in animals, has been deduced. By this theory, the circulation of the blood in insects, fishes and cold-blooded animals, the development of acardiac monsters, the accumulation of blood on the right side of the heart in man after death, with many other phenomena unexplainable by any other theory, have been satisfactorily accounted for,

2nd, Assuming then, that endosmose, secretion, absorption, imbibation, &c., are nothing but modifications of the phenomenon of capillary attraction, we will now enquire, whether such phenomena can be explained by reference to general principles. It is by an answer to this question that we must establish the validity of our first position. What is the cause of capillary attraction?

"If a circular disc of glass be placed on the surface of mercury, it will adhere with a certain force, which may be measured by means of a balance; but the glass may be raised from the increury, without bringing any particles of the latter along with it. If a disc of the same kind, be placed on the surface of water, it will also adhere, and you cannot raise it again without raising some of the water likewise, i. e., the glass will be wetted. Now there cannot be the least doubt that the same cause is in operation here, as that which produces pore-action, or capillary attraction; and from a series of experiments the following laws have been deduced :-

1. If the force of attraction of the particles of a solid for the particles of a fluid, be not equal to half the cohesive force of the latter for each other, the fluids will refuse to pass through a pore of that solid substance, and in capillary vessels consisting of it, the fluid will be depressed below its hydrostatic level.

2. If the force of attraction of the particles of a solid for those of a liquid exceeds half the force of the latter for each other, bat is not equal to the whole force; other fluids will pass through pores formed of that solid substance ; and in capillary vessels consisting of it, will rise above its hydrostatic level.

3. If the force of attraction of the particles for those of a liquid, exceed the whole conesion of the latter, chemical union ensues.

"By tracing cohesive and capillary attraction to the same cause, much advantage is gained, because it simplifies physiological investigations.

" Let us suppose a plane of glass capable of being elevated by an insulating handle, to be resting on the surface of mercury, contained in an insulating vessel. Let the mercury be connected with an electrometer, by means of a wire. Now, as long as the glass plane and the mercury are in contact, the electrometer evinces no disturbance; but as soon as the plane is raised by the handle, electricity is instantly developed, and the gold leaves diverge. By employing another electroscope, it will be found, that the glass is positively, and the mercury negatively, electrified, which, I think, should be proof positive that electricity was the cause of their adhesion. A cause of attraction being thus develop. ed, it would be very unphilosophical to seek for other agencies, especially where one so competent to produce all the effects is seen to exist.

"If the same experiment is performed, substituting water for mercury, no electricity will be developed, and the reason is ob vious-no separation has taken place between the glass and the water; the glass is wetted, therefore the particles of the water have only been separated from each other.

"This difficulty being dismissed, it would seem to follow, ac. cording to the hypothesis indicated by the foregoing experiments, -that if two solids adhere to a certain fluid, with forces differing in amount, they should develope, upon rupture, quantities of clectricity, in the same ratio. As a general result, the balance and electrometer prove this to be the case. Bees' wax, which adheres to mercury, with much less force than gum lac, developes like. wise much less electricity. Gum lac which adheres less strongly than glass, likewise developes much less electricity-much de. pends, however, on the conducting power and other conditions of the substances employed. Great variability in the results is often observed, even when the same materials are used at differ- upon each other. 'To obviate this difficulty, it has been

of the circulation of sap in vegetables, and of the blood ent times. Gay Lussac found that it required a weight sometimes of 158, and sometimes 296 grammes to detach a certain dire of glass from mercury, depending on causes for which he could not satisfactorily account." Does not such variability indicate the influence over such phenomena of that insidious, mighty, and allpervading agent, with the general laws of which, we have yet so much to learn?

"The best method of showing that the voltaic battery has en. tire control over capillary attraction, is to take a shallow vessel containing a quantity of mercury, and place upon it a drop of On making the drop communicate with the positive water. electrode of a battery, and the mercury with the negative, in a moment the drop loses its rounded form, and spreads out in a thin sheet on the metalic surface, completely wetting it, and us the tension of the battery increases, the drop expands more and more. in proportion to the number of plates employed.

"Again-water will pass with great rapidity through a chink, the width of which is not more than half a millionth part of an inch; provided it can wet both sides of that chink,-but if that condition is not fulfilled, it fails to pass, even though the width should be increased to upwards of one hundred and forty-four times its former dimensions.

"If you take a glass tube, half an inch in diameter, and grind one end of it very exact,-place it on the surface of pure mercury, and pour water into the upper end, the water will not escape at the chink between the mercury and glass, because it does not wet the former ; but if a platina wire be inserted into the tube and connected with the positive electrode of a battery, while the mer. cury, by means of another wire, is connected with the negative electrode, then the water will begin to flow through the chink, and spread on the mercury, until it gets below the wire which is inserted in the tube.

"In a tube small enough to exhibit capillary attraction, the same phenomena will take place, which proves that, under such circumstances, the water is driven out by an active force, for, by breaking the galvanic circle and by raising the tube a little from the mercury, the water will again rise by the force of capillary at. traction.

"If two quantities of water are separated from each other by a membranous partition, and one of them made positive and the other negative, all the water in contact with the positive pole will escape into the negative side, passing through the membrane by capillary attraction."

In those facts, I think we have abundant evidence of the identity of the capillary and electrical forces, which will receive further confirmation in the consideration of the positions yet to be examined.

3rd, I believe electricity to be a single fluid.

There are three facts which form the basis, and must be taken into consideration, in all reasoning upon the nature of the electric fluid :-

First,-Two bodies positively electrified repel each other.

Second,—One body positively and another negatively electrified, attract each other.

Third,-Two bodies negatively electrified repel each other.

The theory of Dufay is, that there are two fluids,the one positive, or vitreous; the other negative, or The particles of either fluid repel particles resinous. of the same kind, but they have a powerful attraction for those of the opposite electricity, and matter. By this hypothesis, the facts stated, may be explained.

The Franklin theory asserts, that there is but one fluid, the particles of which repel each other, and possess a powerful attraction for matter. This doctrine explained the two first facts, but failed to afford a satisfactory reason for the third,-namely, how two balls deprived of electricity, could have a repelling influence