

OCCASIONAL PAPERS OF THE MUSEUM OF
ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN

UNIVERSITY OF MICHIGAN PRESS

A PRELIMINARY SYNOPSIS OF THE GENERA OF
AMERICAN MICROHYLID FROGS

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DURING the last ten years I have been engaged in accumulating materials leading toward a revision of the American frogs of the family Microhylidae. This monograph is now near completion, but as publication will be delayed for some time it seems desirable to present descriptions of the new genera and species. As my work has resulted in a considerable modification of Parker's (1934) arrangement of the American members of the family, this opportunity has been taken to give a complete list of the New World genera with a key for their identification.

Detailed accounts of all genera and species with illustrations of external and osteological features and a full description of their evolution and relationships are reserved for the larger paper. Complete acknowledgments to all those who have aided in the preparation of the monograph will also be presented at that time. I am particularly indebted to Dr. George S. Myers, Natural History Museum of Stanford University, at whose suggestion the study was undertaken, and to the John Simon Guggenheim Memorial Foundation, for having made possible my work on the problem in the United States. Abbreviations represent the following collections: American Museum of Natural History (AM); Museu Nacional, Rio de Janeiro (MN); Museum of Zoology, University of Michigan (UMMZ); Natural History Museum of Stanford University (SU). In the lists of species an asterisk (*) indicates forms not seen by me.

ARTIFICIAL KEY TO AMERICAN GENERA OF MICROHYLIDAE

- 1a. Clavicle and procoracoid straight and perpendicular to mid-line of pectoral girdle; both clavicle and procoracoid extending from epicoracoid to glenoid cartilage; tympanum distinct; fingers and toes without subarticular tubercles OTOPHRYNE.

¹ Museu Nacional, Rio de Janeiro, Brazil.

- 1b. Clavicle and procoracoid, if present, curved or straight but never perpendicular to mid-line of pectoral girdle; either clavicle or procoracoid, but never both of them, may extend from epicoracoid to glenoid cartilage; tympanum concealed; fingers and toes with subarticular tubercles.
- 2a. Palatine present.
- 3a. Clavicle, procoracoid, and posterior part of prevomer present; dorsal coloration light, with a dark irregular roughly arrow-shaped mark, sharply demarcated by a light line from ventral coloration, which is dark.
- 4a. Clavicle long, extending from middle of pectoral girdle to glenoid cartilage; a single fenestra on each side between clavicle and coracoid; clavicle supported at medial tip by greatly reduced procoracoid STEREOCYCLOPS.
- 4b. Clavicle short, not reaching the glenoid cartilage; two fenestrae on each side between procoracoid and coracoid; procoracoid long, extending from epicoracoid to glenoid cartilage, touching mesial part of coracoid and supporting the clavicle for its entire length HYOPHRYNE.
- 3b. Clavicle, procoracoid, and posterior part of prevomer absent; dorsal coloration without any arrow-shaped mark, not sharply demarcated by a light line from ventral coloration, which is not strikingly different in color from dorsum GLOSSOSTOMA.
- 2b. Palatine absent.
- 5a. Clavicle and procoracoid present.
- 6a. Clavicle long, extending from middle of pectoral girdle to glenoid cartilage.
- 7a. Premaxillary without a median notch; length of coracoid suture much longer than the clavicle; toes free; one metatarsal tubercle DERMATONOTUS.
- 7b. Premaxillary with a median notch; length of coracoid-epicoracoid suture much shorter than clavicle length; toes webbed; two metatarsal tubercles HYPOPACHUS.
- 6b. Clavicle not reaching glenoid cartilage.
- 8a. Posterior part of prevomer present.
- 9a. Right and left posterior parts of prevomer fused to form a single, flat, narrow, bow-shaped bone; terminal phalanges T-shaped; tips of fingers and toes expanded and truncate ARCOVOMER.
- 9b. Right and left posterior parts of prevomer reduced to distinct small bony plates, not fused to form a single bone; terminal phalanges not T-shaped; tips of fingers and toes not truncate.
- 10a. Quadratojugal in contact with maxillary; terminal phalanges a little enlarged at tip; clavicle extending from the reduced medial procoracoid to beyond middle of coracoid; tips of fingers and toes with a disklike expansion HAMPTOPHRYNE.
- 10b. Quadratojugal not in contact with maxillary; terminal phalanges not enlarged at tips; clavicle extending from a reduced medial procoracoid but not reaching beyond middle of coracoid; tips of fingers and toes rounded, without disklike expansions. RELICTIVOMER.

