MEDICAL RESEARCH, PAST, PRESENT AND FUTURE
THE CARBONYL SAGA

by

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This paper was written for the: purpose of showing how modern medical research has been defined in this century and what its role should be; and for the purpose of presenting a history of the identification, development and use in modern medicine of the carbonyl and dicarbonyl groups, past, present and future in support of the "Chemistry of Natural Immunity".

In September 1950, Albert Szent-Gyorgyi, M.D., Ph.D, N.L., was a guest lecturer who spoke on the subject: "The Next Half Century in Biochemistry" at the Dedication Exercises for the new research laboratories for the Sterling Winthrop Research Institute, Rensselaer, New York. In his talk he made the following specific reference to "basic research" and "applied research":

> "....I often hear distinction drawn between 'basic' and 'applied' research with the unspoken implication that 'basic research' is that which cannot be applied and thus is useless. There is no such difference for all knowledge is useful, all research is but applied research. The difference is merely in timing and dimension. 'Applied research' is the application of knowledge already acquired, paying cash return. Basic research, which seeks new knowledge for knowledge's sake, new truth for truth's sake, is the foundation of the applied research of tomorrow. All really important progress of today was abstruse, apparently useless research yesterday, and if we neglect basic research today we have cut out the roots of progress tomorrow.....Antibiotics were a few years ago merely the subject of the curiosity of two people who were interested in the theoretical problem of natural defense regulations. A big scale reduction in human suffering can come only by such extension of basic knowledge." (p. 46) Emphasis added

Dr. Szent-Gyorgyi, during his lifetime, conducted extensive "basic research" in the fields of physiology and medicine. It was this research that made it possible for him to isolate ascorbic acid from the adrenal glands and from various plant juices and then prove that this ascorbic acid was identical to vitamin C. This research opened the door for him to conduct basic research in the field of cancer. From liver extracts he found an unidentified

substance, which he called "Retine", that had the ability to retard neoplastic cell division and growth. (1; Prevention, Nov. 1972, pp. 124-131)

Based upon his "basic cancer research", Dr. Szent-Gyorgyi presented his theories on the cause of cancer and his ideas as to a proposed method of treatment for cancer in his last two booklets: "ELECTRONIC BIOLOGY AND CANCER, A New Theory of Cancer", 1976, and "THE LIVING STATE AND CANCER", 1978. Here he narrated that the sulfhydryl (SH) was called the hormone of cell division in 1929 by F. Hammett. (3; p. 34; & 2: p. 62) Through his research, he was able to identify methylglyoxal (MG), a dicarbonyl, as the growth inhibitor he had been looking for and which he had called "Retine". He stated that both methylglyoxal and glyoxal (the simplest dicarbonyl) were antagonistic to the cell proliferation action of the (SH) group. He called methylglyoxal the red light to cell division. (2; pp.62-3) He also has shown that **glyoxal and methylglyoxal will suppress cell division without harming the cells** and that this suppression is reversible. (3; p. 29) He further **attributes the suppression of cell proliferation to the carbonyl groups.** (3; p. 71) He points out that ascorbic acid is oxidized to dehydroascorbic acid, a dicarbonyl and that this structure satisfied the requirements of an inhibitor of cell division and that the primary oxidation product of the oxidation of ascorbic acid is a free radical and that the ascorbic acid radical attaches to methylglyoxal making it a stronger electron acceptor. (3; pp. 71-2 & 49)

Dr. Szent-Gyorgyi reports that the ketone aldehydes inativate the (SH) group by acting as an electron acceptor for protein and thus contributes to the stability of the cell's beta state and its structure. It has been shown that **carbonyls react with guanidine; guanidine being a good electron donor.** (3; pp. 32-3) That the dicarbonyls, which are highly unsaturated compounds and rather reactive substances, can be present in cells only in a very limited quantity; that they can not exist in the strongly reducing anaerobic atmosphere of the alpha state. The dicarbonyl is a specific feature of the beta state. (3; p. 23) He goes on to say that it is probable that a more effective electron acceptor will be found than glyoxal. (3; p. 86)

