

clude using this method as a regular routine analysis for all soils.

There are several reasons explaining the divergence of these factors from the average. To obtain one factor which would obtain for all soils, the silt particles (and likewise the clay) would have to be of a uniform size, shape and weight. These conditions do not exist in nature. However, if one size graded into the next, and the shape and specific gravity of the material were fairly uniform, the factors would still not be widely divergent. Another difficulty enters here; not only is this hypothesis doubtful, but it is not possible, on account of the great difference in size of the largest silt particles and the smallest clay particles, to have a counting plate and objective so calibrated that the very small clay particles could be counted and at the same time to give a field large enough to include a number of silt particles. So in order to get the silt it was necessary to use a low-power objective, and consequently many of the smaller clay particles were not counted.

The disadvantages of the method are that it is not applicable in every instance because of the small mass of clay particles in some soils; that the counts are not sufficiently uniform where great accuracy is necessary; and that in order to get the best results the operator must have a large experience in the usual methods of analysis.

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ON A POSTERIOR COMMUNICATION OF THE AIR-BLADDER WITH THE EXTERIOR IN FISHES

RECENTLY, while examining the visceral anatomy of *Ophiocephalus*, my attention was called to what appeared to be a posterior communication of the air-bladder with the exterior. My species is *Ophiocephalus maculatus*, and before its death had been an aquarium pet of a Chinese in Redwood, California. Hence from whence it came is not known, but doubtless from somewhere in China, for many of this singularly hardy fish are carried alive by the Chinese from their home country.

The abdominal cavity of *Ophiocephalus* extends for a greater distance behind the anal opening than in front of it for the accommodation of the very long air-bladder, which reaches almost to the base of the caudal fin. About midway in the length of the air-bladder a wide tube of thin membrane is attached, which opening at its lower end to the exterior through the genital pore, appears at first sight to be a duct from the air-bladder, more especially as it is of the same white, glistening membrane. It, however, ends blindly against the wall of the air-bladder where it is so firmly attached by the incasing fibers of the latter extending over and around it that considerable tearing is necessary to detach it. Both the tube and the air-bladder, where the tube joins, were opened and examined under the microscope but no opening was found in either. The end of the tube is round and blunt. Into its lower end the vas deferens opens. Just above where the vas deferens enters, or just below the middle of its length, the tube expands into a large triangular pocket with a blunt point directed forward.

Almost a century ago Weber ("De aure et audita Hominis et animalium," Leipzig, 1820, p. 73) described in *Clupea harangus* a communication from the posterior end of the air-bladder with the exterior through a duct opening with the vas deferens into the genital pore. This condition being so nearly parallel with that described above for *Ophiocephalus* leads me to question whether the tube described by Weber was not also a blind tube, and not actually opening into the air-bladder.

Having no specimens of *Clupea harangus*, and having other problems on hand, I have not attempted to go more deeply into this subject. As the supposed fact that *Clupea harangus* has a posterior opening to the air-bladder has been repeated several times since the time of Weber without any one attempting to verify his work (or at least indicating that he has verified it), it is desirable that some one do so. I pass the problem on for what it may be worth.

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