- 8b. Posterior part of prevomer absent.
- 11a. Parasphenoid very broad, extending forward beyond level of choanae; coracoid-epicoracoid suture equal to or longer than distance from mid-line of pectoral girdle to glenoid cartilage; snout broad and truncate DASYPOPS.
- 11b. Parasphenoid narrow, not reaching forward to level of choanae; coracoid-epicoracoid suture much shorter than distance from mid-line of pectoral girdle to glenoid cartilage; snout not broad and truncate.
- 12a. Clavicle not extending beyond medial part of coracoid; procoracoid restricted to median tips of clavicle, not reaching to middle of clavicle; neither clavicle nor procoracoid touching coracoid; snout pointed ELACHISTOCLEIS.
- 12b. Clavicle extending beyond medial part of coracoid; procoracoid not restricted to median tips of clavicles but reaching at least to middle of clavicle; either clavicle, or procoracoid, or both touching coracoid; snout not pointed CHIASMOCLEIS.
- 5b. Clavicle and procoracoid absent.
- 13a. Toes almost fully webbed; skull much broader than long; dorsal pattern light, sharply demarcated from ventral color, which is dark CTENOPHRYNE.
- 13b. Toes not webbed, or with a rudiment of web at bases; skull longer than broad, or as long as broad; dorsal color not sharply demarcated from ventral.
- 14a. Quadratojugal not in contact with maxillary; premaxillary without a median notch; snout extremely long.
- 15a. Ethmoids, anterior part of prevomers, and parasphenoid fused into a single element; vertebral column diplasiocoelous; urostyle with well-developed transverse processes; tips of fingers and toes with disks SYNAPTURANUS.
- 15b. Ethmoids, anterior part of prevomers, and parasphenoid separate, not fused together; vertebral column procoelous; urostyle with vestiges of transverse processes; toes without disks . MYERSIELLA.
- 14b. Quadratojugal in contact with maxillary; premaxillary with a median notch; snout not elongated GASTROPHRYNE.

Otophryne

Otophryne Boulenger, 1900: 55 (type by monotypy *O. robusta* Boulenger, 1900).
Parker, 1934: 108.

Parker (1927, Pl. I, Fig. 1, and 1934: 108, Fig. 46) figured and listed as one of the characteristics of this genus a small cartilaginous omosternum. Boulenger in the original description of the genus and species did not figure or refer to this structure. Examination of the pectoral girdle of a specimen of this species (AM 1325) reveals no omosternum, and although the example is in poor condition and the girdle broken or cut, there is no indication that an omosternum was ever present.

Even without the omosternal character this genus is amply distinguished from all other microhylids.

INCLUDED SPECIES.—*O. robusta* Boulenger, 1900.

Stereocyclops

Stereocyclops Cope, 1870: 165 (type by monotypy *S. incrassatus* Cope, 1870).

Emydops (nec Broom, 1912) Miranda-Ribeiro, 1920: 286 (type by monotypy *E. hypomelas* Miranda-Ribeiro, 1920=*Stereocyclops incrassatus* Cope, 1870).

Ribeirina Parker, 1934: 115 (substitute name for *Emydops* Miranda-Ribeiro, taking same type).

REMARKS.—Great confusion has existed concerning *Stereocyclops* ever since Cope described the genus. In 1920 Miranda-Ribeiro described a second specimen of *Stereocyclops incrassatus* under the name of *Emydops hypomelas*. This generic name was preoccupied by *Emydops* Broom, 1912, and for it Parker in 1934 substituted the name *Ribeirina*, in honor of Miranda-Ribeiro. Parker acknowledged the distinctness of the genus (as *Ribeirina*), although he erroneously placed the name *Stereocyclops* in the synonymy of *Hypopachus* on the assumption that Cope's *S. incrassatus* was identical with *Engystoma mülleri* Boettger, 1885. A fuller discussion of this situation along with the essential synonymies may be found in my earlier paper (Carvalho, 1948).

As I have previously demonstrated (Carvalho, 1948), *Stereocyclops incrassatus* represents a genus quite distinct from all other American microhylids in the retention of the palatine, posterior part of prevomer, and fully developed clavicle. In these features *Stereocyclops* appears to be a primitive American microhylid which probably gave rise to the allied genera, *Hyophryne* and *Ctenophryne*, through modifications in the skull and pectoral girdle. It differs widely from *Dermatonotus* and, indeed, from *Hypopachus* as well, in the flattened head and much larger mouth.

INCLUDED SPECIES.—*S. incrassatus* Cope, 1870.

Hyophryne, new genus

TYPE.—*Hyophryne histrio*, new species.

DIAGNOSIS.—Prevomer divided, posterior and anterior parts distinct; postchoanal part narrow and long, extending from mid-line of palate to a point above internal extremity of palatine which lies under, and at an angle to, prevomer. Ethmoids separate. Premaxillary notched

medially. Quadratojugal in contact with maxillary. Vertebral column diplasiocoelous. Clavicle short, semilunar, not reaching glenoid cartilage (Fig. 1); procoracoid cartilage well developed, extending from mid-line of girdle to glenoid cartilage, touching mesial part of coracoid and supporting clavicle for its entire length; two fenestrae on each side of pectoral girdle between procoracoid and coracoid. Xiphisternum cartilaginous and broad. Terminal phalanges not T-shaped, slightly expanded at tip. Fingers not webbed; webs extending along sides of toes as fimbriations. One inner metatarsal tubercle.

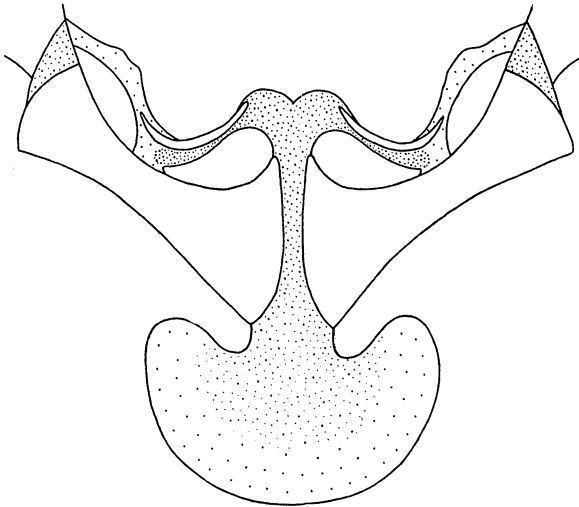


FIG. 1. Pectoral girdle of *Hyophryne histrio*.

