Rhynchodoras: into the belly of the beast

By Mark Sabaj Pérez

The bizarre doradid *Rhynchodoras xingui* (Fig. 1) was described by German ichthyologists Wolfgang Klausewitz and Fritz Rössel (1961) based on two specimens from the upper rio Xingu collected by the famous anthropologist Harald Schultz. The generic name comes from the Greek word *rhynchos*, meaning beak or snout, and was inspired by the dorad’s uniquely-shaped jaws which somewhat resemble the grasping end of a pair of water-pump pliers.

The scientific discovery of *Rhynchodoras* is credited to British naturalist–explorer Alfred Russel Wallace (1823–1913), better known for proposing natural selection as the mechanism behind evolution. For most people, Charles Darwin (1809–1882) first comes to mind with the mention of natural selection. Darwin began developing his ideas on evolution in 1838. But, just before he was about to synthesize his work, he received a manuscript from Wallace who had independently arrived at the same hypothesis. Both men presented their papers to the Linnean Society of London in 1858, followed by Darwin’s publication *On the Origin of Species* in 1859. Their joint offering of such a novel hypothesis is admirable, and speaks to the integrity of both men. Lesser scientists would have tried to scoop one another to gain first credit!

From 1850–1852, Wallace journeyed up the rio Negro to the sources of that river and the rio Orinoco. During the trip he collected numerous specimens and dutifully sketched and took notes on the many fishes he encountered. While sailing back to England on board the *Helen*, however, the ship’s cargo caught fire and his collections were tragically lost at sea. One can only imagine the disappointment of being deprived of such a valuable haul. As a person who routinely travels with collections of dead specimens (albeit mostly by plane, not by ship), I am never at peace until those specimens are safely in my lab. Fortunately, Wallace and his notes and illustrations survived, the latter preserved at The Natural History Museum, London. For a beautiful reproduction of Wallace’s field notes and drawings see “Peixes do Rio Negro” compiled by Mônica Toledo-Piza Ragazzo and published in 2002.
Wallace’s drawing of a species of *Rhinodoras* (originally labeled “Doras” and numbered 175) included his comments: “In a small specimen very closely resembling this *Rhinodoras* in all other particulars the head is higher towards the snout which turns down and is produced in a sort of proboscis which is received in a sort of trough formed by the produced lower lip—the teeth are similar but are also continued in a row round the margin of each lip. Perhaps this is the male and the above *Rhinodoras* being the female” (Wallace, 2002:332). His wonderful description was certainly based on a specimen of *Rhynchodoras*, the only doradid genus in which the snout ends in a pair of long, vertically oriented jaws (Figs. 2 & 3).

It amazes me that Wallace managed to find this specimen, given its extreme rarity in museum collections. It would be 110 years before another *Rhynchodoras* was properly documented!

*Rhynchodoras* was recently revised by Birindelli, Sabaj & Taphorn (2007) who recognized three valid species: *R. xingui* (Xingu & Tocantins), *R. woodsi* (Amazon & Essequibo), and *R. castilloi* (Apure basin, Orinoco drainage), the lattermost newly
named in honor of Venezuelan ichthyologist Otto E. Castillo. *Rhynchodoras woodsi* is distinguished from congeners by having posterior chambers of the gas bladder expanded into a pair of elongate horn-like diverticula (vs. diverticula absent; Fig. 4).

As noted by Wallace, *Rhynchodoras* is very similar in appearance to *Rhinodoras* (Fig. 5). In fact, the species of *Rhinodoras* and *Rhynchodoras* that occur together are nearly identical in overall coloration, and in the shape of the body and head (minus the jaws, lips and barbels). Based on analyses of morphological data (Birindelli, 2014) and molecular data (Arce et al., 2013), the two genera form a monophyletic clade with the monotypic *Orinocodoras eigenmanni* (Fig. 6). That is to say, the three genera are each other’s closest relatives, descended from a common ancestor to the exclusion of all other doradids.

