SHORTER ARTICLES.

NOTES ON THE DEVELOPMENT OF THE POLLEN TUBE AND FERTILIZATION IN SOME SPECIES OF PINES.

DURING the past three years, I have devoted considerable time, under the direction of Professor George F. Atkinson, to a study of fertilization and related phenomena in certain species of pines. A preliminary paper was read before the Botanical Society of America at its Boston meeting, August, 1898. In June, 1900, a more complete report of the work was given in two papers, one of which was presented before the society named above at its meeting in New York City, and the other before the American Association for the Advancement of Science, which Association also met in New York City.

It has been found that the generative cell appears, as a rule, during the first summer rather than shortly before fertilization, as described by other investigators. This cell does not divide while in its place within the pollen grain, as stated by previous writers, but passes into the pollen tube before the sperm cells are formed. In the division of the generative nucleus, the spindle is monopolar in origin; it arises some distance below the nucleus in a prominent cytoplasmic condensation. From this denser area the protoplasm extends in a radial manner towards the periphery of the cell. The sperm nuclei are never separated by a cell wall, but remain surrounded by a common mass of cytoplasm. The two nuclei are of unequal size from the first, and the larger one is always in advance of the smaller one, as regards the apex of the pollen tube.

Just prior to fertilization a cavity is formed in the upper part of the egg cytoplasm. It is believed that this cavity represents the final act of the egg in its preparation for the reception of the sperm cell and other contents of the pollen tube. There is no evidence that it results from the presence, within the egg, of the elements from the pollen tube, as reported by certain writers. The sperm nucleus does not increase in size after its entrance into the egg, but remains much smaller than the nucleus of oösphere. The sexual nuclei come to lie side by side but do not fuse; both nuclei can still be identified, even after the membrane of each has entirely disappeared. Two chromatic groups are clearly distinguished up to the nuclear plate stage.

In the division of the two segmentation nuclei, the chromatin of each nucleus forms two distinct spirems, which doubtless represent the separated-out paternal and maternal chromatic substance. At the time of this second division within the oösphere, the smaller sperm nucleus, which still lies in the upper part of the egg, frequently gives rise to a mitotic figure of more or less definiteness.

Only a few of the results which have been obtained are noted above. Papers giving the details of this research, with discussion and plates, have been sent to the publishers and will appear shortly.

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NOTES ON ENTOMOLOGY.

WITH the December (1900) number the *Entomologische Nachrichten*, long edited by Dr. F. Karsch, closes its career. In its place will be issued a monthly index of entomological publications, called *Entomologische Litteraturblätter*.

M. AUG. LAMEERE, in a recent proposed classification * of the Coleoptera, divides the order, according to the variation of the median vein of the hind wings, into three suborders; viz., Cantharidiformes, Staphyliniformes and Carabiformes; the last is equal to the Caraboidea of Ganglebauer. The second suborder equals the Staphylinoidea of that author with the important addition of the Pulicidæ.

M. Lameere's idea that the fleas are Coleopterous insects is certainly novel, and is based on a supposed affinity with *Platypsyllus*, the well-known parasite of the beaver. The Cantharidiformes contains all the other families.

M. Lameere makes a list of the characters that (according to him) must have been possessed by the ancestor of Coleoptera; these characters indicate a Neuropterous insect of the group of Plannipennia. The most primitive Coleoptera he finds in the family Lymexylidæ.

* Notes pour la classification des Coléoptères. *Ann. Soc. Ent. Belg.*, 1900, pp. 355–357.