The generic name is from the Greek ὕς and φρύνη (pig-frog), with reference to the physiognomy of this form.

INCLUDED SPECIES:

***Hyophryne histrio*, new species**

(Pl. I, Fig. 1)

TYPE.—MN 1010; an immature specimen, 28 mm. from snout to vent, sex unknown; collected by João Geraldo Santos in March, 1944.

TYPE LOCALITY.—Fazenda Repartimento, Municipio de Ilheus, Estado da Bahia, Brazil.

DIAGNOSIS.—This species is superficially similar to *Stereocyclops incrassatus* from which it differs, in addition to the generic characters

listed above, as follows: body stouter, head wider, snout longer, eyes larger, limbs stronger, fingers and toes shorter and broader; toes broader at the base with webs extending along the margins of toes to form fimbriations; tips of toes depressed and enlarged; subarticular tubercles much larger and flattened; skin of entire body and limbs smooth and shiny. The body of *Hyophryne histrio* is stout; head broader than long, roughly triangular when viewed from above; snout prominent with tip rounded; canthus rostralis angulate, edge not sharp but rounded; loreal region vertical, at a very slight, oblique angle to canthus; interorbital space one half the distance from anterior margin of eye to nostril, and twice the distance between nostrils. Eyes relatively large; iris divided into two areas, the superior one silver, the inferior black, latter section the larger. Upper eyelid without a free posterior margin. Mouth inferior; tongue large, entire, with lateral and posterior borders free. Palatal region with two folds, the first projecting markedly downward into mouth, shorter than second and lying between the openings of the Eustachian tubes. Second fold broad, its posterior edge free and crenulate.

Limbs short and strong; fingers free and tips round; toes enlarged basally and narrowing toward the tips, which are expanded. A membrane between bases of toes extending along edges of toes as a fimbriation. Subarticular and metatarsal tubercles enlarged and flattened, each one bordered by a dark line. Only one inner metatarsal tubercle.

COLORATION.—Upper surfaces of head, body, and limbs cream (bright lemon yellow in freshly preserved specimen) with an irregular, roughly arrow-shaped dark mark on dorsum. A similarly colored blotch on femur, tibia, and tarsus. Lower surfaces black with several large light spots concentrated on belly and in pectoral region and a few on arms and legs. Also present are numerous small light punctations in the gular, pectoral, and lower femoral regions. A sharp line of juncture between the light upper color and the dark inferior color beginning at tip of snout, passing through lower edge of nostril, and extending backward across loreal region to anterior corner of eye, then along lower margin of eye to posterior border, whence it passes directly backward over the shoulder and along the mid-side to the groin. A similar line of demarcation on limbs; on arms line of color so divided that along anterior and posterior edges the black area includes the first three fingers; on leg dark area gradually decreases in size from femur to foot; on foot, restricted to the first three toes and half of the fourth toe. Undersides of hands and feet light with some dark areas. Anal region light with a dark spot on each side.

REMARKS.—*Hyophryne* is related to *Stereocyclops* and is probably derived from it. The two genera are readily distinguished by the characters listed above. The new genus has a skull similar to that of *Stereocyclops*, but the pectoral girdle is very different. *Hyophryne* constitutes an intermediate stage between *Stereocyclops* and *Ctenophryne*; the latter has lost the palatine, posterior part of prevomer, clavicle, and procoracoid but has retained well-developed webs between the toes.

Comparison of the pectoral girdle of *Hyophryne*, particularly the clavicle and procoracoid, with this structure in non-American microhylids reveals a striking similarity between the new genus and *Platyhyla* and *Platypelis* of Madagascar. This is another interesting parallel between the pectoral girdles of distantly related genera in the family and emphasizes the unnaturalness of genera based upon the clavicle-procoracoid arrangement alone.

The trivial name *histrion* is from the Latin, meaning clown, in reference to the bicolored garb of this frog.

Ctenophryne

Ctenophryne Mocquard, 1904: 308 (type by monotypy *C. geayi* Mocquard, 1904).
Parker, 1934: 122.

REMARKS.—This genus is allied to *Stereocyclops* and *Hyophryne*, differing from them in the reduction of the number of elements of the palatal region and pectoral girdle. The posterior part of the prevomer and the palatine are absent, the quadratojugal is in contact with the maxillary, the clavicle and procoracoid are absent, the vertebral column is diplasiocoelous. In other characters *Ctenophryne* agrees with Parker's (1934: 122) description of the genus except that the tongue is not notched or entirely adherent. This condition described by Mocquard may be due to effects of preservation. I have examined three examples (AM 42663, 44787 from Amazon, Brazil, and Pampa Hermosa, Peru, respectively, and a specimen from Municipio de Borba, Brazil, in the collections of the Museu Nacional, now cleared and stained).

INCLUDED SPECIES.—*C. geayi* Mocquard, 1904.

Hamptophryne, new genus

TYPE.—*Chiasmocleis boliviana* Parker, 1927.

DIAGNOSIS.—Prevomer divided, posterior part reduced to a small osseous plate lying more or less free in mucosa of palate (Fig. 2).

Palatine absent. Quadratojugal in contact with maxillary. Vertebral column diplasiocoelous. Clavicle not reaching glenoid cartilage, resting at distal end on coracoid, at proximal end on tip of reduced procoracoid. Fingers and toes not webbed. Terminal phalanges a little expanded laterally but not T-shaped.

