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.

E. R. DUNN

SMITH COLLEGE

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.

Upon occasionally adding to the ration the usual amount of oil the cough ceases, and complete protection is afforded.

Rabbits have a certain form of snuffles known as nasal coccidiosis. This type has not been known to occur in the colony here and therefore it can not be stated to what extent the oil would act as a preventive.

For the past three winters the addition of the oil to the grain ration of guinea-pigs has been found very beneficial. The losses from pneumonia have been cut down very appreciably and there has been a general improvement in vitality. In previous years the animals were fed sprouted oats in addition to their grain and hay, but this was not sufficient. The sprouted oats is high enough in vitamin C to prevent scurvy but is either lacking or very low in vitamin D. When the latter was supplied by means of cod-liver oil the ration became comparatively perfect.

The feeding of liberal quantities of green alfalfa to guinea-pigs makes them practically immune to pneumonia. It would seem from this that for guinea-pigs the above green feed has sufficient vitamin D for protection. Either green alfalfa is higher in vitamin D than sprouted oats or, if it is not, protection is afforded because it is fed in much larger quantities.

There is still another possibility and that is that green alfalfa may be entirely or almost entirely lacking in vitamin D but contains some other substance which acts as a good substitute in building up resistance to either pneumonia or snuffles.

The present report is not intended to represent experimental work in nutrition but merely the observations of one interested in raising healthy animals for experimental work in other lines; in this particular case, genetics.

HEMAN L. IBSEN

KANSAS AGRICULTURAL
EXPERIMENT STATION

THE SCIENTIFIC PAPERS OF WILLARD GIBBS

DURING the last few months I have been trying in vain, both in this country and in London, to acquire a copy of Willard Gibbs's "Scientific Papers" (Volume I). It is certainly a sad commentary that in this age of cheap printing, when tons of printers' ink flow daily to record and disseminate the most trivial incidents, the scientific papers of the greatest physical chemist America has produced should be unavailable to those who need them.

It can not be said that Gibbs's papers are of historical interest only. Unlike most scientific publications of fifty years ago, his writings on thermodynamics are as useful to-day as they were when first published. Those who have patiently labored through his admittedly difficult writings are agreed that we are far from having exhausted the valuable material which lies hidden therein.

The publisher who would bring out a reprint of the old edition of Gibbs's papers would certainly perform a service to science. In the meantime, I shall be greatly obliged if any reader can inform me where a copy of the old edition can be bought.

Since writing the above, I have obtained from Professor R. G. van Name, of Yale University, through the kind offices of Dr. A. W. Kenney, a copy of the German edition of Gibbs's "Thermodynamische Studien" edited by Wm. Ostwald in 1892. I understand that Professor van Name, who is a near relative of Willard Gibbs, will bring out next year a new edition of Gibbs's Scientific Papers.

VICTOR COFMAN

CHEMICAL DEPARTMENT,
E. I. DU PONT DE NEMOURS & CO.,
WILMINGTON, DELAWARE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

A SPECIAL FEATURE OF THE SECOND NASHVILLE MEETING: SCIENCE FOR THE PEOPLE

INCREASINGLY from year to year we witness the further correlation of isolated scientific facts into broad "laws" of economic value and the application of these "laws" to the welfare of the people as a whole. Curious phenomena not known outside of laboratories twenty years ago combined with others equally uncanny are found to form broad basic principles which in one way or another influence the daily lives of each and every one of us. With this development there has arisen in the public mind a keen desire for enlightenment in regard to science as a whole, as well as in regard to each of the various branches into which it is divided.

In order to progress science must find support. A century ago science was supported chiefly by the scientific men themselves, because they alone appreciated the importance and the potential value of scientific work. Then others became interested, and still later industry took a hand, while at the same time the people as a whole began to accord generous support to scientific institutions, especially to those of their own creation. At the present time science in this country, and indeed everywhere, is very largely supported by the general public, either through money derived from taxes or by numberless direct donations.