymphs died 14 days after hatching.

The fact that embryos of Belostomatinae can develop from eggs out of the male's back without any care would suggest that brooding-surface, pumping and stroking are not obligatory for all stages of embryonic development in this taxon. The finding of encumbered females of Belostomatinae species with high eggs hatching success allows us to speculate that they would fulfill a sexual role similarly efficient to those performed by males, after eggs fertilization. Nevertheless, further field and laboratory studies are needed to assess whether or not the observed female egg's back-brooding is either an usual or an exceptional sexual behavior.

RESUMEN

Se considera que el desarrollo embrionario y la emergencia de las ninfas de las especies de Belostomatinae (Heteroptera, Belostomatidae) se cumplen con éxito si los huevos son incubados sobre el espacio dorsal de machos adultos. No obstante, hemos registrado eclosiones exitosas a partir de dos hembras grávidas portando huevos sobre su dorso; una de ellas de la especie *Belostoma elegans* (Mayr), la otra de *B. micantulum* (Stål). Se registra la eclosión de huevos, previamente removidos del área de postura por los propios machos incubantes de *B. elegans* (N=4) y la presencia de una hembra de *B. elongatum* Montandon, portando huevos sobre sus hemiélitros, los cuales no eclosionaron después de haber sido removidos por la propia hembra.

Palabras clave: belostomatinae, incubación, inversión parental, roles sexuales.

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