This genus is named in honor of Dr. Hampton Wildman Parker of the British Museum (Natural History), the describer of its only species and monographer of the family Microhylidae.

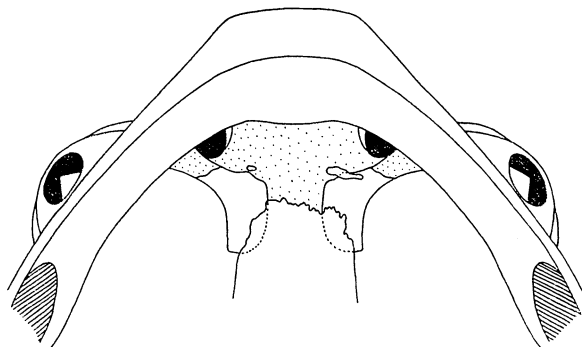


FIG. 2. Roof of mouth of *Hamptophryne boliviana*.

REMARKS.—Examination of AM 43384 from Cashiboya, Peru, and SU 3152 from Pevas, eastern Peru, shows that *H. boliviana* possesses, in addition to the characters mentioned by Parker (1927, 1934), a reduced posterior part of the prevomer similar in size and position to that of the Asiatic microhylids, genus *Ramanella*. The prevomerine character together with the quadratojugal-maxillary contact and the condition of the clavicle cause me to separate this species from the genus *Chiasmocleis*.

Hamptophryne is most closely related to *Arcovomer* and *Chiasmocleis*, but is more primitive than either of these genera in the retention of the closed quadratojugal-maxillary arch, longer clavicle, and color pattern.

INCLUDED SPECIES.—*H. boliviana* (Parker), 1927.

Arcovomer, new genus

TYPE.—*Arcovomer passarellii*, new species.

DIAGNOSIS.—Prevomer divided, postchoanal parts fused on mid-line to form a single arclike element, the center of which lies in front of anterior tip of parasphenoid, the two lateral wings of which curve

forward under the ethmoids and the supporting cartilage of the ethmoids (Fig. 3). Ethmoids separate. No palatine. Quadratojugal not in contact with maxillary. Vertebral column diplasiocoelous. Clavicle curved, not extending to glenoid cartilage, resting at mid-point of coracoid on a blocklike vestige of procoracoid which separates the

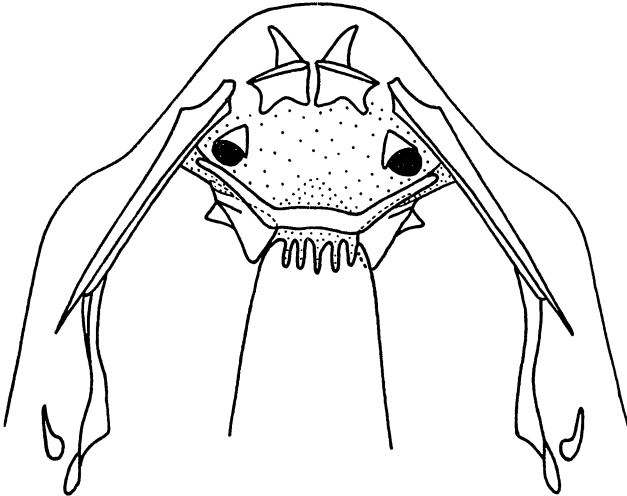


FIG. 3. Ventral view of anterior cranial elements of *Arcovomer passarellii*.

clavicle from the coracoid (Fig. 4). Terminal phalanges T-shaped. Fingers and toes not webbed, with broad truncate extremities. A single inner metatarsal tubercle.

The generic name *Arcovomer* (arched vomer) is Latin and is descriptive of the peculiar prevomer of this genus.

INCLUDED SPECIES:

Arcovomer passarellii, new species
(Pl. I, Fig. 2)

TYPE.—MN 1012, a male 16 mm. from snout to vent. Now cleared and stained. Collected by Antonio Passarelli in November, 1944.

TYPE LOCALITY.—Duque de Caxias, Estado do Rio de Janeiro, Brazil.

DIAGNOSIS.—Body small and slender. Head broader than long; canthus rostralis rounded, not sharply marked; loreal region convex, lying at oblique angle to canthus. Snout equals length of upper eyelid.

Eyes relatively large, pupil round. Interorbital space twice as broad as internarial space. Tongue narrow and long, entire, with posterior part free. Two palatal folds, anterior short and straight, posterior extending between openings of Eustachian tubes. Fingers and toes long with extremities expanded, depressed, and truncate.

COLORATION.—BROWN above with a distinct irregular dark pattern which originates above nostrils and continues over dorsum onto the rump. Anterior surface of upper arm with a dark brown longitudinal band; anterior face of thigh with a similar mark. A dark spot on each

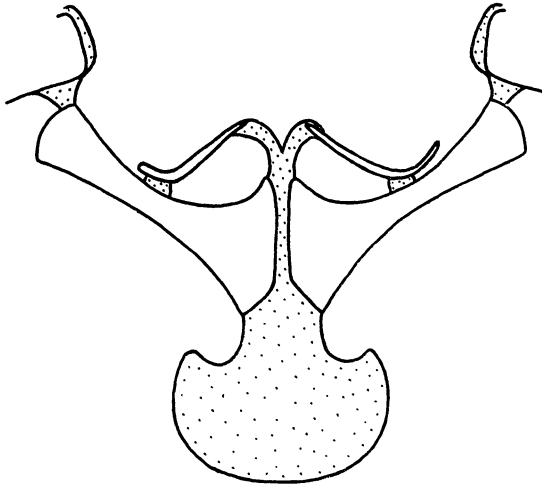


FIG. 4. Pectoral girdle of *Arcovomer passarellii*.

side of anus. A chestnut bar beginning in the inguinal region and extending obliquely across leg to posterior surface of thigh. An irregular dark mark crosses the upper surface of the tibia. Small dark blotches on tarsus and base of foot. Belly and undersides of limbs lighter, vermiculated with light spots and light brown areas. Gular region in the male type dark.

