

MORE ON THE ATELOPUS (AMPHIBIA, SALIENTIA) FROM WESTERN SOUTH AMERICA

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ABSTRACT: *Atelopus pulcher* Blgr., 1882, is synonymized with *A. spumarius* Cope, 1871, and a new race of this species is described from Biabo Valley, Peru (*A. s. andinus*). The possible identity of some uncertain species of *Atelopus* from Peru and Ecuador is discussed.

AFTER the publication of my paper on the *Atelopus* from Colombia and Ecuador I had the opportunity to examine an additional number of specimens from these countries and from Perú. From these studies, it appears now that some of the species mentioned can be synonymized, while others, whose affinities could not be ascertained at the time, can now be related to other forms occurring in those countries.

Atelopus pulcher Blgr., 1882, for example, appears to be a strict synonym of *A. spumarius* Cope, 1871. *A. pulcher* came from Chyavetas, E. Peru, and *A. spumarius* from Pebas, about 400 miles to the northeast. Chyavetas, to be certain, was never found in a Peruvian map and no Peruvian native could give reference to this locality. However, a place by the name of Chayahuitas was found near the margin or Rio Puma (5° 5' S, 76° 10' W), and about 40 miles north of Balsapuerto. Considering that the name Chayahuitas begins with

a "ch", ends with a "tas" and has a "y" in between, there is a good possibility that Chyavetas may only be a misspelling of Chayahuitas.

Both Pebas and Chayahuitas are within the Amazon drainage system and both occur within the uniform, humid, tropical forest of the Amazonian Basin. The description of *Atelopus puleher* fits that of *A. spumarius*, except for the fact that Cope speaks of "a broad band from orbit to groin composed of numerous aggregated annuli of greenish yellow which has the appearance of green foam", and neither *A. pulcher* Blgr. nor any of the other *Atelopus* from east of the Andes known to the author, meet these specifications. In *A. pulcher* Blgr. there is a solid brown lateral band, and above this, a yellow (green?) band usually containing brown dots, but no annuli. In fact, greenish annuli with brown centers can only be found in some *A. cruciger*, and the appearance of green foam can perhaps be most properly applied to the lateral pattern of that species. This may be one of the rea-

sons why *A. spumarius* was long synonymized with *A. cruciger*. The possibility that Cope may have confused the label and assign to Perú material actually coming from Venezuela was considered, but abandoned upon finding that apart from the "green foam", the description does not fit *A. cruciger* while it does, in many details, characterize *A. pulcher*.

Material coming from as near as possible to the type locality of *A. spumarius* are AMNH 43405, 42334-36, from Tachsha, Huachiyacu, Río Morona, Loreto, Perú. In all details, these specimens follow Cope's description, but the lateral band is green (above a brown one) and the dots within the band are of a solid brown color. This seems to be the most common *Atetopus* in the departments of Loreto, Amazonas and San Martín of Perú. Specimens have been examined from Río Bombo (E. Loreto), Utiquima and Roabaya (S.E. Loreto, at Río Ucayali), Shepahua (S. Loreto, Río Urubamba), Upper Riabo, Cachiyacu and Río Huallaga Valley (S. San Martín), Cachipuerto and Balsapuerto (N. San Martín), Manseriche, mouth of Río Santiago, and Río Tambo (N.W. Loreto) and Ríos Cenipe and Ayambis (N. Amazonas). The southernmost specimens known to the author come from Shepahua, at the Cuzco Valley, and the northernmost from Río Oglán, in Ecuador. Other Ecuadorean specimens available for examination are from Miazal, at the eastern base of the Cutucú Cordillera, Veracruz, Puyo, Baños-Canelos, Cutucú, Río Upano, Chancha (Chimborazo) and Riobamba. Dr. James Peters tells me that these last two localities are undoubtedly incorrect, and that is probably what they are, as it is most improbable for this East Andean species to occur west of the Andes (Chimborazo) or as high as Riobamba. Yet, the few small specimens labeled as coming from Riobamba have a differently shaped snout in which the eye diameter is slightly longer than the distance between eye and nostril. It seems that, no matter where they are coming from, they have undergone some differentiation from the East Andean population. Because of the un-

