

July 24

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nary type, color plain blackish gray, without markings, the lower parts scarcely paler; no reddish shades.

Few specimens of this species have been studied, and only one has been recorded of less than 100 pounds weight, so far as I remember.

It is evident that this species has no special relation to the Great Jewfish or Guasa (*Promicrops itaiara*). Its nearest relations seem to be with *Epinephelus morio*. Not having seen specimens of the two at all similar in size, it is hard to decide as to how near these relations are. The most obvious differences are in color, in the more robust form of *E. nigritus*, and in the much greater concavity of the caudal in *E. morio*.

Dr. Bean, who has examined the young of *E. nigritus*, regards it as very distinct from the young of *E. morio*.

INDIANA UNIVERSITY, April 1, 1885.

DESCRIPTION OF A NEW SPECIES OF AMBLYSTOMA (AMBLYSTOMA COPEIANUM) FROM INDIANA.

By O. P. HAY.

The specimen on which the following description is based was found dead and somewhat mutilated. The injury that it has suffered does not, however, in any way obscure the characters of the species, amounting, as it does, only to a loss of the entire left fore-limb and slight fractures of a few of the bones of the anterior part of the head.

The head is large, somewhat wider than the body, and flattened; the body short, and the tail long and compressed. The skin is, for the most part, smooth, but everywhere, as seen under a lens, is pitted with the openings of the cutaneous follicles. Of these, there are a few enlarged ones in a band surrounding the orbit and extending forward to the nostril. Others are found above the angle of the jaw, and a few still larger ones on the posterior border of the parotid region. The prominent keel, and the whole tip of the tail are so richly provided with enlarged pores as to present a granulated appearance.

The width of the head is somewhat greater than that of the body. It is possible that the breadth and flatness of the head have been exaggerated somewhat by the injuries that it has received; but this can be true only to a very slight extent. The breadth is about the same at the angle of the jaw and the corner of the mouth. From the former point the head tapers backward, the outline being concave to its posterior border, where it is suddenly constricted into the neck. From the corners of the mouth the head tapers forward to nearly opposite the nostrils, beyond which it is rapidly rounded to form the snout. The width of

the head is a little less than the distance from the snout to the gular fold; and is contained in the distance from the snout to the groin three and six-tenths times. The distance to the gular fold is contained in the distance to the groin three and two-tenths times. The depth of the head, on a line joining the angles of the jaws, is a little less than one-half its width. The gular fold does not overlap, as it does in some species. It may have done so in life, but manipulation of the skin fails to restore an overlapping fold. The upper jaw projects beyond the lower. Eyes of moderate size. External nares small; their distance apart somewhat less than the width of the interorbital space.

The tongue is not notably different from that of *A. tigrinum*. The teeth are arranged in four series, which together form an inverted V, the angle of which is very obtuse. The limbs of the V, as seen with the unaided eye, appear nearly straight, and are seen to extend beyond the internal nares along their external fissure. Examination with a lens proves that the inner series are each slightly \sim shaped and so disposed as to make the angle of the V rounded off. The outer series on each side is nearly as long as the corresponding inner series, is plainly separated from it, and nearly straight or slightly concave on the posterior side. Inner nares more distant than the external. The body is somewhat depressed, but has not the swollen appearance presented by *A. opacum*. The distance from the snout to the axilla is just equal to that from the axilla to the groin. There are eleven well-marked costal grooves. There is a median furrow, not deep but distinct, beginning on the occiput and running along the back, deepening on the sacral region and ending over the middle of the vent at the commencement of the caudal crest. The cloacal region is considerably swollen and is broad and rounded, or slightly emarginate, behind. The distance from the groin to the posterior end of the vent in this species is greater proportionally than in any other of the genus, so far as I have been able to determine. It is contained in the distance from the snout to the groin but three and one-sixth times.

The tail is equal in length to the distance from the snout to the beginning of the vent. It is much compressed and rather high. It has a well-developed keel, or crest, which begins immediately over the cloaca and extends to the tip of the tail. The keel is sharp above and is bounded below, on each side, by a shallow groove. Inferiorly the tail is broadly rounded for its anterior third or more, and is traversed by a median longitudinal groove. The remainder of its lower border is compressed to a sharp edge. A transverse section of the tail, taken just behind the cloaca, would form approximately an isosceles triangle whose base would be about one-half its height. One-third of the distance back toward the tip the height of the tail is three times its thickness.

The limbs are well developed. The posterior are a little longer, somewhat stouter, and the foot broader than the same limbs of a specimen of *A. tigrinum* that measures the same distance from the snout to the

end of the vent. They are also fully as long as the same limbs of a specimen of *A. punctatum* that measures from snout to the end of the vent three-fourths of an inch more than the specimen I am describing. The toes are much like those of *A. tigrinum*, perhaps not so broad, while they are not so slender as those of a specimen of *A. punctatum* now before me. They are provided with a narrow marginal and basal membrane. There are two distinct plantar tubercles.