REMARKS.—This genus and *Hamptophryne* are related and constitute the connecting link between the series *Stereocyclops-Hyophryne-Ctenophryne* and *Chiasmocleis*. *Arcovomer* is clearly distinguished from any of these genera by the peculiar fusion of the posterior part of prevomer and by the T-shaped phalanges.

The species is named for Sr. Antonio Passarelli, who collected the type and has added much valuable material to the collections of the Museu Nacional, Rio de Janeiro.

Chiasmocleis

Chiasmocleis Méhely, 1904: 210 (type by monotypy *Engystoma albopunctatum* Boettger, 1885). Parker, 1934: 116.

Nectodactylus Miranda-Ribeiro, 1924: 256 (type by monotypy *Nectodactylus spinulosus* Miranda-Ribeiro, 1924 = *Engystoma leucostictum* Boulenger, 1888).

REMARKS.—Of the South American genera of the family this genus contains the most species. These are widely distributed over the continent. *Chiasmocleis* appears to be related to *Hamptophryne* and *Arcovomer*, but differs from these genera by the characters indicated in the key.

Most, if not all, species of *Chiasmocleis* show a marked sexual dimorphism. This characteristic of the group has led to some confusion. Miranda-Ribeiro (1924) redescribed *Engystoma leucostictum* Boulenger, 1888 (based upon a female) as a new genus and species, *Nectodactylus spinulosus*, even though he recognized the fact that Boulenger's description was based upon one sex.

Recently Bokermann (1952) described three new species of this genus from Brazil. From the description and figures it would seem that *C. centralis* (type locality Aruanã, Estado de Goiaz) is close to *C. albopunctata*; *C. schubarti* (type locality Corrego Juncado, Município Linhares, Estado do Espírito Santo) to *C. bicegoi*; and *C. urbanae* (type locality Ilha de São Sebastião, Estado de Paulo) to *C. leucosticta*.

INCLUDED SPECIES.—*C. albopunctata* (Boettger), 1885; *C. leucosticta* (Boulenger), 1888; *C. bicegoi*, Miranda-Ribeiro, 1920; **C. hudsoni* Parker, 1940; *C. ventrimaculata* (Andersson), 1945; *C. panamensis* Dunn, Trapido and Evans, 1948; **C. shudikarensis* Dunn, 1940; **C. bassleri* Dunn, 1949; **C. centralis* Bokermann, 1952; **C. schubarti* Bokermann, 1952; **C. urbanae* Bokermann, 1952.

Glossostoma

Glossostoma Günther, 1900: 210 (type by monotypy *Glossostoma aterrimum* Günther, 1900).

REMARKS.—Included by Parker (1934) in the genus *Microhyla*, this group constitutes a quite distinct genus. Unlike *Gastrophryne*, to which I refer most of the American species placed in "*Microhyla*" by Parker, *Glossostoma* possesses a palatine bone, a well-developed anterior projection of the epicoracoid, and almost completely webbed toes. *Glossostoma* is not closely allied to *Gastrophryne* but appears to be a parallel modification. *Gastrophryne* seems to have been derived from *Hypopachus* through loss of the clavicle, whereas *Glossostoma*

by a similar loss may have been evolved from some form ancestral to *Hypopachus* or *Dermatonotus*.

INCLUDED SPECIES.—*Glossostoma aterrimum* Günther, 1900; *Glossostoma aequatoriale* (Peracca), 1904.

Hypopachus

Hypopachus Keferstein, 1867: 351 (type by monotypy *Hypopachus seebachii* Keferstein, 1867 = *Engystoma variolosum* Cope, 1866).

REMARKS.—This genus and its relative *Gastrophryne* are restricted to Central and North America. *Hypopachus* contains many forms of specific or subspecific value.

INCLUDED FORMS.—*H. variolosus* (Cope), 1866; *H. inguinalis* Cope, 1869; **H. oxyrhinus* Boulenger, 1883; *H. cuneus cuneus* Cope, 1889; *H. cuneus nigroreticulatus* Taylor, 1940; **H. barberi* Schmidt, 1939; **H. globulosus* Schmidt, 1939; **H. ovis* Taylor, 1940; **H. caprimimus* Taylor, 1940; **H. alboventer* Taylor, 1940; **H. maculatus* Taylor, 1940; *H. championi* Stuart, 1940; **H. simus* Stuart, 1941; **H. aquae* Stuart, 1952.

Gastrophryne

Gastrophryne Fitzinger, 1843: 33 (type by original designation *Engystoma carolinense* Holbrook, 1836).

REMARKS.—This genus is closely related to *Hypopachus* from which it differs in lacking the clavicle and procoracoid and in having the webs of the toes reduced or absent. Very similar to *Hypopachus*, the genus from which *Gastrophryne* apparently arose, is *Gastrophryne usta* and its subspecies, which have two metatarsal tubercles as in *Hypopachus*. Only one tubercle is present in all other *Gastrophryne*.