certainty of the data is not possible to determine if there is any variation among the rest of the Ecuadorean specimens deposited at the A.M.N.H. (Baños-Canelos, Cutucú, Río Upano, Chancha, Riobamba). All of these animals show some variation from the Peruvian material,* but this may be due to the state of preservation of the latter, as specimens from Río Oglan, Puyo (Pastaza), Veracruz, Miazal (Morona-Santiago) and Limón (Zamora) U.S.N.M. are similar to the Peruvian from. Yet, Miazal is at the eastern base of Cutucú, and Canelos is only about 20 miles southeast of Puyo. Material from Macas at the USNM is similar in snout shape to the Upano-Cutucu-Banos-Canelos (and Riobamba) form, but looks different from the Limón (Gral. Plaza) specimens, which are from approximately the same elevation along the same river system. Thus, no conclusions regarding differentiation of this species in Ecuador can be offered, although one should be on the lookout for any possible change along the area of Macas and Río Upano.

Apart from some slight variation in the amount of webbing, in the pointedness of the snout, in the abundance and size of the lateral spots and in the presence or absence of ventral spots, the population of the Amazonian region of Perú seems to be quite uniform. In the mountains of San Martín, however, the species varies somewhat, and for these, a new racial name is proposed. Some variation is already noticed in animals from Río Pisqui, but the greatest differentiation is shown by material from Biabo Valley and from Tocache, in upper Río Cachiyacu. These valleys are enclosed by fairly high ridges, and the isolating effect of the

* In Peruvian specimens the sides of the snout are externally concave, opening up at the nostrils, while in some Ecuadorean material at the A. M. N. H. (Baños-Canelos, Cutucú, Río Upano, Chancha, Riobamba), the sides of the snout are straight, forming a triangle with a more or less truncate tip. When looked from below, the snout overhangs the mouth more in the Peruvian specimens. The nostrils are, in these specimens, in elevated protuberances, which explains why the snout is concave on the sides.

surrounding mountains, plus the effect of higher elevation, have apparently induced differentiation of the mountain form.

Atelopus flavescens, from British Guiana, belongs to the same group as *A. spumarius*, but it is separated from that species by many miles of forest from where neither of them nor their representatives, have been collected. The two forms are very similar, however, and severance of a probably once continuous population may have occurred at not too distant a future.

In my paper on the *Atelopus* from Colombia and Ecuador (Carib. J. Sci., 1963, 3 (2-3) : 110) the possibility that *Atelopus palmatus* Andersson be a synonym of *A. spumarius* was considered. To be certain, there are a few characters in the description of *A. palmatus* that do not fit *A. spumarius*. For one thing, the snout of *A. spumarius* is not "as long as, or little longer than, the diameter of the eye", but definitely longer, and there are no swollen protruding edges of the frontoparietals or glandular ridges behind the orbit. The rest of the description fits so well, that one is inclined to disregard some of these characters as resulting from dessication or from a different way of taking measurements.

I am still confused with two of the characters mentioned by Andersson. He had an animal with an acuminate, projecting snout and a long head ("considerably longer than broad"). Yet, the eye diameter was as long as, or almost as long as the snout. This does not seem right unless Andersson's measurement of the snout was taken between eye and nostril. The other doubtful character is the extension of the adpressed hind heel, which, according to Andersson, reaches in *A. palmatus* to "a little before the eye". He doesn't say whether it is before it reaches the eye or just beyond, that is, ahead of the eye. These characters discarded, or rather interpreted as if Andersson's "snout" is from eye to nostril, and "before the eye" means anterior to the eye. there is another form from eastern Ecuador that fits the description quite well. This is a frog that

occurs in Sarayacu (AMNH 33891,3893) and may also have a transandean representative at Balzabamba, in Bolivar, Ecuador AMNH 18229). This form has the long, pointed snout, a post-orbital ridge which forms an angle with the slightly protruding rear margin of the frontoparietals and a porous, rather indistinct, dorsolateral ridge. The color is as described by Andersson, except for the fact that the light dorsolateral band is narrow and there are no reddish spots inside or ramifications of the light color into the brick red upper areas.

