ON THE LOSS OF THE FIFTH TOE IN CERTAIN SALAMANDERS

DR. G. K. NOBLE (in Osborn, *Amer. Nat.* LXI, p. 18, 1927) makes a statement regarding the loss of the fifth toe in salamanders which is liable to quotation and which is sufficiently misleading and general to merit correction. "There is abundant evidence in both the *Plethodontidae* and the *Hynobiidae* that the outer toe is usually lost at a single step (*i.e.*, mutation) and not by a gradual dwindling away."

Now there are forms in both families which never have more than four toes, and these of course give no evidence, but in the well-known species of *Hynobiidae,* which have either four or five toes, there are frequent cases of the fifth being rudimentary, which might mean a "gradual dwindling away" or rather that the loss of the fifth toe is, as are most size characters, due to several genetic factors, rather than to a single one.

In 317 specimens of *H. leechii,* there were ten cases of lack of fifth toe and two cases of a rudimentary one.

In *H. lichenatus,* of 50 specimens, there two cases of lack and fourteen of reduction.

In *H. sonani,* four specimens showed two cases of lack and six of reduction.

In *H. tsuensis,* 184 specimens showed one case of reduction.

H. ikishimae showed three cases of loss and eight of reduction in a series of 179.

In *nebulosus* ten specimens showed five cases of loss and five of reduction.

Thus twenty-two cases of complete loss are balanced by thirty-six of reduction, which makes it seem very much rather a "gradual dwindling away" in these cases than "loss at a single step."

For completeness sake it may be added that *H. keyserlingii* and its possible derivative *Batrachuperus* (with two species) always lack the fifth toe, and that one out of twenty specimens of *H. kimurai* has a fifth toe, but that no reduced cases have been reported in it, and that one out of 14 *H. retardatus* showed one case of loss. Schmalhausen (*Anat. Anz.* 37, p. 441, 1910) points out that in *keyserlingii* the fifth toe begins to develop, tarsale V developing only to fuse later with tarsale IV.

In the *Plethodontidae* two groups lack the fifth toe. *Manculus* with two forms derived from *Eurycea,* and *Hemidactylium* and *Batrachoseps* with several derived from *Plethodon.* No cases of reduction have been observed in *Eurycea,* or *Manculus* or *Hemidactylium,* and the loss here may be due to a single factor, but a specimen of *Batrachoseps attenuatus pacificus* (the most Plethodon-like type) has been reported by Van Denburgh (Proc. California Acad. Sci. (3), 4, p. 8) to have a rudimentary fifth toe.

The "abundant evidence" therefore, in the absence of which it would be permissible to suggest that the loss took place at a "single step," indicates rather that it took place at more than one step.

Since this evidence is largely set forth in my monographs of the two families in question, which were Noble's source of information, it seems strange to meet with his statement. I have therefore thought it appropriate to set down the known facts concerning digital loss in these families.

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COD-LIVER OIL FOR "SNUFFLES" IN RABBITS AND PNEUMONIA IN GUINEA-PIGS[1]

"SNUFFLES" has long been one of the deadliest diseases in rabbits. The affected animals seem to have a very bad cold and as a result their nasal cavities are clogged with a heavy yellow discharge. In most cases death follows within a few days after the first symptoms appear. Many practical rabbit breeders house their animals in outdoor hutches where they can be exposed to direct sunlight. This keeps the animals in good health as far as snuffles is concerned. The breeders seem to be of the opinion that the fresh air is responsible for the health of their animals. It now seems that the ultra-violet rays in the sunlight bring about this effect.

Most experimenters with rabbits keep their animals indoors and for this reason are not able to expose them to sunlight. Experience here shows that when two per cent. of cod-liver oil is fed with the grain ration the same effect is produced as by direct sunlight. The grain ration fed is made up mostly of rolled oats, a good absorbent of the oil. In severe cases in which the animal is too weak or unwilling to eat the grain, it has been found serviceable to administer several cc. of the pure oil by means of a medicine dropper. When this is inserted into one corner of the mouth there is no difficulty experienced in causing the animal to swallow.

The oil replaces sunlight because of its high vitamin D content, this vitamin having approximately the same effect as ultra-violet rays. The vitamin A content is high also, but is not of very great importance since the alfalfa hay fed the animals furnishes it in sufficient quantity. When green alfalfa is fed the animals during the summer months they do not die of snuffles, but a considerable number cough, indicating that the vitamin D in the green alfalfa is not quite high enough to act as a complete preventive.

[1] Contribution No. 72 from the Department of Animal Husbandry.