Gastrophryne was included in the genus *Microhyla* by Parker (1934). The Asiatic species of the latter genus appear to form a composite of several groups of generic value, none of which can be considered as congeneric with American "*Microhyla*." The only character shared by these diverse groups, American and Asiatic alike, is the absence of the clavicle and procoracoid. As the process of reduction and loss of these features has occurred many times in microhylid evolution, little significance can be attached to a group characterized only by the absence of these two elements. The group *Microhyla*, as recognized by Parker (1934), is apparently an unnatural assemblage of species which are the end products of several evolutionary lines in

which the clavicles and procoracoids have been lost. This is strongly indicated by my examination of several Asiatic species.

Gastrophryne differs from the Asiatic forms included by Parker under the name *Microhyla* in having the quadratojugal in contact with the maxillary, the coracoids broader and shorter, terminal phalanges simple, toes more elongate and without disks, and in the different type of larva. Further study of Asiatic *Microhyla* will probably show the propriety of dividing this group into at least four genera, some of which will share part of the above-mentioned features with *Gastrophryne*.

INCLUDED FORMS.—*G. carolinensis carolinensis* (Holbrook), 1836; *G. carolinensis olivacea* (Hallowell), 1856; **G. carolinensis mazatlanensis* (Taylor), 1943; *G. usta usta* (Cope), 1866; *G. usta gadovi* (Boulenger), 1903; **G. elegans* (Boulenger), 1882; **G. pictiventris* (Cope), 1886.

Dermatonotus

Dermatonotus Méhely, 1904: 207 (type by monotypy *Engystoma mülleri* Boettger, 1885).

REMARKS.—In 1948, when writing about this group, I retained *D. mülleri* in *Hypopachus* because of lack of comparative material of the latter genus. Now, after examining material of the Central American species, I am forced to recognize the validity of the genus proposed by Méhely. *Dermatonotus* is the South American counterpart of *Hypopachus* and seems allied to it and to *Gastrophryne*. *Dermatonotus* is apparently primitive, being close to the ancestral stock which gave rise to *Glossostoma*, *Hypopachus*, *Gastrophryne*, *Relictivomer*, *Elachistocleis*, *Dasylops*, *Myersiella*, and *Synapturanus*.

Dermatonotus differs from *Hypopachus* in the following characters: clavicle stronger with proximal parts thicker; coracoid very strong, broader and shorter and having a long suture with epicoracoid; toes not webbed; one metatarsal tubercle; size larger (adult *Dermatonotus* almost twice as large as adult *Hypopachus*); a mottled and spotted dorsal pattern without an irregular arrow-shaped mark (not characteristically mottled and spotted and always with an irregular arrow-shaped mark in *Hypopachus*).

INCLUDED SPECIES.—*Dermatonotus mülleri* (Boettger), 1885.

Relictivomer, new genus

TYPE.—*Hypopachus pearsei* Ruthven, 1914.

DIAGNOSIS.—Prevomer divided, posterior part reduced to a small osseous plate lying more or less free in mucosa of palatal region (Fig.

5). No palatine. Quadratojugal not in contact with maxillary. Vertebral column diplasiocoelous. Clavicle short, extending from reduced medial procoracoid laterally but not reaching to middle of coracoid. Fingers and toes without webs. Terminal phalanges simple, with rounded tips.

Relictivomer is Latin (left behind and vomer), describing the condition of the posterior part of the prevomer.

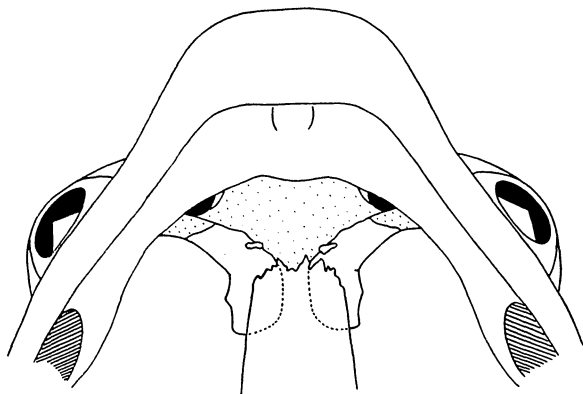


FIG. 5. Roof of mouth of *Relictivomer pearsei*.

REMARKS.—*Relictivomer* is related to *Elachistocleis* and *Dermatonotus*, differing from the former by the presence of the posterior part of the prevomer, the shape of the snout, and coloration. The type species was originally placed in the genus *Hypopachus* by its describer (Ruthven, 1914: 77). It was included by Parker in 1934 in the genus *Elachistocleis* because of the reduced clavicles. Examination of specimens from Fundación, Colombia (UMMZ 45608, 45568–69), verifies the girdle condition and reveals that a much reduced posterior part of the prevomer is present. The prevomer and other characters cause me to place this species in a separate genus.

Relictivomer is restricted to northwestern South America and is allied to *Dermatonotus* from which it may have been derived. The new genus probably gave rise to *Elachistocleis*.

INCLUDED SPECIES.—*R. pearsei* (Ruthven), 1914.

Elachistocleis

Elachistocleis Parker, 1927: 4 (type by original designation *Rana ovalis* Schneider, 1799).

