In some few instances the effects of medicines are analogous to those of electricity. Thus the instantaneous death caused by hydrocyanic acid is something like an electrical phenomenon. "A drop of acid, mixed with a few drops of alcohol," says Magendie, "when injected into the jugular vein, kills the animal instantly, as if he had been struck by lightning."—(*Formulaire*, 8me ed. p. 174.) The same physiologist has compared the convulsive shock, caused by the Upas Tieuté, "to that which takes place when a current of galvanic fluid is directed along the spinal marrow of an animal recently killed."—(See *Orfila's Toxicologie Générale.*) Again, "If an animal be touched whilst under the action of this substance [extract of nux vomica,] it experiences a commotion similar to that of a strong electrical shock; and this takes place every time the contact is renewed."—(*Formul.* p. 5.) These phenomena deserve especial notice in relation to the suggestion of Dr. Faraday, (*British Annals of Medicine*, for Feb. 24, 1837,) that the agent or source of the animal portion of the nervous system may be electricity.

2. *Vital force of the Organism.*—The peculiar properties possessed by living beings are two in number; namely, a capability of receiving impressions, and a capability of contracting—that is, of executing certain motions when the requisite impression has been made. The first has been denominated *latent* or *organic sensibility;* while the second has been termed *insensible* or *organic contractility.* These two properties, observes Adelon (*Physiologie de l'Homme*, 2e ed. t. iv. p. 565,) are reducible to one (*sensibility;*) for to feel is to change the mode of existence, in consequence of an impression—that is, it is to move in a way that is neither physical nor chemical. But as Mr. Grainger (*Observations on the Structure and Functions of the Spinal Cord*, p. 105,) has justly observed, "Organic sensibility is not sensibility of any kind; but a capability possessed by certain nerves (the incident) of receiving and transmitting the impressions of physical agents to the true spinal cord; which organ, by its peculiar power, excites muscular contraction through the medium of the reflex nerves." He proposes, therefore, to call it *excitability* (p. 127;) and suggests "that the contraction required for the nourishment and support of plants is the result of an excited action, effected by a structure analogous in its office, though differing in its physical character, to the true spinal (and, I believe, sympathetic) system of the animal kingdom."—(P. 131.)

Vital properties have by some been ascribed to organic structure, by others to a distinct internal principle called *Life* or the *Vital Force.* For an account of the opinions of writers on this subject I must refer to *Barclay's "Inquiry concerning Life and Organization,"*—as the subject hardly falls within the scope of a work on Pharmacology.

4. *Physiological Effects of Medicines.*

The *primary* or *physiological effects* of medicines may for convenience be divided into such as are *local*, or those that occur in the part to which the agent is applied;—and into those that take place in distant organs, and which by way of distinction we denominate *remote effects.*

1. Topical or Local Effects.—These are of three kinds:—

a. Mechanical or Mechanico-vital effects, as those caused by the hairs of the pods of Mucuna pruriens,—by demulcents,—by adhesive plaster, &c.

b. Chemical or Chemico-vital effects, as those produced by the agents denominated caustics. The constituents of the tissues on which the caustics expend the energy of their affinities are principally water, albumen, fibrin, and gelatine. Water constitutes four-fifths of the weight of the animal tissues and without it, they are wholly insusceptible of vitality, except in the case of some of the lower animals.—(*Müller's Elem. of Physiol.* p. 7.) Hence, therefore, agents like sulphuric acid, which powerfully attract water, act as caustics. Substances which either coagulate liquid albumen, as the mineral acids and alcohol, or which dissolve solid albumen, fibrin, and gelatine, as the alkalis, are also powerful caustics. Many salts, as bichloruret of mercury, sulphate of copper, acetate of lead, and chloruret of zinc, form new compounds when placed in contact with the organic principles just referred to: they also are caustics. As a preliminary to the production of the chemical changes here mentioned, the caustic must destroy the life of the part. Lastly, around the cauterized parts inflammation is set up.

c. Vital Effects.—The effects placed under this head are those which are unaccompanied by any obvious mechanical or chemical changes. As examples we may select two kinds—the vascular and nervous.

The *vascular effects* are those caused by the agents termed *irritants* or *acrids*, as cantharides, savine, gamboge, croton oil, &c. They are, pain, heat, redness, and the other phenomena of inflammation.

The *nervous effects* are numbness, tingling, pricking, and sometimes paralysis, without necessarily any redness or other obvious change in the vascular conditions of the part. When a few drops of the tincture of the root of aconite are applied to a delicate part of the skin, as the inner surface of the lips, numbness and tingling are speedily experienced. The most powerful effects are produced by the *Aconitum ferox*, a native of Nepal, and used as a poison under the name of *Bish* or *Bikh*. Some years ago, at the request of Dr. Wallich, I undertook a series of experiments to determine its effects, (see his *Plantæ Asiaticæ rariores*). I found that one drop of the alcoholic tincture of the root applied to the tongue, caused, within ten minutes, intense numbness in the tip of that organ, and also in the lips, with a sensation as though the soft palate and uvula were relaxed and rested on the tongue. The latter symptom continued for about 15 minutes only, but the numbness and tingling endured for 18 hours.

2. Remote Effects.—These are of two kinds, chemical and vital.

a. Chemical effects.—Vogt (*Pharmakodynamik*, bd. i. p. 15) denies that any remote chemical effects can be produced. But for the reasons before detailed, I regard the alteration in the qualities of the urine, by the internal use of acids or alkalis, as the effect of chemical influence. Moreover, the deposition of silver under the skin by the exhibition of the nitrate, and the colour communicated to bones by the use of madder, seem to show that even solids may undergo chemical changes by the internal employment of medicines.

b. Vital effects.—The functions of remote parts are affected by medicines, as when narcotics or diuretics are exhibited:—The former act on the brain, the latter on the kidneys. Inflammation even may be set up in a distant organ,—as of the bladder, by the use of cantharides.