Measurements.

Length:	Inches.	Lines.
From snout to end of tail	5	8
From snout to gular fold	0	8.5
From snout to line joining axillæ	1	1.5
From snout to groin	2	3
From snout to end of vent	3	0
From end of vent to tip of tail	2	8
From axilla to groin	1	1.5
From groin to end of vent	0	8.5
Width of head at angle of jaw	0	7.5
Distance between anterior canthi	0	4.6
Interorbital space	0	3.25
Greatest height of the tail	0	5
Thickness of tail at highest point	0	2
Length of whole fore-leg	0	11
Lower arm and hand	0	7.5
Length of third finger	0	2.5
Hinder limb, total length	1	0.05
Lower leg and foot	0	9
Free portion fourth toe	0	3
Expanse of outstretched hinder limbs	2	5
Distance between external nares	0	2.6
Distance between inner nares	0	3.6

Proportional dimensions.

	Times.
Muzzle to gular fold:	
In distance from snout to groin	3.2
In distance to end of vent (nearly)	4.2
Fore-arm and foot:	
In distance to groin	3.6
In distance to end of vent	4.7
Lower leg and foot:	
In distance to groin	3
In distance to end of vent	4
Width of head:	
In distance to groin	3.6

The color is dark brown, almost black, above, brownish-yellow below. Between the fore and hind legs the light color of the belly mounts up on the sides to a level with the upper surfaces of the limbs. The middle of the belly is of a duskiest hue than its sides. Pectoral, inguinal, and pubic regions slightly brighter yellow than the sides of the belly. Head above like the back, below like the other lower parts. Just

behind the symphysis of the lower jaw are indications of a bright yellow spot. The upper half of the tail is not so dark as the back, the lower half dusker than the belly. The limbs below and in front yellowish, as other lower parts. Feet, especially above, dark. This species must be compared with *A. bicolor*, *A. tigrinum*, and possibly with *A. obscurum*. The last two belong to the group which has twelve costal grooves, as the species are arranged in Prof. E. D. Cope's "Review of the Amblystomidae" (Proc. Acad. Nat. Sci. Phila., 1867, 166). *A. obscurum* has the internal nares no more widely separated than are the outer; the limbs of the palatine V are decidedly concave, and the inner series of teeth are about twice the length of the outer. The frontal region of *A. obscurum* is also said to be very convex. It is also a rather long-bodied species, the distance from the snout to the axilla being contained in the distance from the snout to the [groin] nearly two and four-tenths times, while in *A. copeianum* the latter distance is but twice the former. Indeed, this form differs from all others, so far as my knowledge extends, in this equality of the distances from snout to axilla and from axilla to groin. *A. bicolor* approaches it most nearly. In such specimens of *A. tigrinum* as I have been permitted to examine, the ratio of the two dimensions is about the same as given above for *A. obscurum*. It is about the same in specimens of *A. mavortium*, as deduced from measurements given in Professor Cope's paper cited above. From *A. tigrinum* my species differs further in having no traces of the yellow spots so characteristic of that common form. *A. copeianum* has also a broader and more depressed head, a more compressed tail, and longer limbs.

A. bicolor is described as having the palatine teeth in three entirely transverse series; as having a very short muzzle, and as being more or less spotted. A comparison of some of the dimensions of the two species is necessary. The type of *A. bicolor* now in the museum of the Academy of the Natural Sciences of Philadelphia furnishes the measurements found in the first column, which are taken principally from Professor Cope's paper. Those marked with an asterisk have been kindly obtained for me by Prof. Angelo Heilprin. It is almost exactly the size of the type of *A. copeianum*, 5 inches 10.05 lines.

Measurements.	A. bicolor.		A. copeianum.	
	In.	Lin.	In.	Lin.
Length from snout to gular fold	0	9.75	0	8.5
Length from snout to axilla	*1	2.5	1	1.8
Length from snout to groin	2	7.2	2	3
Length from snout to end of vent.	3	2.3	3	0
Length axilla to groin	*1	4.5	1	1.15
Length lower leg and foot		8.8		9
Width of head		8.75		7.5
	Times.		Times.	
Fore-arm and foot into distance snout to groin		4.6		3.6
Lower leg and foot into distance snout to groin		3.54		3
Whole anterior limb into distance snout to groin		*3 $\frac{1}{3}$		2 $\frac{5}{11}$
Whole anterior limb into distance snout to vent		*4 $\frac{1}{2}$		3 $\frac{1}{11}$

The above table of comparative measurements shows that *A. bicolor* has, in comparison with *A. copeianum*, a longer and still broader head; in spite of this a distance from the axilla to the groin greater than that from the snout to the axilla, a much shorter pelvic region and shorter fore and hind limbs.

Found at Irvington, near Indianapolis, April 7, 1885, by one of my students, Mr. George H. Clarke.