REMARKS.—This genus is related most closely to *Synapturanus*,

Myersiella, and *Relictivomer*. The last genus is probably ancestral to *Elachistocleis*, which differs from *Relictivomer* primarily in the absence of the posterior part of the prevomer and the pointed snout. *Synapturanus* and *Myersiella* are more specialized than *Elachistocleis* and *Relictivomer* in the loss of the clavicle and procoracoid and in their highly modified skulls. They may have been derived from either *Elachistocleis* or *Relictivomer*. *Elachistocleis* has a wide distribution in South America east of the Andes. Two species are here recognized, although some authors consider them to be subspecies.

INCLUDED SPECIES.—*E. ovalis* (Schneider), 1799; *E. bicolor* (Valenciennes), 1838.

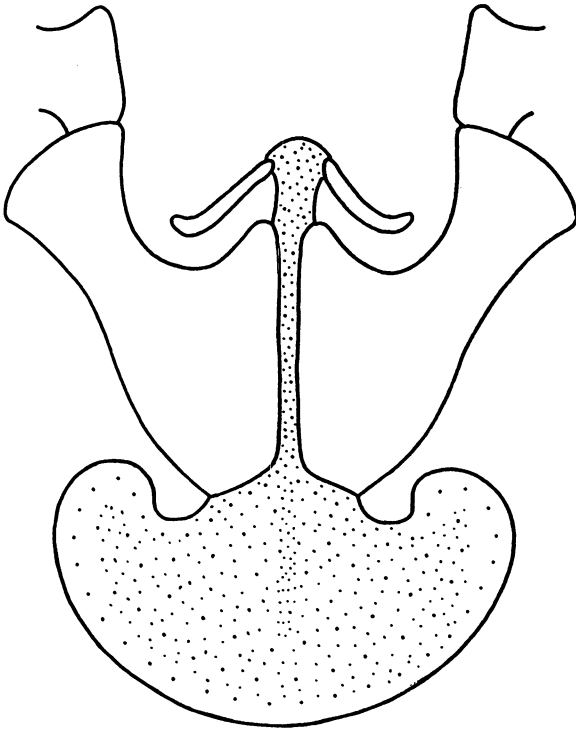


FIG. 6. Pectoral girdle of *Dasyhaps schirchi*.

Dasyhaps

Dasyhaps Miranda-Ribeiro, 1924: 255 (type by monotypy *Dasyhaps schirchi* Miranda-Ribeiro, 1924).

REMARKS.—Originally this genus was described (erroneously) as lack-

ing a clavicle (Miranda-Ribeiro, 1924). This misled Parker (1934: 149) to include the species in *Microhyla*. Re-examination of the type specimen in the Museu Nacional, Rio de Janeiro, shows that the clavicle is present although rather small and reduced (Fig. 6). *Dasylops* appears to be allied to *Dermatonotus* and is distinguished by the following characters; snout very broad and truncate; parasphenoid very broad and extending forward past level of choanae; coracoid very short and broad; clavicle short, lying almost parallel to coracoid and suspended at proximal tip by a short procoracoid; quadratojugal not meeting maxillary. Contrary to the conclusions of Bokermann (1952) *Dasylops* cannot be placed in *Hypopachus*. The two genera differ in numerous characters, and, although both are probably derived from *Dermatonotus*, they seem to represent different evolutionary lines.

INCLUDED SPECIES.—*Dasylops schirchi* Miranda-Ribeiro, 1924.

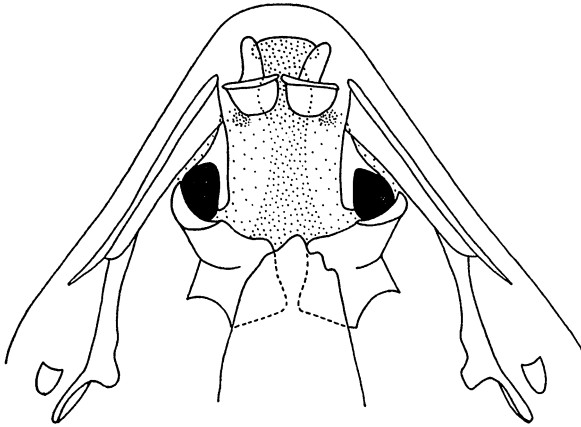


FIG. 7. Ventral view of anterior cranial elements of *Myersiella subnigra*.

Myersiella, new genus

TYPE.—*Engystoma subnigrum* Miranda-Ribeiro, 1920.

DIAGNOSIS.—Prevomer divided, anterior part elongate, posterior part absent (Fig. 7). No palatine. Ethmoids separate. Premaxillary not notched. Quadratojugal not in contact with maxillary. Vertebral column procoelous. Clavicle and procoracoid absent. Terminal phalanges simple although slightly expanded at tip; fingers and toes rounded at tip. Urostyle with vestiges of transverse processes.

The genus is named for Dr. George Sprague Myers, curator of zoological collections in the Natural History Museum of Stanford University, at whose suggestion a revision of the American microhylids was undertaken.

REMARKS.—*Myersiella* is related to, and probably derived from, *Elachistocleis*. It shows affinity with *Synapturanus*, a genus also greatly specialized in the skull and pectoral girdle. It is possible that *Myersiella* lays a few extremely large eggs similar to those of *Synapturanus* and that the larvae undergo partial or complete transformation in the egg, lacking a free aquatic stage.

Parker (1934) placed this species in *Microhyla* because of the absence of clavicles but, as noted above under *Gastrophryne*, his *Microhyla* is a composite of polyphyletic origin. The present form cannot be included with the Asiatic *Microhyla* or in American *Gastrophryne* from which it differs as indicated in the diagnosis and key given above.