Dr. Szent-Gyorgyi expressed the opinion that the two more important and direct roles for oxygen were the transformation of protein into free radicals and semiconductors, and the promotion of electronic reactions, making charge transfer and formation of free radicals autocatalytic (3; p.64). He further states that a lack of oxygen will eventually take the cells back from the oxidative beta state to the fermentative alpha state. That without oxygen dicarbonyls cannot be produced in the cell and without dicarbonyls oxygen systems can not be built. That the presence of oxygen and the dicarbonyls are both essential to the beta state, and without either one, the other can not exist and the cell will go from the beta state of oxidation to the alpha state of fermentation. That

this situation may play a major role in oncogenesis. That he expects that the dicarbonyls will induce contact inhibition in cancer cells. (3; pp. 82-3)

Dr. Szent-Gyorgyi also reports that the suppression of proliferation of invading microorganisms in vegetable cells is accomplished, irreversibly, by highly active aromatic dicarbonyls such as diquinones of catechol derivatives, i.e., o-diquinones which is toxic (3; p. 71) and that methylglyoxal would inhibit bacterial growth. (3; p. 38)

According to Dr. Szent-Gyorgyi, animal cells exist in two states, a fermentation (alpha) state where there is cell proliferation and a normal oxidative (beta) state which involves the higher functions of complex cells. That when this beta state becomes unstable or is deranged by out side factors, the cell can change and persist in the proliferation alpha state and thus tumors would result. After normal cell division, cells will return to the beta state; i.e., there is a reversible transformation from the beta state, during normal cell division, to the alpha state (undifferentiated state) which is followed by a return to the beta state (differentiated state). While in cancer cells, he believes, that there is no reversibility once derangement has occurred and thus cancer cells continue to divide and can not return to its beta state. (2; pp. 68-9)

In the final chapter of Electronic Biology and Cancer, (Chapter 20, "Notes On History", pp.95-7) Dr. Szent-Gyorgyi made a brief reference to Dr. William F. Koch's interest in the carbonyls in the 1960's and his claim that quinones had therapeutic action. Dr. Szent-Gyorgyi said that unfortunately, Dr. Koch did not give enough details to allow repetition of his work. He went on to say that the carbonyl's oncostatic action had been well established. Dr. Szent-Gyorgyi was also of the opinion that quinones were very toxic and that quinones did inhibit cell division. Though he said he found quinones devoid of therapeutic activity; he did not identify which quinones he was referring to and he did not give any information on the types of biological tests he had conducted with these quinones, the conditions under which these tests were conducted and how the test material was prepared. It should be noted that Dr. Koch used 100% pure parabenzoquinone ("BQ") in a concentration of one part "BQ" to a million (6X dilution - one mcg per ml) in a sterile, triple distilled, aqueous solution. It should further be noted that Albert L. Wahl, M.D., C.M., in 1947 wrote his booklet "A Least Common Denominator In Antibiotics" based upon his research with "BQ" (parabenzoquinone) in homeopathic dilutions as an effective therapeutic agent. His "BQ" was prepared by an independent pharmaceutical company under his directions.

Dr. Szent-Gyorgyi was right when he said that quinones inhibit cell division but are very toxic. I only wish that Dr. Szent-Gyorgyi had learned more about Dr. Koch's work. In 1979,

three years after "Electronic Biology And Cancer" was written, Dr. Garber had contacted Dr. Szent-Georgyi in regards to my father's work. Dr. Garber had suggested that Dr. Szent-Georgyi meet with me in order that he might learn more about Dr. Koch's theories and work. Dr. Szent-Gyorgyi, in his reply letter of Nov. 1, 1979, wrote the following to Dr. Garber.

> "I can tell you, I have a great admiration for Koch. He must have been a very outstanding man. My feeling is that he had a strong intuitive feeling about the role of C=O group and especially its conjugated form as C=OC=O as one of the great regulating forces in nature ....I have been working myself on these lines now for years and the subject has made very great progress and it is doubtful whether the notes of Dr. Koch could help any further.
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> "I would not like to become involved in the controversy around his name and, maybe, reproached later that I am led in my studies in by the posthumous notes which Paul could put at my disposal. I also doubt whether I could find the time for their study they undoubtedly deserve. I would not like either to revive the controversy around his work. That he has met by hostility is not doubtful for me. I know it from my own experience that people with intuition are regarded as an enemy by those who have none." (emphasis added)

Who was William F. Koch, Ph.D., M.D.?