The two specimens from Sarayacu are granular on the pectoral region but the one from Balzabamba is smooth. This last specimen is also slightly less webbed than the eastern form, the tip of the snout is not triangular, the post-orbital ridge is not distinct and the porous dorsolateral ridge is not apparent. In spite of these differences, the two animals appear to be related and may, perhaps, be conspecific. There is a good possibility that the specimens from Sarayacu may represent *Atelopus palmatus* Andersson.

There is in Macas, E. Ecuador a small tubercular species of *Atelopus* (AMNH 16717-16724) which cannot be assigned to either *A. festae* Peracca or *A. carinatus* Andersson, both of which occur in that general region. It does not have a truncate snout and although the eye diameter is larger than the distance between the eye and nostril, it cannot be said to be as long as the snout (as in *A. carinatus*). The animal is of a yellowish brown color, sometimes with darker markings, and in this respect it differs from both *A. carinatus* (solid brown above) and *A. festae* (brownish black). From *A. festae* it also differs in size, in the wartiness of its skin and in having the eye diameter definitely larger than the distance between eye and nostril.

This form is perhaps most closely related to *A. bufoniformis* Peracca, from Pun (near the Colombia-Ecuadorean frontier)

and to *A. nicefori* Rivero,* from Caicedo, Colombia. With both species it shares the small size (25-30 mm), the tubercular skin and the proportion between eye and distance between eye and nostril. It differs from *A. bufoniformis* in color (*A. bufoniformis* is brownish black above; brownish black with yellowish spots below) and from *A. nicefori* in lacking a tarsal fold. An occasional specimen of the Macas form shows a color pattern that is quite similar to that of *A. nicefori* but unless this species represents a form of very wide distribution, it is unlikely that an animal from Caicedo, 1800 m., in the western face of the Andes of Colombia, may be the same as one occurring in Pun (2600-2800 m.) or in Macas (around 1000 meters in the eastern face of the Oriental Andes). As the author did not have the opportunity to compare material from these three localities or with a specimen from Aguadita (CNHM 81875-Sibate-Aguadita) tentatively, but probably incorrectly, included with *A. nicefori* (Rivero op. cit. 115), no further comments are offered regarding this form. It appears, however, that *A. bufoniformis*, *A. nicefori*, the form from Aguadita, and the form here mentioned belong to a group of related frogs, the affinities of which can only be ascertained by examining more material from a good number of localities.

A specimen from Antioquia, Andes, Colombia, at the American Museum of Natural History (14149) is the closest thing I have found to *Atelopus longirostris* Cope (Vane de Quito). The animal has a very long and pointed snout, the nostrils are on two distinct lateral protuberances, the fingers are slightly webbed, the toes a little more than half webbed and there is a yellow (green?) marking on the scapular region and three or four others in the sacral region. If it were not for the ambiguity of the locality (It is not known if it refers to the town or to the department of Antioquia and, of course, Andes,

could mean any point in the Andean Cordillera within the Department of Antioquia) and the distance, both vertical and horizontal, from the type locality, I would not hesitate to consider this animal as strictly nonspecific with *A. longirostris*.

In Mera, in the Napo Pastaza region (now separated into the departments of Napo and Pastaza) there is a form that appears to belong to the same general group as the above. Dr. James Peters has examined this lot (AMNH 49943-46, 449948-50) and believes that the locality record is incorrect and that these specimens agree with animals he has collected in western Ecuador, which again, are strictly conspecific with Cope's *Atelopus longirostris*. Yet, Cope did not call attention to a mid-dorsal fold or to lateral spinulosity, characters which are, however, present in the Mera specimens. These animals are fully webbed in the toes (Cope's were half webbed), there is a distinct spotting of the dorsum and the snout is pointed and protuberant although not quite as much as in the specimen from Antioquia.

