

organic bodies will thus by slow oxidation give such a disproportionate amount of light, we may enter upon a path which leads to the accomplishment of one of the great desires of civilization, the production of light, without undue expenditure of energy in the development of heat, as a waste product.

In regard to the manner in which the light is evolved, I have but little information to give, though what I say may serve to correct some erroneous views which have been elsewhere expressed.

The popular name of these insects, *lightening* (or lightning) *bugs*, as distinguished from *fire flies*,* is derived from the fact that the light is intermittent. It is never entirely extinguished, but is paroxysmally weak and brilliant. When seized, under the influence of fear, the intervals become irregular, and the flashes are frequent. When put into alcohol there is at first a fitful and rapid exhibition of light, but afterwards the light becomes moderate and permanent for some minutes. When the light organs are separated and crushed, the light also continues for some time, becoming gradually weaker.

I therefore infer that the excitement of the light-giving organs to the highest degree of activity is manifested by the supreme effort of the will of the animal, and that the exhibition of light is dependent upon a particular structure, more or less under the control of the will, but containing a special material capable of evolving the light independent of the will. In a similar way to that in which the voluntary muscles of all animals evolve motion, and the special electrical organs of certain fishes evolve electrical currents, so do these organs of the Lampyridae evolve light from some peculiarly constituted structure fitted for the purpose.

It may be conceded, after what has been said above, that the idea of Mr. Gorham,† that "the external white vitreous parts are diaphanous, and permit the light to shine through," is perfectly correct, but that his belief that "the source of light within the body of the insect can be pressed against these windows, or retired from them at its pleasure," is quite without foundation.

* Fire flies are Elateridæ of the genus *Pyrophorus* (Spanish *Cucuyo*), of which one of the smaller species, *P. physoderus*, occurs in Florida and Texas, and shine with a constant light, chiefly visible in two vesicles near the hind angles of the prothorax, which are convex, and covered with a transparent chitinous integument. All species of *Pyrophorus* are not phosphorescent.

† Trans. Ent. Soc. London, 1880, p. 66.