

A dangerously toxic new frog (*Phyllobates*) used by Emberá Indians of western Colombia, with discussion of blowgun fabrication and dart poisoning. Bulletin of the AMNH ; v. 161, article 2

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URI: <http://hdl.handle.net/2246/1286>

Date: 1978

Abstract:

"*Phyllobates terribilis*, a remarkably toxic new species of frog, is described from the vicinity of an Emberá Chocó settlement in lowland rain forest of Pacific coastal Colombia. It is the third frog definitely known to be used for poisoning darts; the other species are *P. aurotaenia* and *P. bicolor*. Toxicity of the skin secretions of *Phyllobates*, and frog-poisoned darts, is due primarily to batrachotoxin and homobatrachotoxin, steroidal alkaloids that are stronger than curare mixtures. *Phyllobates terribilis* produces relatively massive quantities of these compounds and is at least twentyfold more toxic than other poison-dart frogs. The new species is potentially dangerous to handle: One freshly caught frog may contain up to 1900 micrograms ... of toxins, only a fraction of which would be lethal to man if enough skin secretion came into contact with an open wound. A human lethal dose is indirectly judged as being somewhere in the range of 2-200 [micrograms], and the secretions also are irritating to porous skin and poisonous if ingested. *Phyllobates terribilis* attains a snout-vent length of about 47 mm., making it one of the largest species in its family (Dendrobatidae). It is readily distinguished from all other dendrobatids in that body and limbs are a uniform golden or pale metallic green color above and below, except that small juveniles have a primitive pattern of golden dorsolateral stripes on a black ground. The ontogenetic color change, tadpoles, and other aspects of the life history and behavior are described. A component of aggressive grappling behavior of this and some other dendrobatids is suggested as being homologous with dendrobatid cephalic amplexus, an instance of which is photographically documented for *Dendrobates tricolor*. The trill call of *Phyllobates* is the third class of dendrobatid vocalizations to be defined. At the type locality, *Phyllobates terribilis* occurs in populations of predominantly adult frogs that probably have relatively long (> 5 years) and secure lives; reproductive success or juvenile survivorship might be inversely correlated with population density. Emberá Indians are occasional predators, and the snake *Leimadophis epinephelus* is identified as a potential predator, at least of young frogs. This snake has an unusual capacity for tolerating a great chemical diversity of anuran skin secretions. Piperidine-based skin alkaloids provide a shared, uniquely derived character (synapomorphy), seeming to establish that frogs of the *Dendrobates-Phyllobates* complex share a monophyletic origin apart from a sister group (*Colostethus*). But, in the *Phyllobates bicolor* group, primitive piperidine alkaloids have been largely replaced by a more effective set of defensive skin toxins--the steroidal batrachotoxins. The latter are a novel synapomorphy that seems to establish the monophyly of *Phyllobates* (*sensu stricto*), a genus heretofore inadequately defined on the basis of shared primitive (plesiomorphic) characters. Most of the species recently assigned to *Phyllobates* (by Silverstone, 1976) are here removed to *Dendrobates*, including the nomenclatural type species (*trivittatus*) on which the name *Dendrobates* must be based. *Dendrobates* is more diverse as now defined (*vs.* Silverstone, 1975). The diversity is due to a mixture of shared primitive characters, along with derived characters still to be tested for convergence or parallelism. These changes have minimal effect on the usefulness of Silverstone's (1975, 1976) monographs on the two genera, since his accounts of species and species groups are mostly well considered. The laborious process of fabricating an Emberá Chocó blowgun, quiver, and darts is described and photographically illustrated. The Chocó blowgun is of Yde's type IV, two long and tapering, semi-cylindrical sections of palm wood glued together and wrapped with bast. There are two principal ways of making the bore in type-IV blowguns. Some tribes (Jívaro and Yagua) scratch initial grooves on the half-shafts, which are then joined and the bore enlarged and smoothed with a ramrod and sand. The Chocó and Cofán finish the grooves before the half-shafts are joined; use of metal implements by present-day Chocó and Cofán probably is a simple improvement over such objects as mammal teeth, said to have been used for the same purpose by Pasé Indians over a century ago. The Chocó weapon differs from most other type-IV blowguns in lacking a separate mouthpiece and in rarely being waterproofed. The blowgun is for hunting, but, unlike some Amazonian tribes, the Chocó may have no superstitious strictures against turning it occasionally on man. The Chocó are the only Indians known with certainty to use frog toxins as the sole ingredient of dart poison, and the practice is documented only in the Río San Juan and Río Saija drainages of western Colombia; use of a plant poison is more widespread, although the Chocó blowgun is on the decline and absent in some areas. The Emberá Chocó and Noanamá Chocó have two ways of obtaining frog poison: frogs of the species *Phyllobates aurotaenia* and *P. bicolor* (San Juan drainage) are impaled on a special stick entering the mouth and exiting through a hind leg; the spitted frog may sometimes, but not necessarily, be held near fire while darts are rubbed in its skin secretions. In contrast, dart tips are simply rubbed against the backs of living *Phyllobates terribilis* (Saija region). These different methods reflect more on the relative toxicity and abundance of the frogs than on cultural differences"--P. 311-312.

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from the Native Americans' use of the frog toxic secretions to poison the tips of blow darts. Rodolpho was asked to find some of these colorful frogs prevalent in Guiana for

the zoologists. Fig. Myers CW, Daly JW, Malkin B. A dangerously toxic new frog (Phyllobates) used by Emberá Indians of western Colombia, with discussion of blowgun

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