The species is dedicated to Prof. E. D. Cope, herpetologist and paleontologist. It is represented on Plate XIV of this volume.

IRVINGTON, INDIANA, May 5, 1885.

LIST OF PLANTS COLLECTED BY MR. CHARLES L. MCKAY AT NUSHAGAK, ALASKA, IN 1881, FOR THE UNITED STATES NATIONAL MUSEUM.

By FRANK H. KNOWLTON.

The plants enumerated in the following list were collected during the spring and summer of 1881 by Mr. Charles L. McKay, of the United States Signal Service, stationed at Nushagak, Fort Alexander, Alaska. The collection, although small in point of numbers, contains several species of extreme interest, and adds also a few to the flora of Alaska. Nothing like an exhaustive collection was made, owing, of course, to lack of sufficient time, and we remark the absence of many well-known genera, e. g., *Draba*, *Saxifraga*, *Aster*, &c.

In passing it is a pleasure, as well as an act of justice, to record the highly satisfactory manner in which this collection was made, a fact quite at variance with the generality of such itinerant collecting. The greatest care was taken to fully represent every species, which, as in the case of the species of *Salix*, often necessitated visiting the same locality several times. It is to be regretted deeply that science lost by the untimely death of Mr. McKay (he was drowned by the unfortunate overturning of his boat, on April 19, 1882), one so well fitted to do thorough work.

I wish to acknowledge my great indebtedness in the preparation of this list to Prof. Lester F. Ward, of the National Museum; Dr. George Vasey, of the Department of Agriculture; and Mr. M. S. Bebb, of Rockford, Ill.

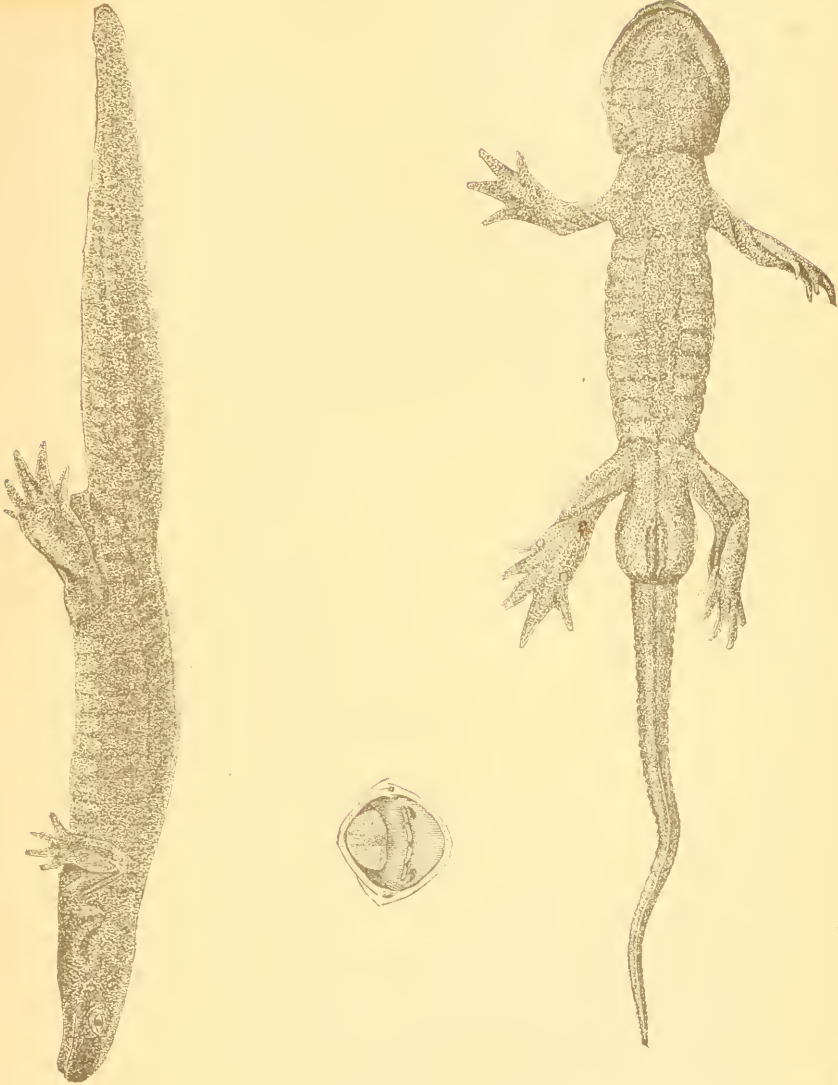
In the arrangement of families and genera, Bentham and Hooker's "Genera Plantarum" has been exclusively followed. In the arrangement of species, the various publications of Dr. Asa Gray have been followed where available.

EXPLANATION OF PLATE XIV.

• (For text see pages 209-213.)

Amblystoma copeianum Hay. About natural size.

The type specimen was found at Irvington, Ind., by Mr. George H. Clarke.



AMBLYSTOMA COPEIANUM, HAY