

HERPETOCULTURE NOTES

TESTUDINES — TURTLES

CARRETOCHELYS INSCULPTA (Fly River Turtle). **CLEANING MUTUALISM.** Cleaning mutualism is a well-known symbiotic relationship frequently observed in the wild. This interaction involves a cleaner, a host, and often times may take place at a cleaning station. A cleaning event typically involves the cleaner species removing ectoparasites from a client species (Losey et al. 1994. *Copeia*. 1994:684–690). The cleaner may also feed on the skin of the host to remove mucus or diseased skin (Floeter et al. 2007. *J. Anim. Ecol.* 76[1]:105–111). Cleaner species often linger around an area known as the cleaning station, while clients approach such a place specifically to be cleaned. Cleaners may range from specialized fish to birds (Losey 1972. *Copeia*. 1972:820–833; Poulin and Grutter 1996. *Bioscience*. 46[7]:512–517). Meanwhile clients can include any species in need of ectoparasite removal, typically a species larger than the cleaner. Cleaning mutualisms occur among various species; however, most documented instances occur in marine environments (Floeter et al. 2007, *op. cit.*).

Carettochelys insculpta is an omnivorous turtle found in freshwater streams and rivers in the Northern Territory of Australia and the southern part of Papua New Guinea. They have

a carapace covered with soft skin that lacks keratinized scutes. The carapace can range from olive to black in coloration and is counter shaded by a cream colored plastron. *Carettochelys insculpta* are fully aquatic and have four flipper-like limbs resembling the limbs of a sea turtle. They can also be identified by their long, snorkel-like snout (Cann 1998. *Australian Freshwater Turtles*. Beaumont Publishing, Singapore. 292 pp.)

A single male *C. insculpta* was observed over a period of four non-consecutive days in its enclosure at the Smithsonian National Zoo in Washington, District of Columbia, USA. The *C. insculpta* was housed with a *Pterygoplichthys gibbiceps* (Leopard Pleco) during the observations. *Carettochelys insculpta* and *P. gibbiceps* do not occur naturally together in the wild; *C. insculpta* is endemic to parts of Australia and New Guinea, while *P. gibbiceps* naturally occurs in South America. Nonetheless, a presumably symbiotic cleaning mutualism was regularly observed among these individuals.

The *C. insculpta* was often seen posing during a cleaning event (Fig. 1A). Posing is a behavior common to clients in cleaning mutualisms. During posing, the client species assumes a position in anticipation of a cleaning. This position is only assumed during a cleaning interaction (Losey 1972, *op.*

