A rather sinister possibility of injury to trees in flooded areas, which at the present time may only be speculated, is injury from chemicals such as gasoline, which would leave no perceptible trace on trees, but which nevertheless might effectively kill all plants.

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## FISH MORTALITY

IN the issue of SCIENCE dated November 1, 1935, Mr. David Tomlinson reported a case of sudden death of fishes in a shallow pool under the title "Rare Aquatic Phenomena" and stated that the phenomenon has been "only recorded in a very few places throughout the world during the past 50 years." I may state that in the plains of India this phenomenon seems to be of frequent occurrence. In Calcutta, when the writer was working there, a sudden epidemic of fish mortality occurred in an acute form twice (and in mild form several times) in the same pool within five years (1926–31). Though on both occasions the epidemic was investigated and the results obtained were published, Mr. Tomlinson apparently does not seem to be acquainted with this happening. In 1926 it was investigated by Seymour Sewell,[1] who concluded that the cause of the epidemic was the sudden accumulation of $CO_2$ brought about by abrupt changes in the meteorological conditions. In 1931, when the phenomenon occurred again in a severe form, the writer of this note investigated its various aspects and published the results.[2] It was concluded that the epidemic of mortality in the pool was due to the complete exhaustion of dissolved oxygen in the bottom layers of the water as a result of the rapid decay of the accumulated organic matter there. The writer is therefore very much interested to learn that the cause of the catastrophe observed by Mr. Tomlinson in Connecticut, U. S. A., though only superficially investigated, was also associated with almost complete exhaustion of the oxygen content of the water.

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# SCIENTIFIC BOOKS

## INSECT MORPHOLOGY

*Principles of Insect Morphology.* By R. E. SNODGRASS. 667 pages, with 319 figures, the majority of which carry two to several illustrations. Published by the McGraw-Hill Book Company, Inc., New York and London. 1935. Price $6.00.

THIS is a volume of interest to zoologists as well as to entomologists. From the wealth of material it contains will be drawn a few samples of interest to both.

The work opens with a forty-page synopsis of the more general features of insectean embryology. In the Collembola, a primitive, wingless group which some authors set off as a class, cleavage of the egg is holoblastic. This is probably not the primitive type of cleavage for other insects as the Collembola are further peculiar in having but six segments in the abdomen, though otherwise their body-structure is insectean. In all other orders, excepting some highly specialized parasitic forms, the egg is loaded with a dense yolk which conditions a meroblastic or superficial cleavage. Cleavage is further evidenced distinctive in the early differentiation of the germ cells at the posterior pole. As a result, insect eggs have been one of the favorite subjects of study by students of the differentiation and migration of these cells. In many insect eggs they can be easily recognized as they are slightly different from the surrounding cells in structure of nucleus and in the presence of dark-staining granules.

Gastrulation, because of the dense yolk, deviates from the terms of the general gastrulation theory, for in most insects the endoderm is formed from anterior and posterior rudiments which arise at the ends of the mesodermal rudiment. In a few instances a strand of endodermal cells may connect these temporarily. Usually the strand cells migrate very shortly into the yolk and become vitellophags. The coelomic sacs are formed by a splitting of the mesoderm, which later by fusion form a haemocoele. The body-wall of the embryo is a single layer of cells which later become glandular and secrete the exoskeleton.

In the basic plan of the insect body Snodgrass, following Holmgren and Hanström, takes the view that it is composed of a preoral or prostomial region followed by eighteen segments enervated from as many pairs of ventral ganglia and ending in a periproct (telson in the Malacostraca) which bears the anus. Thus the procephalon, which bears the compound eyes and antennae, has been derived from a prostomial region enervated from a supraoral brain (protocerebrum plus deutocerebrum). The tritocerebrum is a distinct pair of ganglia arising laterad of the oral opening and with a commisure behind the mouth. The tritocerebrum enervates the oral and labral regions and the second antennae (embryonic). By this theory,

[1] *Jour. Asiatic Soc. Bengal,* 22: pp. 177–201, 1926–27.
[2] *Internat. Rev. Hydrol. Hydrog.,* 26: 1932.