AN ALBINO SALAMANDER, SPELERPES BILINEATUS.

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In May, 1912, while collecting amphibian material in the field the writers took an albinotic (a xanthic) larva of *Spelerpes bilineatus* Green. The larva was a year old and measured about 4.3 centimeters in length. It was colored a uniform yellowish orange, except for the gills, which were reddish from contained blood, and the eyes, which appeared opaque white. While this individual entirely lacked black pigment in the skin, eyes, and connective tissue as well, it had the normal amount of yellow pigment. In fact the animal was so conspicuously yellow that it seemed hard to believe that it did not have more than the normal amount of this pigment; but a close examination of the skin of normal individuals convinces one that there is a large amount of the yellow pigment, but that it is pretty thoroughly masked by the large amount of melanin present.

The color of this albino larva was recorded by using one of the Milton Bradley color tops. The exact shade of the body color was most nearly matched with the following percentages: Black, 39; white, 9; orange, 28½; and yellow, 23½. A normal of the same size and apparent stage of development was matched on the head region with: Black, 74½; white, 8; orange, 4; yellow, 13½. The body region was recorded as: Black, 85½; white, 4; orange, 2; and yellow, 8½. The percentage of black given in the color record of the albino does not indicate partially concealed black pigment, but was necessary in order to obtain the proper density of the orange yellow.

The albino was kept in a large battery jar provided with water, sand, and stones, and was fed upon small annelids and slender strands of beef. It took food very well and grew rapidly. It began to resorb its gills early in the following October and completed its transformation in two or three weeks. During transformation it became distinctly more orange in color than it had previously been and there appeared two distinct dorsal lines not evident before. These bands were at either side of the median line running back from just in front of the shoulder region to well along the base of the

tail, in the position occupied by the heavily pigmented bands in the normal. They were of a peculiar dull opaque yellow appearance, in contrast with the soft, transparent orange yellow of the general body color.

The color drawing, reproduced in the plate (Plate 54), was made in July, 1913. The normal drawn (Plate 55) was of almost the same size and, as nearly as one could judge, of the same stage of development as the albino. The artist's "high light" interfered with the proper representation of the opaque line on the left side of the albino.

The presence of the normal amount of yellow pigment and entire absence of black pigment in the albino indicates in a most interesting way that the black and yellowish-orange pigment in Spelerpes are inherited independently of each other and that they have a different chemical origin. The writers hoped to rear the albino to sexual maturity and secure offspring from it, but although it had been taking food regularly it died in August, 1913.

An oft-repeated search in the locality where the albino was secured failed to reveal other albinos.

An albino strain of the axolotl has been reared in captivity for nearly half a century. So far as the writers are aware this is the only unquestioned albino urodele on record. The cave-inhabiting *Proteus anguineus* is sometimes referred to as an albino, but it is distinctly not an albino, as has been abundantly proven by the production of pigment in individuals kept for some months in daylight (Zeller, '88; Viré, '04, p. 707). Whether the pigmentless *Typhlomolge rathbuni* (Stejneger, '96) of the Texas underground waters is an albino, in that it lacks capacity for pigment production under conditions suitable for its development, has not been determined.

In his discussion of cases of albinism in amphibians Pavesi ('79) refers to some reputed but doubtful cases of albino urodeles. The only case the description of which has been examined by the writers is that of a *Salamandra maculosa* referred to by Latreille ('02, p. 220),[1] though this case, too, was called in question by later writers. There are numerous records in the literature of so-called partial albino urodeles. Many of these, however, are merely slightly pigmented individuals, such as occur frequently in amphibian material reared under laboratory conditions and probably have no genetic significance.

Britcher ('99) discovered pigmentless eggs of *Ambystoma punctatum*, but in the course of development the normal amount of pigment was produced. Such a case is comparable to what normally occurs in the development of Cryptobranchus, Spelerpes, Plethodon,

[1] This is not the original description, for as Dr. Stejneger suggests "Latreille (1802) only refers to the Paduan albino Salamandra at third hand. It was apparently first described and figured in 1683 by Wurffbain (Salamandrologia, pl. 2, fig. 1). In 1768 Laurenti gave this specimen a binominal appellation *Salamandra candida* (Syn. Rept., p. 41) quoting Wurffbain. Latreille took his reference to this specimen from Gmelin's Syst. Nat., 1789."

Desmognathus, and other colorless amphibian eggs which produce pigmented larvae. During the season of 1914 Prof. T. H. Morgan, of Columbia University, procured pigmentless eggs of the common toad and kept them through their development until they were nearly ready to transform. Early in their development they acquired the normal pigment for toad larvae. The larvae were distributed in convenient ponds at Cold Spring Harbor in the hope of finding more of the same sort of eggs again.

A number of cases of albino anurans have been reported in European species. Pavesi ('79) and Boulenger ('97, pp. 28–29) report such cases and review a number of those reported by others. These albinos include larvae of *Rana esculenta*, larvae and adults of *Rana temporaria*, a *Bombinator pachypus*, larvae of *Bufo viridis*, and larvae and adults of *Alytes obstetricans*. Of the last-named species Héron-Royer ('86) reared adult albinos from albinotic larvae and in turn got offspring of the same sort from them. Most, at least, of these albino anurans were unquestionably xanthic specimens, possessing abundant yellow pigment, as our Spelerpes did.

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ALBINO SPELERPES BILINEATUS (GREEN) X 4.

FOR EXPLANATION OF PLATE SEE PAGE 378.

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NORMAL SPELERPES BILINEATUS (GREEN) X 4.

FOR EXPLANATION OF PLATE SEE PAGE 378.