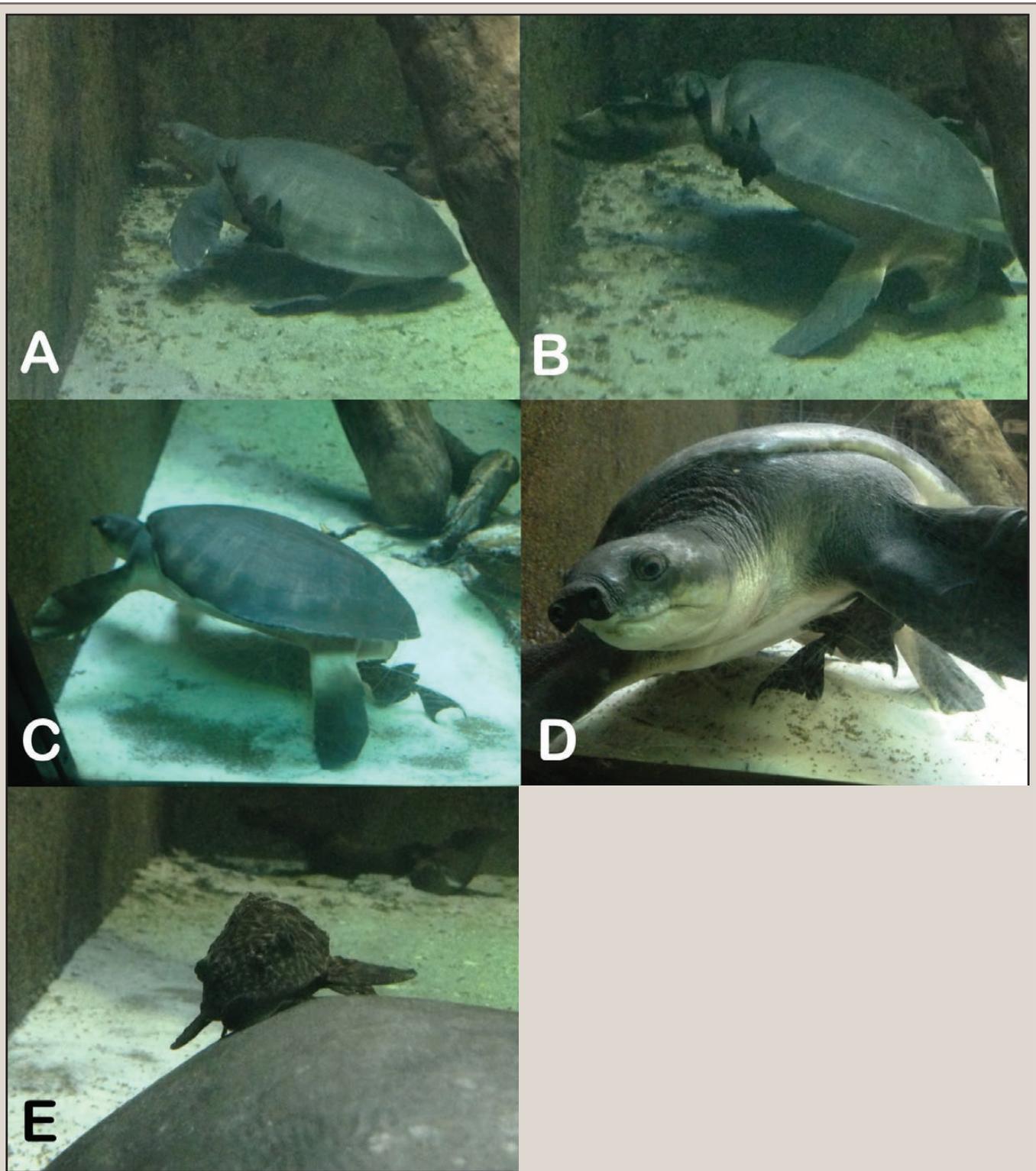


FIG. 1. A) The *Carettochelys insculpta* seen posing during a cleaning event. B) The *C. insculpta* is seen with limbs stretched out and head lifted upward. C & D) The *C. insculpta* can be observed lifting a portion of its plastron from the substrate as *Pterygoplichthys gibbiceps* moved in to clean the area exposed underneath. E) The *P. gibbiceps* was observed resting on the carapace of the turtle.

cit.). The *C. insculpta* was observed posing for the fish five times out of seven cleaning events. As seen in Fig. 1B, the limbs of the *C. insculpta* were stretched out and the head lifted upward, a pose that has been previously observed among clients. Similarly, clients often remain motionless during a cleaning

event (Poulin and Grutter 1996, *op. cit.*), which was observed multiple times. Additionally, a possible cleaning station was identified in the enclosure. A single branch was frequented by both individuals a large percentage of the observation time. Cleaning events were often observed at this site, indicating that

this branch may very well be a cleaning station in the enclosure. The use of this cleaning station was noted approximately seventy five times during the observations.

A majority of the cleanings were instigated by the *C. insculpta* by nudging the fish to indicate the desire for a cleaning. The *C. insculpta* was also observed shifting the direction of its body, moving limbs, or corralling the fish towards different parts of its body. When the turtle would shift positions or move its limbs this resulted in the fish cleaning those areas that were adjusted. In Fig. 1C and Fig. 1D, the turtle can be observed lifting a portion of its plastron from the substrate and *P. gibbiceps* having moved in to clean the area exposed underneath the turtle. The *P. gibbiceps* was observed cleaning the carapace, plastron, limbs, neck, chin, head, and around the cloaca during most cleaning events.

Interestingly, the *P. gibbiceps* was observed on several occasions simply resting on the turtle, either on a limb or the shell (Fig. 1E). This resting behavior was observed a total of ten times throughout the observational periods; both during a cleaning event and when no cleaning event was in progress. The reason for this behavior is unclear; this likely does not constitute cleaning behavior, but it is an interesting aspect of the possible symbiotic relationship between these individuals.

The observation period ended when the *P. gibbiceps* was found dead in the enclosure. It is unknown whether the *C. insculpta* decided to consume the *P. gibbiceps* or whether it died of another cause. It is well known that cheating clients exist in seemingly symbiotic relationships. A cheating client will take advantage of the cleaner by consuming it (Poulin and Grutter 1996, *op. cit.*). The *C. insculpta* was not observed killing the *P. gibbiceps*, however the turtle was observed consuming parts of the fish after it had died. The *P. gibbiceps* may have already died before consumption by the turtle. It is unclear what occurred.

It is necessary to speculate why this cleaning mutualism occurred since *C. insculpta* and *P. gibbiceps* do not live together in the wild. There are several species of fish that may fill the same niche as *P. gibbiceps* would that inhabit the Fly-Strickland river system in New Guinea where *C. insculpta* is found (Roberts 1978. Smithsonian Contrib. to Zoo. 281). However, there has not yet been a documented cleaning mutualism between fish and *C. insculpta* in the wild.

An alternate or additional explanation for this cleaning mutualism is simply the desire of this *C. insculpta* to be cleaned. It is well known that *C. insculpta* is a host to ectoparasites found on its skin (Saumure and Doody 2000. Herpetol. Rev. 31[4]:237–238). It is possible that the turtle's need to be cleaned stems from this natural tendency to get rid of these ectoparasites. This may explain why the turtle initiated the majority of the cleaning events.

Because cleaning mutualisms have been known to occur among different species in captivity (Poulin and Grutter 1996, *op. cit.*), it is possible that a cleaning mutualism will also occur with another individual of *P. gibbiceps*. Further study will be needed to determine if the relationship observed between these two individuals is specific to them or if the same relationship will result with a different fish. In the future *P. gibbiceps* or another cleaner fish from within the same range of *C. insculpta* should be placed in the enclosure. The individuals should be observed in the same manner as above. Initial interactions and characteristics such as presence of a cleaning station and client posing should be noted in the observations.

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