separated from it by a clear space. The cells of this membrane increase in size, and, when the larva is ready to emerge from its protecting envelope, they measure about 60μ by 25μ.

Emergence is effected by the larva rupturing the chorion. It is still often surrounded more or less completely by the cellular membrane, but at this stage the cells of the latter commence to dissociate and become free in the body cavity of the beetle. Here each cell assumes a spherical shape, and continues to increase in size, measuring eventually about 220μ by 160μ. They appear as opaque white spheres, and are a sure indication that a weevil is parasitised. When the parasite larva is young, as many as 600 of these cells have been counted in the body of the host, but as the larva increases in size the number of the cells decreases, and few or none are left when the larva is mature and ready to leave the host.

These cells react strongly to the usual fat tests, and when the Perilitus larva is approaching maturity they show signs of disintegration, being very readily crushed, with the result that their fatty contents ooze out. It is possible that the ultimate disappearance of these cells is brought about merely by their friction against the larva, which is by this time very large and almost completely fills the abdomen of the beetle. It is thought that the function of these cells is to absorb fat-constituents from the "blood" of the host for the ultimate nourishment of the larva, and it is interesting to note that the most rapid growth of the larva commences at the time when these cells have attained their greatest size and are commencing to disintegrate.

Henneguy in his paper on Smicra (*Comptes rendus*, tome cxiv. No. 3, pp. 133-136, 1892) and Marchal in his work on the development of certain Platygasters (*Arch. Zool.* IV.ᵉ série, tome iv. pp. 485-640, 1906) describe a similar dissociation of the embryonic membrane, but the former makes no mention of the subsequent growth of the cells, and the latter shows that the dissociated amnion forms multi-nucleated balls, "pseudogermes," and not single cells with one nucleus as is the case with Perilitus. Marchal observed that these "pseudogermes" increased in size and multiplied by division, but the latter point has not been established in regard to the dissociated cells of the embryonic membrane of Perilitus.

There are at least three larval instars, and it is possible that the larva may undergo an additional ecdysis between the second and the final stadium. The first instar larva is characterised by a strongly chitinised head capsule and the possession of a caudal appendage. The second instar is represented by a soft and flabby larva in which the mouth parts are not strongly chitinised and the caudal appendage is absent. The final instar is achieved just before the larva emerges from the host. In this stage the larva is very active, yellowish in colour and with mouth parts very distinct. It forces its way out through the apex of the beetle's abdomen and immediately seeks for a place in which to spin its white silken cocoon. The host dies a few days later. Its body is almost devoid of fat tissue, and the reproductive organs have a much shrunken appearance. Investigation has shown that the ovaries are rendered functionless by parasitism. Thus, when a female weevil is infected with an egg of Perilitus before its ovaries are mature, they never attain normal development, and if parasitism occurs when the host is already laying eggs, oviposition ceases soon after and the eggs already present in the ovarian tubules undergo degeneration. Only one larva attains maturity in each weevil. When several eggs are laid in one host all commence development, but, in some, growth is arrested early and the embryo dies within the chorion. Other larvæ succeed in emerging from the chorion, but only one, the successful competitor, reaches the second instar, and the remainder gradually die off.

DOROTHY J. JACKSON.

Swordale, Evanton, Ross-shire, February 6.

Problems of River Pollution.

I HAVE read with interest the letters upon this subject by Prof. Meek and by Dr. J. H. Orton and Prof. W. H. Lewis, in NATURE of November 17 and February 16 respectively. The subject of river pollution, notwithstanding the very large amount of work which has been done, is still very much in the stage where opinion is relied on rather than knowledge. That which is a necessity imposed by consideration of public health or industry in one riparian district is, from the point of view of that district, flagrant pollution when practised higher up the river. Sewage authorities, when their attention is directed to the effects of pollution, talk of factory discharges and vice versa. As the writers of the letter of February 16 say, "pollution . . . has to be allowed in some form." Public opinion in urban districts will insist on a sewerage system, but not necessarily on sewage treatment. Factories situated on or near rivers must, from economic reasons, discharge their waste liquors into the streams. The question which should be decided in each case, by somebody having no local interests, is what sort of pollution, continuous or intermittent, can properly be allowed as having no ill-effect on the amenities of a river or its value as a fishery. I do not refer to water supply as the requirements here are fairly well defined.

Dr. Orton and his colleague write as biologists. I can only base my remarks on a long experience of the chemical and physical aspects of river pollution, but I agree that a careful examination, extending over at least a year, of an unpolluted tidal river would be of the greatest value as showing what are the normal seasonal variations of such rivers. Does, for example, the retardation of photosynthesis and the accession of much-decaying matter in the autumn cause a fall in the dissolved oxygen before the winter rains bring down large volumes of well-aerated water? Is the foul mud of sewage-polluted streams materially different from the marsh-gas yielding mud of unpolluted swamps? Does sewage, as Miss Meek's work tends to show, act as a specific poison for fish? If so, why is it that on a certain eyot in the Thames one nearly always sees an angler sitting over the sewage outfall? The many biological problems arising out of river pollution no doubt call urgently for examination.

If any work is done on a large scale, it is important that it should be undertaken solely in the interests of truth, and not, as so much of the work of last century, from an *ex parte* point of view. J. H. COSTE.

Teddington.

Origin of Atmospheric Electricity in Thunderstorms.

PROF. ARMSTRONG holds that Simpson's theory of the thunderstorm is invalid because its physical basis is unsound. He believes that it is not possible for water-drops to become electrically charged by simple rupture in air. If Simpson's paper (Phil. Trans., A, vol. 209, p. 379, 1909) is consulted, it will be found that the author of the theory has established quite definitely that when water-drops in contact with air only are broken by an air-current, the resulting smaller drops are positively charged, the corresponding negative charge going to the air as an excess of