it is grown, that is, a microörganism incapable of growing in the presence of gentian violet readily does so on a more suitable medium, and it can adapt itself to a less suitable medium if started on a selective medium. Gentian violet has not been found to be of any value in the differentiation of the *Mucosus capsulatus* group. Further, the microörganisms of this group which refuse to grow on agar violet are representatives of what we at present regard as three distinct species.

It would seem from the result of the experiment here recorded that while the action of gentian violet on bacteria is usually constant, it is sometimes susceptible of modification and may not be as fundamental a characteristic as originally supposed.

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On the influence of light on the electric potential of bacterial and other suspensions.

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Experiments in this laboratory have shown that light and other forms of radiant energy exert a marked influence on the rate of wandering in the electric current. Thus the rate of wandering of arsenic sulphide suspensions is about twice as great in the dark as under strong illumination in the sun, or in the carbon arc or in the Nernst lamp. On the other hand, the rate of wandering of mastic emulsions is increased under strong illumination, and that to the extent of about forty per cent. of the value in the dark. Ferric hydroxide is retarded in the light to the extent of about six per cent., while chlorophyll suspensions are accelerated in the light to the extent of about forty per cent. The effect of the radiant energy is not in general instantaneous, but requires a few minutes exposure to reach its greatest value. In general also the effect is reversible, that is colloids whose rates of wandering have been influenced by radiant energy, return to their original values if kept in the dark for some minutes.

These phenomena are very interesting in connection with photochemical reactions in general. Arsenic sulphide suspensions may be kept almost indefinitely in the dark. On exposure to light they oxidize rapidly. Knowing now that light also reduces the negative charge on the colloidal particles of arsenic sulphide, one can arrive at a comparatively simple electrical theory of photo-oxidation. If one assumes that oxidation takes place when two hydroxyl ions can give up their charges, forming water and nascent oxygen available for oxidation, and that subsequently the negative charges thus set free may react with free hydrogen ions and free oxygen to form new hydroxyl ions which may again discharge and oxidize, it will be readily seen that the rate of oxidation will primarily depend on the value of the negative charge which the oxidized particle itself carries. If this is large the hydroxyl ions will be repelled, and oxidation will be retarded. If any force intervenes to reduce the negative potential of the colloid particle, the hydroxyl ions will be less repelled and oxidation favored. The above results show that such a result is produced by radiant energy. Since it is well known that practically all organic matter, living or dead, carries a negative charge, and since the oxidation of all organic matter is greatly accelerated by radiant energy, it would seem that this theory might find quite wide application.

It was thought interesting in this connection to determine what might be the effect of illumination upon the rate of wandering of bacteria in the electric current. *Sarcina flava*, *Sarcina rosea* and *Bacillus prodigiosus* were investigated. The rates of wandering were first determined in the dark, and then in the light. The results were in all cases positive. In every case the rate of wandering was less in light than the dark. The difference was in general about twenty per cent. We have here a possible electrical explanation of the toxic effect of sunlight on bacteria. Bacteria live best in the dark. If we assume that they take on such a charge as regulates the rate of oxidation to such a value as is demanded by the normal metabolism, then anything which reduced this charge would tend toward destructive oxidation. Radiant energy is capable of reducing the negative potential of the bacteria, and the result is clear.

Another class of phenomena which receives ready explanation from this point of view is that of the coagulation of many proteins under the influence of ultra-violet rays. It is generally considered that the coagulation of colloids is favored by the reduction of the electric field between the colloid particle and the medium in which it exists. As has been shown radiant energy in general affects the field and very commonly reduces it, which would explain the coagulation in such cases.

In a purely tentative and speculative way, it may perhaps be justifiable to raise the question as to what extent the above principle may be applied to the explanation of any or all of the life processes. From the physical-chemical point of view it is not unreasonable to assume that all metabolic processes which take place between a colloid particle and the medium in which it is found are determined and regulated by the establishment of certain potential differences between colloid and medium. There will be in any particular case, such a potential developed as is most favorable to the particular work in hand. So long as such favorable conditions of potential are maintained metabolism will proceed smoothly. Such influences as disturb the potential system will disturb the metabolism, and such disturbance may be either favorable or unfavorable. It may be going too far, but is it not possible there is some suggestive value in the assumption that living and dead matter are to be distinguished by the ability or inability to maintain such potential systems as properly regulate the metabolic processes? Certainly there would seem to be here a possible explanation of the fact that the living stomach does not digest itself, while the dead one does.

It is also interesting to note that bacteria, whose metabolism is essentially one of oxidation, and which are adjusted to the dark, have their potentials so affected by light as to lead to destruction. On the other hand, chlorophyll, whose function is that of an agent in a metabolism which is essentially reducing, and which is active only in the light, has its potential so affected by light as to favor its type of metabolic reaction. In other words the charge on bacteria is reduced by light, that on chlorophyll is increased.

The author desires that the above be considered not as the exposition of a theory, but merely as the suggestion of one.