

Stingrays as possible facilitators for foraging trevallies in a nearshore sandflat

Jeremy J. Kiszka · Michael R. Heithaus · Jean-Pascal Quod

Received: 28 October 2014 / Revised: 3 December 2014 / Accepted: 5 December 2014 / Published online: 30 December 2014
© Senckenberg Gesellschaft für Naturforschung and Springer-Verlag Berlin Heidelberg 2014

Mixed-species associations are temporary aggregations of individuals of different species that are driven by improved foraging, anti-predator benefits, and host/cleaner relationships (Morse 1977). Host/cleaner relationships are common among fishes, including between elasmobranchs and teleosts (Papastamatiou et al. 2007). However, the function of associations between teleosts and elasmobranchs for other purposes is poorly described (Heithaus et al. 2010).

On 27 April 2013, in the waters of Petite-Terre, along the north shore of Terre de Bas (Guadeloupe archipelago, 16°10'23.10"N, 61°06'32.41"W), a ~90 cm (disk width) southern stingray (*Dasyatis americana*) was observed (~15 min) and filmed (102 s) in association with a ~40 cm bar jack (*Caranx ruber*). The observation occurred at 340 pm in shallow waters (<1.5 m) over a sandflat that is adjacent to a coral reef ecosystem. Video footage shows the jack swimming above the ray and actively maintaining the

association during periods when the ray stopped to forage or changed headings (Fig. 1a, see [supplementary material](#)). During extractive foraging by the ray, the jack was observed inspecting the sand plume expelled by the ray and striking at prey that were dislodged (Fig. 1b). It therefore appears that the jack was associated to the stingray to forage and may have been able to access otherwise unavailable resources.

Similar commensal associations were observed in the Pacific Ocean by two of the authors (JJK and JPQ), where trevallies were associated with stingrays for foraging purposes: at Cocos Island (5°31'08"N, 87°04'18"W), involving the bluefin trevally (*Caranx melampygus*) and the black-spotted stingray (*Taeniurops meyeri*), and in the lagoon of Tetiaroa, French Polynesia (17°0'S, 149°33"W), where several associations between pink whiprays (*Himantura fai*) and both bluefin and giant trevallies (*Caranx ignobilis*) were observed. Stingrays were always alone, but up to three trevallies could be observed with a single ray. In several of these cases, trevallies were seen lunging in plumes created by rays. Although other benefits to trevallies (e.g. reduced predation risk) cannot be discounted, we hypothesize that rays constitute facilitators for foraging trevallies. As documented for other batoids such as bat rays (*Myliobatus californica*) and round stingrays (*Urobatis halleri*) (VanBaricom 1982; Heithaus et al. 2010), stingrays in coral reef ecosystems may facilitate other predators that take advantage of prey that are disturbed or excavated during ray foraging.

Electronic supplementary material The online version of this article (doi:10.1007/s12526-014-0304-6) contains supplementary material, which is available to authorized users.

J. J. Kiszka (✉) · M. R. Heithaus
Florida International University, 3000 NE 151st Street, North Miami,
FL 33181, USA
e-mail: jeremy.kiszka@gmail.com

J.-P. Quod
ARVAM, La Technopole, 97400 Sainte-Clothilde, La Réunion

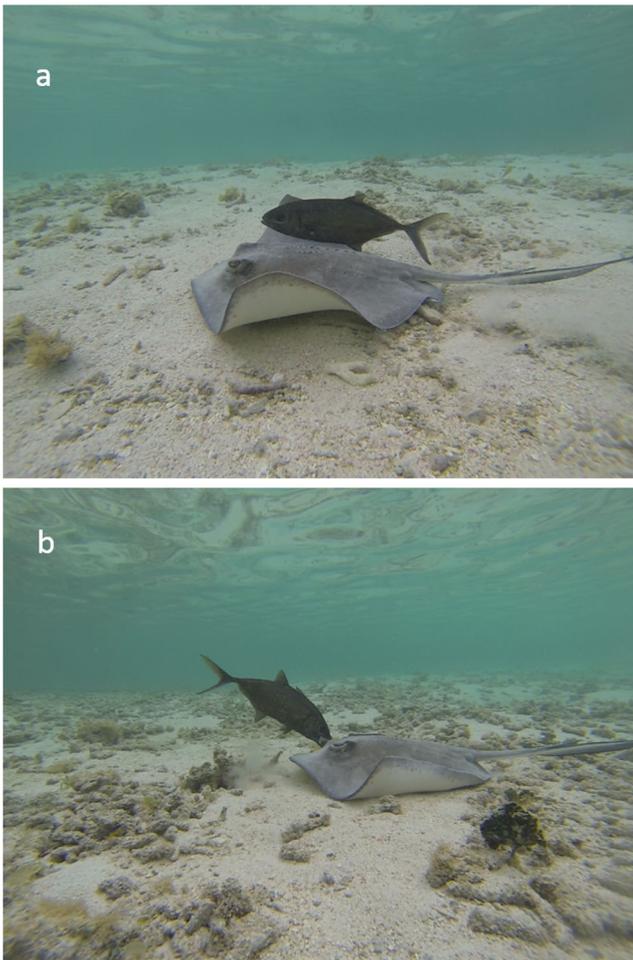


Fig. 1 Association between an American stingray (*Dasyatis americana*) and a bar jack (*Caranx ruber*) off the island of Terre de Bas (Petite-Terre, Guadeloupe archipelago): **a** The jack was mostly observed travelling above the foraging stingray; **b** When the stingray detected prey and produced a small sand plume, the jack lunged towards the anterior part of the ray to catch prey

References

- Heithaus MR, Frid A, Vaudo JJ, Worm B, Wirsing A (2010) Unravelling the ecological importance of elasmobranchs. In: Carrier JC, Musick JA, Heithaus MR (eds) Sharks and their relatives II: biodiversity, adaptive physiology and conservation. CRC Press, Boca Raton, pp 611–637
- Morse DH (1977) Feeding behavior and predator avoidance in heterospecific groups. *Bioscience* 27:332–339
- Papastamatiou YP, Meyer CG, Maragos JE (2007) Sharks as cleaners for reef fish. *Coral Reefs* 26:277
- VanBaricom GR (1982) Experimental analyses of structural regulation in a marine sand community exposed to oceanic well. *Ecol Monogr* 52: 283–305