Another form occurring in Cisneros, Colombia (CNHM 43850-51) and discussed by the author in a separate paper (Rivero, 1963: 112) should also be studied in connection to this group of frogs. In all the forms included in the group there seems to be a mid dorsal fold, a long, pointed snout in which the nostrils are on distinct protuberances, and a dark brown dorsal coloration with yellow (green ?) spots on the scapular region. These characters seem to indicate relationship among these various frogs.

The Ecuadorean collection of the American Museum includes two groups of frogs coming from Rio Pescado in Guayas. One of them is apparently made up of specimens of *A. spurrelli*. The other, comprising 15 specimens, includes a frog that in color pattern reminds one of *A. longibrachius* Rivero (El Tambó, Guisitó, Colombia). However, in this species the dorsal markings are round and solid while in *A. longibrachius* they are usually sinuous, elongated or annular. There may

* Described as plain brown on the basis of dry specimens but with markings when wet, as shown in photograph of the species (Rivero, 1963, Carib. J. Sci., 3 (2-3): 248.

be other differences, but since the type material of *A. longibrachius*, is not available for comparison at this time, these specimens are, for the time being, considered as nonspecific with that species. This spotted form is also similar to *A. spurrelli* (which may also show an occasional spotted individual), but differs from it in snout shape (longer and more pointed in *A. spurrelli*), in color pattern and in having a shorter hind limb.

A. bicolor Noble, from Cordillera Cutucú, east of Macas, 1800-2000 m. is certainly synonym of *A. Boulengeri* Peracca, from Gualaquiza and San José, E. Ecuador. Four specimens from Turula, E. of Macas, 2800 ft. (AMNH 13133-35, 33893) and four from Ecuador (AMNH 17427, 17428, 17431) easily show the characters of that species, which however, seems to be somewhat variable insofar as the amount of webbing is concerned. In some of the Ecuador specimens, the snout, in front of the eyes, is yellow, and in no. 17430, there is a yellow, sickle-shaped marking on the right side of the posterior portion of the back.

In my recent paper on *Atelopus ignescens* (Carib J. Sci., 5 (3-4) : 137-140), I mentioned *A. pachydermus* (Schmidt) as coming from Buenaventura, on the western coast of Colombia. The type locality is actually "near Buenaventura, 5000 ft." and it was I who, on the basis that I could not find any other Buenaventura in Colombia, concluded, perhaps prematurely, that *A. pachydermus* should have come from the mountains north of the city. Examination of a number of specimens from Oyacachi, Napo-Pastaza, Ecuador (AMNH 20492-20503) which I have tentatively identified as *A. pachydermus*, makes one doubt if Schmidt's Buenaventura was the western locality I originally thought. However, no town by the name of Buenaventura has been found east of the Andes of Colombia, and no Colombian consulted believes there is such a town, although some agree that there could be a small village with that name.

If Schmidt's Buenaventura is the sea level, western town at 4°15'N, the probabi-

lity that the animals from Oyacachi represent the same species is very doubtful. There may be however, a place by the name of Buenaventura in the east. Under the circumstances, identification, of the above mentioned material should be considered provisional.

Still unaccounted for are *Atelopus seminiferus* Cope, 1874, from, Balsapuerto and Moyabamba, Perú, well within the territory of *A. spumarius* but differing from it in having a solid brown dorsum, a brownish orange venter and a shorter snout, and *A. boussingaulti*, (Thomiot), 1889, from Guayaquil-Latacunga, S. of Quito (?) which Dunn (personal communication) and James Peters, who has examined the type, consider a synonym of *A. longirostris* Cope.

The description of the subspecies proposed follows here:

Atelopus spumarius andinus sp. n.

Type: AMNH 4300, a ♂ from Upper Biabo Valley, Perú.

Diagnosis: *Atelopus spumarius andinus* differs from the typical form in having a granular skin and a different color pattern.

Description: Morphologically, the subspecies is very similar to the type species but the skin is densely spinulose, especially on the eyelids, the sides of the dorsum and the posterior half. The spinules are not as common on the limbs. The dorsolateral band and dorsal spots are tan rather than greenish yellow or green and the dorsal pattern in general is different from that occurring in *A. spumarius* (See Pl. II).

