

or a substance which speeds up a chemical change.

"The use of hydrogen under these conditions for melting metals has proved to have many advantages," Dr. Langmuir said. "Iron can be melted or welded without contamination by carbon, oxygen or nitrogen. Because of the powerful reducing action of the atomic hydrogen, alloys containing chromium, aluminum, silicon or manganese can be welded without fluxes without surface oxidation. The rapidity with which such metals as iron can be melted seems to exceed that of the oxy-acetylene flame, so that the process promises to be particularly valuable for welding.

The other method of producing ductile welds was developed at the Thomson Research Laboratory of the General Electric Company at Lynn, Mass., by Peter Alexander, independently of Dr. Langmuir's work. The electric arc is passed between the metal to be welded and an iron electrode, and the gaseous atmosphere is supplied in the form of a stream around the arc, so as to keep it entirely away from air. Pure hydrogen, water gas, methanol or wood alcohol vapor, or dry ammonia can be used, as well as a mixture of hydrogen and nitrogen, for it is found that the nitrogen is not harmful unless oxygen is also present. All of these mixtures contain hydrogen, and Dr. Langmuir suggests that this method also depends in part for its efficacy on the disintegration of hydrogen molecules into their atoms.

GERM THEORY OF CANCER REFUTED

The germ that causes cancer, if there is one, has not been discovered yet. Dr. James B. Murphy of the Rockefeller Institute for Medical Research has repeated the experiments of Dr. W. E. Gye and J. E. Barnard which attracted such wide attention last summer and in a report of his results appearing in a recent issue of the Journal of the American Medical Association he holds his experiment refutes their contention that chicken tumor is caused by a micro-organism.

The English scientists reported that they produced tumors in chickens by injections of the filtered juice from chicken tumor in the presence of a second chemical factor. They also produced tumorous growths in chickens with filtrates from malignant growths from other animals - mice, rats and even humans, in the presence of this second factor. This necessary secondary element was nothing else than filtered juice, or filtrate of chicken tumor treated with chloroform. None of these substances would produce a tumor or cancer when used alone.

By means of a complicated ultra-microscope employing ultra-violet light they studied the cell-free filtrate and detected the presence of a micro-organism which they believed was the causative agent of cancer.

A cancer consists of rapidly subdividing cells that keep on growing and will not stop. Such a condition of normal growth is found in the rapid cell subdivision of an embryo. At the Rockefeller Institute it was decided to try to produce a cancerous growth with a filtrate from embryonic tissue used in the same way as the juice from the malignant growths. In accordance with this idea the filtered juice from ground-up bits of chick embryo and rat placenta were injected into hens along with the chloroform treated filtrate of chicken tumor and it was found that cancer resulted just as it did following the injection from malignant growths.

Dr. Murphy says in explanation:

"Apparently the power to activate a chloroformed filtrate cannot be considered as proof of the action of a living organism, for cultures of embryonic tissue or placenta are just as potent in this respect as so-called cultures of malignant tissues.

"Two possibilities present themselves in explanation of the results attained. First, that the causative agent of the chicken tumor is in the nature of an enzyme-like substance which is inactivated by chloroform and may be reactivated by a diffusible substance from malignant tumors, embryonic tissues and placental tissues. The second possibility is that the chloroform treatment does not destroy but simply attenuates the causative agent to a point at which unaided it is too weak to induce a tumor but in conjunction with some injurious or stimulating substance supplied by the 'culture' it becomes effective. The fact that a great excess of chloroform so completely destroys the agent that no reactivation is possible is rather in favor of the latter possibility. Further experiments are in progress to elucidate these points."

REMOVAL OF ONE IDEA WOULD COLLAPSE CIVILIZATION, MILLIKAN SAYS

Two ideas, one three hundred years old and the other very new, that have exerted a powerful influence upon man's ideas of the world in which he lives, were explained by Dr. Robert A. Millikan, director of the Norman Bridge Laboratory of Physics at Pasadena, Calif., in the annual Messenger lectures that he delivered at Cornell University in April.

"One idea has probably already exerted a larger influence upon the destinies of the race than any other which has ever entered the human mind." Dr. Millikan said. "This is the one which underlies the whole of modern mechanics, theoretical and applied, and which came into human thought in a large way beginning with Galileo."

Expressed quantitatively this idea takes the form of the second law of Newton, which says that force, f , equals mass, m , multiplied by acceleration, a .

"If this idea were removed from modern civilization, it would cause the whole of it to collapse like a house of cards and throw back the world, so far as its material life is concerned, to the conditions existing in the civilization of ancient Rome," Dr. Millikan declared.

The other and younger idea is that of the electrical constitution of matter. According to Dr. Millikan, this idea, which although now less than thirty years old, including as it does radio activity, electronics, quantum theory, and relativity, has already had such enormous consequences in changing the conceptions of man about the physical world in which he lives and in practical applications to his daily life that it justifies the expectation that it will be of no less significance than the first.

The development of this idea of the electrical constitution of matter, in which Dr. Millikan has so greatly participated, is the subject of his lectures.