INCLUDED SPECIES.—*M. subnigra* (Miranda-Ribeiro), 1920.

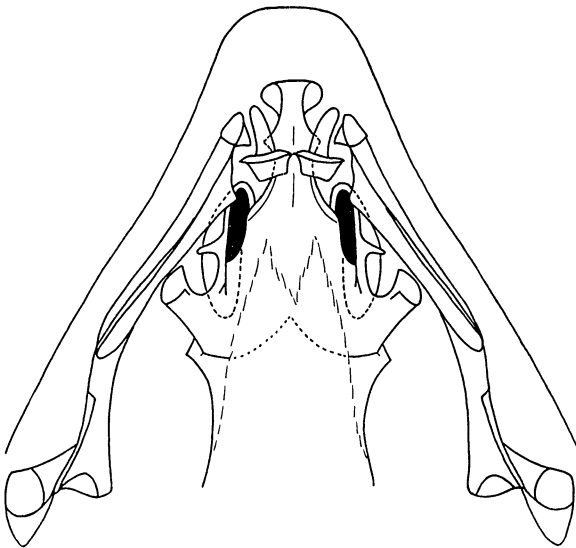


FIG. 8. Ventral view of anterior cranial elements of *Synapturanus microps*.

Synapturanus, new genus

TYPE.—*Engystoma microps* Duméril and Bibron, 1841.

DIAGNOSIS.—Prevomer divided, posterior part absent, anterior part fused with ethmoids and parasphenoid to form a single bony element

(Fig. 8). No palatine. Premaxillary without medial notch. Quadrato-jugal reduced, not in contact with maxillary. Vertebral column diplasiocoelous. Clavicle and procoracoid absent. Terminal phalanges pointed, fingers and toes with disklike expansions. Urostyle with well-developed transverse processes.

Synapturanus is from the Greek συναπτός and οὐρανός (joined together and roof of mouth), and has reference to the fusion of the palatal elements.

REMARKS.—The genus is closely related to *Elachistocleis* and *Myersiella* and is highly specialized. The species *S. microps* was placed in *Microhyla* by Parker (1934). This grouping is unnatural, as shown under *Gastrophryne* above, and *Synapturanus* cannot be considered related to Asiatic *Microhyla* or to *Gastrophryne*, both of which are of entirely different origin.

A female (AM 53204) of *S. microps* from Shudikar-wau, British Guiana, which was cleared and stained, contained about 30 large, heavily yolked ovarian eggs, measuring approximately 5 mm. in diameter. This suggests that the species does not have a free aquatic stage, but that the young are partly or completely transformed in the egg. Complete metamorphosis in the egg capsule is known in the family Microhylidae among a few genera in New Guinea. Partial metamorphosis in the egg is known for some African and Malagasian microhylids. This is, however, the first American form in which any evidence for such a possibility has been noted.

INCLUDED SPECIES.—*S. microps* (Duméril and Bibron), 1841.

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Submitted for publication January 25, 1954

PLATE I

FIG. 1. Dorsal and ventral views of holotype of *Hyophryne histrio*, new genus and species.

FIG. 2. Dorsal and ventral views of holotype of *Arcovomer passarellii*, new genus and species.

PLATE I

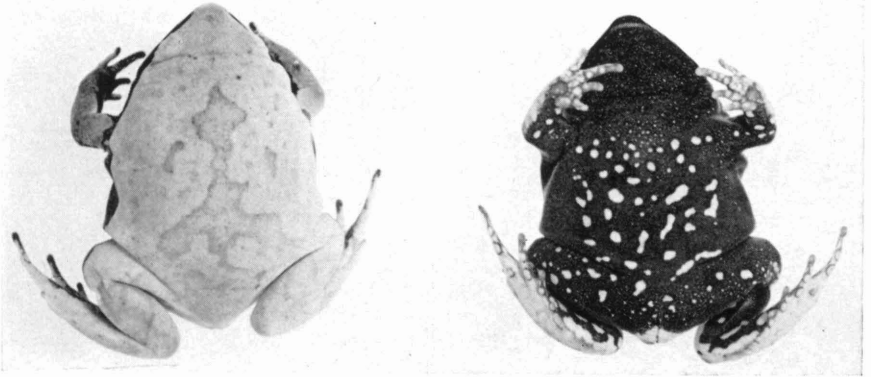


FIG. 1

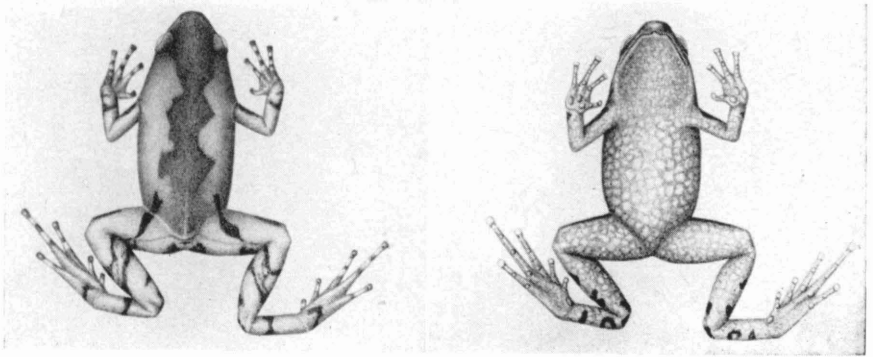


FIG. 2

