Although having little effect on the life of the flowers, most of the compounds used were bactericidal. They prevent the decay of the stems and keep the water free from unpleasant odors. Potassium permanganate is one of the best for this purpose. The primary objection to this compound seems to be the pink color of the solution which of course is undesirable in a clear glass container.

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CRYPTOBRANCHUS alleganiensis IN WEST VIRGINIA

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Cryptobranchus alleganiensis, commonly known as the "water-dog" or "Hellbender," is the largest salamander in the western hemisphere. Its only near relative is the giant salamander of Japan (cryptobranchus japonicus v. d. Hoeven) which attains a length of four feet. **Crytobranchus alleganiensis** is found more abundantly in West Virginia, perhaps, than in any other region throughout its area of distribution which is that territory drained by the Ohio River and its tributaries.

It occupies no elevated position of phylogenetic relationships as do a few of the salamanders; it is despised by sportsmen and fishermen; its slimy and disgusting appearance turns away the most casual observer; but, its habits, the lack of information concerning its life, and its abundance in my locality aroused an interest in it which has kept me an observer of this salamander for five years.

Cryptobranchus is found throughout West Virginia in creeks and rivers with gravelly bottoms. This type of bottom no doubt, provides a greater abundance of food for the salamander. In this habitat it seeks the shelter of a large rock. It burrows along its edge in making its shallow home. In this dwelling with the sand as the floor and the rock as the roof it spends the day venturing forth at night in search of food. Rarely are they seen in the day time unless one overturns the rocks under which they are hiding and then only to find them immobile, seemingly indifferent to the light and depending on their coloration for protection.

Cryptobranchus thrives in cool, running water. During the summer they move to the deeper holes to find the colder water. In the still water of an aquarium they are uneasy, moving about in an effort to escape, and regurgitating their food. Even in this habitat they live for long periods of time. A specimen in my possession for two months without food when shipped to Oklahoma lived for a month without food before dying. They are hardy brutes insensible to extreme physical injury such as cuts and bullet wounds, but dying quickly in warm water (40 degrees C.) or in the air. Netting

Copeia, No. 170, April 30, 1929), speaking of a Cryptobranchus, says, "one specimen was shot three times with a .32 cal. revolver and only temporarily stunned, for it was quite active until it was killed 24 hours later.

Cryptobranchus attains a length of 27 inches, although most specimens rarely exceed twenty inches. The body is depressed dorso-ventrally with a decidedly flat head with very small, bead-like eyes placed close to the snout. Large, fleshy folds of skin running along the side of the animal's body from the short rear legs to the arm pits of the front limbs add to its uncouth appearance. These folds of skin increase in size as the animal grows older, being absent in the young salamander. Its tail is compressed laterally with a pronounced keel running its length. It is extremely strong as it is this organ on which it depends for locomotion, its legs being too short and weak for anything more than a support. When the animal walks, or, rather, crawls, its legs move as those of a trotting horse, that is, right front and left rear work together, and left front and right rear.

Its color is dark brown mottled with small, irregular black spots. The color varies wth age and in all probability food and the water in which it lives have a bearing on it.

The food of **Crptobranchus** consists chiefly of crayfish. Of 27 specimens examined over a period of three years, every specimen had been eating crayfish. They occasionally eat fish although the belief that the water dog is an enemy of fish probably arises from the fact that these salamanders are frequently caught on a hook baited for fish. I have had fishermen tell of water dogs collecting around the fish which they have already caught and were submerged in the water. Calvin Price writing in the Pocahontas Times of July 21, 1932 says, "The 'water dog' is no great destroyer of game fish spawn, unless the smaller ones invade the gravel beds at the heads of the few streams where trout deposit their eggs in the fall. I do not think this likely." In the same article he says, "I have taken them on artifical flies and spinners, late of an evening."

The water dog seizes its food with a sidewise jerk of its head snapping at it as it passes. If the morsel does not yield it will jerk and pull as though it were tearing off a bite. Many a good fisherman has mistaken the jerk of a water dog on his line for a large game fish. I have never known one to bite a human being although I have had them snap at me while handling them. The bite could hardly be worse than being caught in a mouse trap as the teeth of the animal are very small and weak although the jaws are powerful.

The salamander is covered with slime, which makes it slippery and very hard to handle. When annoyed or when dying, it threshes around, covering itself with a thick, white slime, very sticky and disagreeable.

The water dog, like all salamanders, breathes through its skin. This enables it to stay under the water for several hours. It then rises leisurely to the surface, opens its broad mouth, and swallows a mouthful of air, at the same time expelling a bubble of air.

The spawning season of **Cryptobranchus** in the vicinity of Elkins, is from the middle of August to the first week in September. The eggs are laid, us-

ually, under rocks, often in the ordinary dwelling of the salamander. About three hundred are laid. After a few days the envelope swells and the eggs are 15 mm. in diameter. The eggs are deposited in strings, each egg attached to the next one by a slender thread. Both male and female devour the eggs and it has been found that they may be regurgitated and continue their development. During the breeding season the water dog does not remain secluded in his hiding place during the daytime but comes out boldly, sometimes congregating with many others. Fertilization is external.

Crytobranchus is generally distributed throughout West Virginia with the exception of the Eastern section, no report being available as to their occurrence there. Cheat, Tygart, and Greenbrier Rivers are plentifully stocked with **Crytobranchus.** Dr. A. M. Reese reports it in the Monongahela at Morgantown and in Cheat River at Ice's Ferry. H. E. Finley at West Virginia State College reports it in the Kanawha River between Dunbar and Saint Albans. W. I. Utterback of Marshall College reports it rather common in the Ohio River but not so common for its tributaries in the locality of Huntington. Frank Cutright of Concord State Teachers College reports it in the New River and its branches such as the smaller streams of Mercer, Summers, and Monroe Counties.

Throughout West Virginia many sportsmen's organizations are making an effort to eradicate many so-called enemies of our fish and game. Unfortunately the water-dog is considered as one of these enemies. The salamander is very useful as a scavenger. It eats trash and dead or dying fish. No true biologist will destroy plant or animal life wantonly. Let me close this paper with a plea for the conservation of the water dog.

REACTION OF BROOK LAMPREYS TO VARIOUS COLORED LIGHTS

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Lampreys, lamprey eels, or sand eels are eel-shaped Cyclostomes found in freshwater streams, lakes, or in the sea.

In size the brook lampreys are the smallest of all the lampreys. These, in the adult stage, have an average length of 129 millimeters.

The eggs are laid in nests in the sand during April and May. The young lampreys develop and bury themselves in the sand at the edge or the bottom of the streams and remain there as larvæ for at least four years. After metamorphosis the animals leave the sand and enjoy a short period of adult life.

Knowing these habits of the brook lamprey, I became interested in their possible reactions toward various colored lights. During the past summer a group of larval lampreys averaging 80 millimeters in length, were taken from Cobun Run, a short distance south of Morgantown, West Virginia.

Various observations, 1000 of which are included in this paper, were made upon these animals to determine their reactions: (1) when allowed to choose between a dark area and any given light; (2) when allowed to choose between