Measurements: (mm.) Snout-vent 28; head breadth 8; head length 8.1 (from angle of the mouth) ; femur 13.2; tibia 12.3; foot 10.1.

Paratypes: Belonging to this same form are AMNH 42657, a ♀ from the same locality, and AMNH 42194, 43296, 43297, 42657 from Tocache, Upper Rio Chachiyacu, Sn. Martin, Perú and AMNH 43545 from Lower Rio Pisqui, Loreto, Perú.

AMNH 42914 is a ♀ with the following measurements: (mm.) snout-vent 34.9; head breadth 15; head length; femur 16; tibia 17.2; foot 14.7.

All the specimens are spinulose above and in all, the light dorsal color is tan rather than yellow or green. In all of them the dorsal pattern is different from the dorsal pattern of the typical form (see Pl. 1). In all except the type, there is considerable overlapping of the knees when thighs and tibiae are placed perpendicular to the body.

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- FIGS. 1-8. *Atelopus spumarius*.—FIG. 1. U.S.N.M. 65488, from Macas, Morona-Santiago, Ecuador.—FIG. 2. A.M.N.H. 33915 from Cutucú, Santiago-Zamora, Ecuador.—FIG. 3-4 J.A.P. (James A. Peters) 7519, 7517, from Limón (Gral. Plaza), Morona-Santiago, Ecuador.—FIG. 5. A.M.N.H. 42334, from Tacsha, Loreto, Perú.—FIG. 6. A.M.N.H. 42527 from Roaboya, Loreto, Perú.—FIG. 7a. J.A.P. 7514 from Limón.—7b. A.M.N.H. 21492 from Macas, 1600m.—7c A.M.N.H. 33915 from Cutucú.—7d A.M.N.H. 65487 from Macas.—FIG. 7. A.M.N.H. 10532 from Riobamba, Chomborazo, Ecuador. Note the difference in snout shape between specimens from Macas-Cutucú (Figs. 1, 2, 7b, c, d.) and those from elsewhere. Specimen A.M.N.H. 10532.—FIG. 8. Perhaps erroneously labeled as coming from Riobamba, has a shorter snout than other examples from Ecuador and Perú.



1



2



3



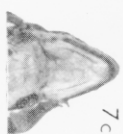
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5



6



7c



7a



7d



7b



8

FIG. 1. A.M.N.H. 43200 *Atelopus spumarius andinus*, type, from Upper Biabo Valley, Loreto, Perú.—FIG. 2. A.M.N.H. 42657, *A. spumarius andinus* ptp. from Biabo Valley, Loreto, Perú.—FIG. 3. A.M. N.H. 432966, *A. spumarius andinus* prtp. from Tocache, Upper Rio Cachiyaçu, Sn. Martín, Perú.—FIG. 4. A.M.N.H. 42914, *A. spumarius andinus* from Tocache.—FIG. 5. A.M.N.H. 20496, ¿*Atelopus pachydermus* from Oyacachi, Pueblo Viejo, Napo-Pastaza, Perú.—FIG. 6. A.M.N.H. 20493, ¿*Atelopus pachydermus*, from Oyacachi.—FIG. 7. A.M.N.H. 13133, *Atelopus boulengeri* from E. of Macas, Santiago-Zamora, Ecuador.



FIG. 1. A.M.N.H. 22198 *Atelopus planispinus* from top of Volcán Sumaco, Napo-Pastaza, Ecuador.—
FIG. 2. A.M.N.H. 49950, ¿*Atelopus longirostris* from Mera, Napo-Pastaza, Ecuador.—FIG. 3. A.M.N.H.
49946, ¿*Atelopus longirostris* from Mera.—FIG. 4. A.M.N.H. 33891, ¿*Atelopus palmatus* from Sarayacu,
Napo-Pastaza, Ecuador.—FIG. 5. A.M.N.H. 17738, *Atelopus* sp. (nr. *longibrachius*) from Guayas, Río
Pescado, Ecuador.—FIG. 6. A.M.N.H. 16717, *Atelopus* sp (nr. *bufoniformis*) from Cordillera Cutucú, E.
of Macas Santiago-Zamora, Ecuador.



