

Spotlight

A stunning example of the strange mutualistic relationship between the microhylid frog *Chiasmocleis ventrimaculata* and the giant tarantula *Pamphobeteus* sp.



A TINY FROG AND A GIANT TARANTULA
THE ODD COUPLE

The unique - and mysterious - mutualistic relationship between a giant predatory South American spider and a minuscule defenceless amphibian

While regularly preying on other terrestrial and tree frogs, the giant tarantula ignores the presence of the small frog.

TEXT AND PHOTOS
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Frogs lead difficult lives in South American rainforests. Many of them are preyed on by snakes and by arthropods, especially by spiders, which are big and particularly active at night. Tarantulas like *Teraphosa*, *Pamphobeteus* and *Avicularia*, especially adult females, are adept killers of treefrogs and forest floor species smaller than themselves. But there is a frog that has developed a peculiar relationship with some spiders. This is the Microhylid *Chiasmocleis ventrimaculata*, a 3 cm long terrestrial frog, common on the wettest forest floor, near rivers. But what is interesting is that this species lives, often in good numbers, near and inside spider burrows of some tarantulas species. The spider, a still undescribed but very large, relatively common and locally well-known *Theraphosidae* species belonging to the genus *Pamphobeteus*, tolerates the frog and never attacks it. Adult females of this

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Adult female tarantulas *Pamphobeteus* sp. not only tolerate the tiny microhylid *Chiasmocleis ventrimaculata*, but also show a surprising amount of maternal care, living with their offspring without showing any cannibalistic tendencies.





Young of *Pamphobeteus* not only live for at least one year with the adult female (without being eaten and without eating each other), but are also capable of communal feeding - this unique sequence shows the clutch preying on an unfortunate tree frog.



■ An adult female of *Pamphobeteus* explores the forest floor. These large tarantulas leave their burrow very rarely, and do not venture very far from it.

A juvenile Pamphobeteus preys on an unlucky tree frog. These very large and impressive arachnids are known as "Aranhas pollitos" or "Chicken Tarantulas" in South America due to their habit of living communally with their offspring, rather like a hen with its chicks. Top right, another image of a large adult with its tiny microhylid "house mate".



species live together with their spiderlings until they have reached at least one year of age, with no sign of cannibalism. They also feature communal feeding, mother and babies, on cockroaches, crickets and of course small frogs but they pay no attention to this tiny Microhylid living with them. Field tests indicate that the frog is probably recognized thanks to skin chemicals which the spider finds unpalatable.

The advantages for *Chiasmocleis ventrimaculata* seem obvious: thanks to its fearsome bodyguard it won't be attacked by other spiders and by small snakes. Intrusions are not tolerated in the tarantula territory.

And it's also possible that the arachnid is somehow helped by the frog which preys upon small parasites (mainly *Diptera*) and possibly ants, which could harm the spider or its eggs. This curious relationship is one of the few cases of mutualism between amphibian and spiders, for the first time photographed in such detail. The relationship between the two partners anyway is not rigid: many tarantula burrows were observed without frogs, as well as free frogs roaming on forest floor with no spider "bodyguard".

Similar cases have been documented with *Xenesthis immanis* instead of

One of several theories put forward to justify the peaceful coexistence of these two apparently incompatible species (at right) postulates that the tiny frog feeds on the parasitic larvae (top right) which are often found on large tarantulas. Body chemicals secreted by the amphibian are also quite possibly involved.



Pamphobeteus sp, but it's likely that other tarantula species enjoy this sort of mutualistic relationship with *Chiasmocleis*. Close relationships between the Microhylids *Ramanella nagaoi* and *Kaloula taprobanica* and the tarantulas *Poecilotheria ornata* and *P. subfusca* have been observed in Sri Lanka. These species are large and aggressive arboreal hunters, known to consume tree frogs. But apparently *Ramanella* shares tree holes with these spiders and their young without being attacked. Another relationship has been reported between the spider *Aphonopelma seemanni* and the Tungara frog *Engystomops pustulosus*

from Mexico. This last relationship widens the spectrum, because the frog isn't a Microhylidae like the previous ones. It really seems that mysterious relationships between spiders and frogs are much more widespread than thought initially, and this could lead to even more fascinating discoveries in the near future. Tropical forests are erupting volcanoes of biodiversity, each species being bonded to tens of others in an endless and complex web of relationships. Disentangling this web and understanding its schemes is one of the most interesting and important challenges in tropical biology research.