thus plants feed animals, and animals feed plants —one of Nature's circles again.

The last two principles mentioned are of profound importance. The vegetable kingdom is a provision for the storing away or magazining of force for the animal kingdom. This force is acquired through the sun's influence on forces acting on the plant, and so promoting growth; mineral matter is thereby carried up to a higher grade of composition, that of starch, vegetable fibre and sugar, and this is a state of concentrated or accumulated force. To this stored force animals go, in order to carry forward their development; and, moreover, the grade of composition thus rises still higher, to muscle and nerve (which contains nitrogen in addition to the constituents of the plant), and this is a magazining of force in a still more concentrated or condensed state. There are thus five states of stored force in nature—three in the *inorganic*, the solid, liquid, and gaseous; and two in the *organic*, the vegetable and animal.

Now what is the provision to meet this last and highest condition? Is this magazined force left to go wholly to waste by the death and decomposition of the plant-eaters? Just the contrary: an extensive system of flesh-eaters was instituted which should live upon it, and continue it in action in sustaining animal life among successive tribes. The flow is taken at its height, and the power is employed again and again, and made gradually to ebb. What is left as the refuse is inorganic matter —the excremented carbonic acid, water, and excrements, with bones or any stony secretions present. Thus the flow starts at the inorganic kingdom, and returns again to the inorganic. Moreover in the class of quadrupeds (mammals), the flesh of the herbivores (cattle) is among the means by which the animal type is borne to the higher grade of the carnivores. The true carnivores, besides, take the best of meat. Whales may live on the inferior animals of the sea; but the large forest flesh-eaters take beef and the like.

There is another admirable point in this scheme. The death and decomposition of plant-eaters would have rendered the waters and air locally destructive to life. It is well known that it is necessary in an equarium to have flesh-eaters along with the plant eaters and plants. And when in this way the living species are well balanced, the water will remain pure, and the animals live on indefinitely. If not so balanced, if an animal is left to decay, the waters become foul, and often everything dies. Putrefaction and noxious chemical combinations follow death, because, in life, the constituents, carbon, hydrogen, nitrogen, and oxygen, are in a constrained state, at the furtherest remove from what chemical forces alone can produce; and hence when the restraint is taken off at death, the elements fly into new conditions, according to their affinities. Now animals, dying yearly by myriads, are met at death by an arrangement which makes the dead contribute anew to animal life as its aliment, and in this very process the flesh ultimately comes out innocious, and is at least so far changed to the inorganic condition as to be the best of fertilizers for plants. Part of the process of getting rid of the great fleshy carcases consist in their minute subdivision by the feeding of larvæ of insects, and, further, an infinitesimal division of the insect as the food of the infusoria,—which again may become the nutriment of larger animals, to go the rounds once more. But the final result is, as stated, *plant-food*—largely through the processes of digestion and excretion, but part through the decomposition of animals that are two small and readly dried up to prove offensive.

Thus the carnivorous tribes were necessary to make the system perfect.

One word respecting the necessity of a check on the excessive multiplication of individuals. Nature as just now observed, is a system of constantly varying conditions—of changing seasons, winds, clouds: of inconstancy, under law, in all forces and circumstances. At the same time, the growth of a species requires the nicest adjustment of special conditions in each case. On this account the reproductive powers in species is, in many cases, excessively large, so that the various accidents to which the eggs or young would be exposed, might not cause their extermination. This provision opened the way for occasional excessive multiplication, and requiring a check from carnivorous races.

6. Finally, could death be prevented in a system of living beings in nature without a constant miracle? How should the earth be managed to secure it against death? It would be necessary to still the waves, for they are throwing animals and plants on the shores to die; to still the winds for they are ever destroying in some parts of their course: to still even the streams and rains. With winds and waves, not only helpless animals and plants, but men's houses, ships, and boats, would now and then be destroyed, in spite of prudent precaution and holy living. But if we still the waves, the winds, and the streams, the earth would rot in the stagnation, and here again is death.

We thus learn, that in life the fundamental idea of reproduction implies death; the processes of life are the processes simultaneously of death; the stability of the system of life requires death; the vegetable kingdom is made to feed animals, and the animal kingdom, while containing plant-eaters, demands flesh-eaters for its own balance, for the removal of the dead, and to make out of dead flesh the proper food for plants, thus to pay its debt to the vegetable kingdom. Hence death pervades the whole system of life in its essence and physical laws; and it could not be prevented in a world of active forces except by a constant miracle; and this would be an annihilation of nature, that is, a system of law.—*Silliman's Journal of Science and Arts.*

THE MANUFACTURE OF WAX CANDLES AT CLICHY.

By J. TURGAN, of the *Moniteur Universal.*

The manufacture of stearine* is essentially French—from the first works of MM. Chevreul and Gay-Lussac in 1824, and the industrial realisation of MM. de Milly and Motard in 1835, down to the

* Stearine (from *stear*, suet) that part of oils and fats which is solid at common temperatures. The nature of these substances was first made known by Chevreul, in 1823, who showed that they were compounds of peculiar acids, with a base termed glycerine; of hese compounds the chief are stearine, margarine and oleine (from *elaion*, oil).