Science in Its Relation to The Conservation of Human Life.

Severance Burrage.

Nearly every branch of science has direct or indirect relation toward the conservation of human life. Unfortunately the appreciation of scientific work has been from the industrial rather than from the humanitarian viewpoint, and such researches as have resulted in discoveries that have commercial importance have been the ones to receive the plaudits of the public.

Chemistry, physics, geology and biology in all of their subdivisions have undoubtedly contributed in the work of saving human life. For example, we have in *chemistry* the studies of the impurities in the air, water, food and drugs, practical applications on the purification of water and sewage, and so on. In *physics* and its various branches we have the practical application of safety devices of all kinds, rescue apparatus for mines, the developments in rapid communication, climaxed by the invention of the wireless telegraph and telephone, most useful in the prevention of accidents, the various inventions which protect employes from dangerous machinery, the development of fire-fighting apparatus, and special protective devices against floods, earthquakes, cyclones and other disasters. In *geology*, the selection of proper building stone, the dangers from the corrosion of building stone in different climates, the selection of proper building sites, and, indirectly the discoveries of coal, oil, and other things essential in many phases of human existence. In *biology*, particularly in the subdivisions, bacteriology, medicine and sanitary science, we find some of the most important discoveries resulting in the prevention of disease and death. Even in entomology—the life histories of various mosquitoes and flies have important bearing on the prevention of disease. In bacteriology the discovery of the causes of transmissible diseases, through the research of Pasteur, Koch and others, methods in the rapid diagnosis of disease, protective inoculation against disease, resulting from the work of Jenner Von Behring and others, are familiar to you all. In medicine the application of asepsis and cleanliness to surgical methods has revolution-

ized this important branch of medicine and made it a most important factor in the conservation of human life; the discovery of selective chemical substances for the treatment of specific diseases, such as quinine for malaria, salvarsan for syphilis and most recently ipecac for amebic dysentery and pyorrhea.

In sanitary science the development has been most remarkable. This includes its practical applications in sewage and garbage disposal, street cleaning and the sanitary construction of pavements, the sanitation of heating and ventilation of factories, workshops and schools, the medical inspection of schools, the sanitation of railway cars, and stations, and such special sanitary devices as individual drinking cups, dental lavatories in railroad cars, and the various applications of sanitation to the farmhouse and rural dwelling.

The above outline, which is obviously incomplete, suggests some of the things which science in its various branches has done that have been and can be applied in the conservation of human life. Granting that science has done all of these things and many more, I would raise this important question: Is the public at large getting the full benefit of all of this scientific work? Is the public taking advantage of these discoveries of science? In my opinion it is not.

Notwithstanding intensive efforts on the part of state boards of health, extension departments in our universities, instruction given before farmers' institutes, educational activities of anti-tuberculosis societies and insurance companies, we find the death rate from preventable diseases decreasing very little if at all. In some communities the deaths from preventable diseases are on the increase. In our own State we find very little change in the last ten years in the deaths from preventable diseases.

This Academy is of course particularly interested in Indiana. Can not this Academy suggest or recommend ways and means to apply throughout this State the various developments of science relating to health and disease prevention in such a way as to create a healthier and longer-lived citizenship? A commission appointed recently in Massachusetts to investigate the high cost of living stated—

> "The increased vital efficiency of the citizens of this State (Massachusetts) which would result from a conservation of the present waste of health would, if expended in labor, increase the earnings of those whose health is impaired and also lessen the burdens of

those who are at present unnecessarily ill. This increase in earnings would thus tend to reduce the cost of living, increase the total earnings of the citizens and make the average income larger."

Thus conservation of health means higher wages, which enables the worker to keep ahead of the increasing price of the commodities of life. Surely this is worth striving for, and in my opinion Indiana can decrease the death rate and lengthen life and thus bring about this condition. To accomplish it I would urge the adoption of a law which would provide for a full-time health commissioner in every county in the State. This commissioner must be especially trained in sanitary science and the various applications of the other sciences in so far as they affect the prevention of unnecessary deaths. If such a law were passed, and backed up by an intelligent public, we would have the healthiest State in the Union in a very short time. I state my belief because where such sanitary applications have been thoroughly carried out, we have as a result healthful conditions. I would cite as an instance of this the Panama Canal district. While the names of Goethals and Gorgas will go down to posterity as constructors of the Panama Canal, they should receive more credit for the sanitary organization and administration which made the construction of the canal possible. They converted one of the most unhealthful localities in the world, where the death rate was over 70 per 1,000, to the most healthful spot with the death rate of less than 6 per 1,000, a death rate lower that that of any other civilized community in the world.

Another instance of the practical applications of sanitary science has been in our military camps. Reports show that out of 12,000 men in these camps there was not a single case of smallpox or typhoid fever for a period covering two years. Typhoid fever has long been one of the pests of camp life, but through improved sanitation and typhoid vaccination, this disease has been absoluetly eliminated. Other diseases in these camps over which there was not such perfect control showed a great reduction.

With such fine examples of successful sanitary administration it seems to me justifiable to make application to our own communities, with of course necessary modifications. I therefore would suggest that this Academy at this session pass resolutions favoring the passage of a law at the next Legislature which would provide for a competent, full-time health commissioner in each county in this State. I know of no way in which the Indiana Academy of Science can better further the best interests of the State with reference to the conservation of human life.