Very little is known about the natural history of *Rhynchodoras*. The genus is found in turbid white waters (Apure, Amazonas, Branco, Essequibo), black waters (Negro) and clear waters (Tocantins, Xingu). Most of the specimens deposited in museums were collected via bottom trawls in large river channels. During the Calhamazon Project, John Lundberg et al. collected *R. woodsi* in the rio Purus (Solimões drainage) at depths ranging from 27.8–35 m. *Rhynchodoras*...
Also were trawled up from shallower depths, 1-5 m, in the Solimões-Amazonas. In the rio Amazonas near Iquitos, *Rhynchodoras* are sometimes collected in the main channel by towing a long, deep net along the bottom between two canoes powered by long-shaft motors. *Rhynchodoras* often co-occurs with *Rhinodoras* (think back to Wallace), and the two genera are often collected together. Both genera prefer habitats with ample current and plenty of cavities for hiding during the day.

In the rio Xingu, *Rhynchodoras* has only been collected via diving, and is more often found during the high-water season. A female (88 mm SL) collected in March 2014 was ripe with mature eggs, suggesting that the species breeds during high water. During the day, the divers pluck specimens of *Rhynchodoras* and *Rhinodoras* from cavities in deeply submerged logs. They did collect a single specimen of *R. xingui* during the lower water season at a depth of about 15 m in a channel of the lower Volta Grande. Water conditions taken near the surface by Dan Fitzgerald were: pH 7.8, dissolved oxygen 100.2% (7.41 mg/L), conductivity 22.4 μS, specific conductivity 19.8 μS, temperature 31.8°C, secchi depth 2 m.

Carvajal (2005) reported a diet composed entirely of *caddisflies* (Order Trichoptera) for two specimens from the rio Apure (Orinoco basin), Venezuela. I recently emptied the gut of one of the specimens collected during our 2014 high-water expedition, and sent the contents to Oliver Flint at the Smithsonian Institution. Oliver is a world-renowned authority on caddisflies, having published about 160 papers on the Order since 1956. After several hours working on the specimens, he considered them likely to be an unusual and undescribed species of the large and disparate genus *Leptonema* (Trichoptera: Hydropsychidae: Macronematinae).

Hydropsychid larvae do not construct the kinds of cases that caddisfly fans commonly connect with caddisflies. Instead, they spin a silken retreat that remains fixed to the substrate with a “fishing net” attached to its entrance. Oliver recalled getting macronematatin larvae from burrows in the hard clay bottom of a Neotropical river. The contents of the *Rhynchodoras xingui* gut were composed entirely of cf. *Leptonema* (Fig. 6), in ample amounts, suggesting a highly specialized diet. The forceps-like jaws of *Rhynchodoras*, fitted with multiple rows of minute teeth, are evidently effective tools for plucking hydropsychids from their silken retreats...or perhaps from their watery burrows, skills first surmised by Klausewitz and Rössel.

![Figure 6. *Orinocodoras eigenmanni* (ANSP160255, 85.5 mm SL) from a tributary to the rio Orinoco, Venezuela.](image)

![Figure 7. Microscope view of the caddis fly larvae that fill the gut of wild caught *Rhynchodoras xingui*.](image)
For information on *Rhynchodoras* in aquaria, see the excellent on-line article by Kai Arendt: [http://www.aqua-terra-net.de/Hydro/Sonder/welse/Dornwels.htm](http://www.aqua-terra-net.de/Hydro/Sonder/welse/Dornwels.htm). Based on aquarium observations, Arendt confirmed that *Rhynchodoras* are agile, nocturnal feeders that probe crevices and the bottom for hidden bloodworms and Tubifex. If one has ready access to hydropsychid caddisfly larvae...they are likely to remind aquarium kept *Rhynchodoras* of home!

**Acknowledgements.**

Thanks to Mariangeles Arce for Figure 3, to Daniel Fitzgerald on water quality measurements, to Oliver Flint for identifying gut contents, and to all the members of the iXingu Project for help in the field and lab, especially local heroes Leandro Sousa and Alany Pedrosa Gonçalves. Funding for the iXingu Project provided by the US National Science Foundation (DEB-1257813).

**Literature Cited**


