its origin to the formerly imagined action of the nerves or muscles, but emanates directly from a purely chemical source, the exciting cause being generated by the contact of the air with the incipient decomposition of the freshly-killed animal. Bearing in mind that a liquid, but very slightly saline, in contact with animal substance is an electrometer, it is easy to perceive that the so-called muscular current is nothing more than the current produced by their contact. To put beyond a doubt the question that a live muscle would generate electricity, which it could not produce when dead, contact has been made between the muscles of a live animal and the wires of a galvanometer, without the latter evincing the slightest sign of an electrical current. Moreover, if a portion of muscle be separated from the body of an animal freshly killed, and placed in communication with a galvanometer, a feeble degree of electricity is demonstrated. According to the opinion of a member of l'Academie Française, this is due to the influence of oxygen upon the flesh, a cause always existing when the muscles retain their normal state of irritability. Assuming that animal electricity was due to the cause surmised by Galvani, the evidence of the current would cease so soon as the muscles become completely inert, or, so to speak, completely dead. But the reverse is the fact. The more decomposed the flesh becomes the stronger are the advances of its electrical condition, and when it has acquired a state of almost total putridity it imparts the maximum deviation to the astatic needle. That the presence of a saline liquid is necessary to these electrical effects is proved convincingly by several circumstances. One is that meat newly salted becomes electrical in proportion to the penetration of the solution, and the other that cured meats, whether beef, pork, or fish, evince a high state of electrical development. The blood of a living animal is altogether destitute of electrical excitation, but becomes capable of affecting the galvanometer so soon as the animal is killed, and its power increases with the putrefaction of the body. A small addition of common salt to the blood immediately increases its electrical sensibility. If the epidermis of an animal be removed the under layers of cuticle are highly electrical, as experiments upon frogs have demonstrated, and this condition is still further augmented by the addition of a saline solution. From these results we are justified in assuming that animal electricity in its original symptoms is a delusion, and that without the intervention of some slightly saline liquid the nerves and muscles are *per se*, powerless to afford the smallest evidence of an electrical current. Unless a chemical action can be set up there is nothing to indicate the presence of that vital muscular agency which the first experiments in connection with the subject led the older philosopher to insist upon and adhere to. The animal current, which they so fondly prepounded and believed in, is simply an ordinary electrical current produced chemically by the contact of a saline solution with animal matter, in which combination the salt acts the part of the electrometer. Adopting this view of the question it is easy to perceive that the development of animal electricity in invalids and deseased organs, instead of being due to the cause originally entertained, is solely the consequence of chemical decomposition. Thus, for instance, the mucous membrane of the mouth becomes electrical in patients suffering under disease of the stomach or digestive organs, and strong evidence of it are manifested in maligunant, cancerous, and other ulcers of a dangerous and fatal type. All animal excretions are electrical, and urine possesses this property in so remarkable a degree as to cause the needle of a galvanometer to make a complete revolution of the dial. The electricity of fishes results from an alkaline solution in the cells of the electric organs, and manifests itself very powerfully. All the effects of animal electricity may therefore be regarded as closely resembling those of fermentation and putrefaction, and to depend not upon any muscular or nervous hypothesis, but solely upon an incipient chemical decomposition in combination with chemical electrometers.—*The Engineer.*

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# ART.

### Natural Qualities and Peculariities of Glass.

This material is as old as reliable history. The fable which ascribes its invention or discovery to the accidental fusion of an alkali with seashore sand by a fire made by ship-wrecked Phœnician sailors is not worthy the degree of credence we usually yield to Pliny's relations. Glass beads and imitation gems have been found with Egyptian mummies which must have been interred over 3,000 years ago. In fact, at Thebes was discovered a glass bead of rare purity which had the name of a monarch inscribed upon it who lived 1,500 years before Christ. Glass lenses, bottles, and vases have been found in the ruins of Nineveh, and it is not improbable that glass was known long before it was manufactured into articles of use or ornament; for in the process of the reduction of metallic ores and in the baking of pottery of vitreous debris must have been noticed. According to Theophrastus the manufacture of glass was practiced 370 years B. C., and the processes of grinding, coloring, and gilding were then in use. Colored glass was used in church windows in the eighth century, and in the time of the crusades the art of ornamenting and decorating articles of glass was introduced from the East. Works were established at Murano, near Venice, and for a long period the Venetian glass was justly celebrated for its elegance. Many of the ornamented objects made in Venice have been lately reproduced; that known as the Venetian ball, so popular now for use as a paper weight, being an instance. They are made by combining pieces of colored glass to imitate flowers, etc., and introducing these into globes which are compressed or flattened upon the designs by the blower drawing in his breath and thus exhausting the air from the interior. The lens form of the envelope has the effect of magnifying the ornamental objects. Frosted glass is produced by dipping the hot glass, before blowing, into cold water, reheating it and blowing before the cracks on the exterior are closed by fusion. Probably the finest specimens of ornamented glass now made are those manufactured by the Bohemian peasantry. The cause of this excellence is partly the superiority of the materials existing in Bohemia and partly to the wonderful skill in manipulation attained by patient and constant practice.

Glass is a chemical combination of silica, potash, lead, lime, alumina, and other substances intended to produce silicates of these bases. The colors are produced by metallic oxides. The specific gravity of glass varies with its composition from 2.4 to 3.6. When cooled it is exceedingly brittle, but when softened by heat is very tenacious and may be moulded at will. It can be drawn into threads of extreme tenuity, and in this form has been woven into silk, producing an elegant effect. These threads are quite elastic, as is also a solid globe; even hollow balls have been dropped upon an anvil from a height of ten feet, when they would rebound to at least one-third of that height without sustaining a fracture. This quality of elasticity when in the form of thread has lately given rise to the story of an attempt by a French chemist to unite masses of these elastic threads by partial fusion, with the object of producing a flexible glass. The project is too ridiculous to merit serious remark. When glass ceases to be brittle it will probably lose some of most valuable properties, which seem to be inseparable from this objectionable quality.—*Scientific American.*

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### Reproduction of Designs on Glass.

The decoration of porcelain with designs embracing every grade of excellence, and at a very trifling cost, compared with the beauty of the products, has long been practiced in this and other countries. But, hitherto, glass appeared to be incapable of receiving any kind of ornamentation except by methods tedious, difficult and expensive. It is likely, however, that such is now no longer the case, as a process has been invented in France. by means of which engravings are transferred to glase with nearly the same facility as they have hitherto been transferred to ceramic products. In the case of porcelain, fine lined copper plate