Dr. Koch's early research in the study of the "Chemistry of the Natural Immunity" started when he was a student at the University of Michigan. While at the U. of M., he received his B.A. in 1909, M.A. in 1910, and Ph.D. in 1916. From 1910 to 1914 he was an Instructor in Histology and Embryology at the University of Michigan. In 1914 he became Professor of Physiology at the Detroit College of Medicine (Wayne State University) where he received his M.D. in 1918. From 1915 to 1919 he was Pathologist (active and honorary) at Women's Hospital in Detroit, Michigan. From 1919 to 1949 he continued his research while he was in the active practice of medicine in Detroit. After 1949 he continued his research in Europe and South America until his death in December of 1967.

Dr. Koch's first paper "On The Occurrence Of Methyl Guanidine In The Urine Of Parathyroidectomized Animals" was published in 1912. In 1913, the Journal Of The American Medical Association published a favorable editorial, "Chemical Consequences Of The Removal Of The Parathyroid Glands," in reference to Dr. Koch's second paper, "Toxic Bases In The Urine Of Parathyroidectomized Dogs". This was the only honest editorial and/or article about Dr. Koch that has ever appeared in the JAMA that I know of. These two papers were followed by Dr. Koch's dissertation (a partial fulfill-

ment of the requirements for the degree of Doctor of Philosophy at the University of Michigan), "The Physiology Of The Parathyroid Glands". This dissertation was published in the Journal of Laboratory and Clinical Medicine, Vol. 1, No. 5, Feb. 1916. While he was Professor of Physiology at the Detroit College of Medicine, his next paper was published in 1918, "Tetany And The Parathyroid Glands". In July of 1919, he published his first article on his cancer research, "A New And Successful Treatment And Diagnosis of Cancer", in the Detroit Medical Journal, Vol. XX, No. 7, pages 244-248. This article was followed by a more detailed paper, "A New And Successful Diagnosis And Treatment Of Cancer", which was published in the New York Medical Record, October 30, 1920.

This paper, that appeared in the Medical Record, was Dr. Koch's first detailed report published on his study of the chemistry of the natural immunity mechanism of the body using substances he had extracted from animal tissues; the heart and the brain. These substances were tentatively called at the time "Tissue Thrombines" because, as a result of their hypodermic administration, a coagulation necrosis took place in all cancer tissue, which was followed by its calcification, digestion, and absorption. He reported that many of the patients treated returned to normal health with reconstruction and return of function to the affected organs. In his book, "NATURAL IMMUNITY", (1936), Dr. Koch described the procedure that he used to extract these substances he had called "Tissue Thrombines". Then he went on to describe the chemistry and a method of synthesizing the basic chemical structure (O=C=C=O) of the oxidation catalysis he used in the treatment of diseases. He stated: "The chemistry of the carbonyl group is therefore of great immunological importance, and the di-carbonyl or di-keto group with which we are concerned has a key position in that form of oxydation which mediates immunity." (Natural Immunity, 4th Ed., p. 20)

Dr. Koch, in December 1941, wrote the following about the method he had developed over the years for the treatment of diseases. (From a lecture that was printed in The Journal of the American Association for Medical-Physical Research, Dec. 1941).

> "The treatment material consist of catalytic dilutions of the carriers of aerobic oxidation which we have described in the past elsewhere. (The Chemistry of Natural Immunity, American Printing Co. 1936, pp. 155-163) These substances are 1:4 benzoquinone and its transition products (O=C=C=O), and (O=C=C=C=O) and also ketene. Their chemical structures conform to the rules we have laid down as requisite to the production of immunity against disease; namely, they possess the smallest molecular weight possible: they possess carbonyl groups that share ethylene linkages or carbonyl groups that are conjugated with ethylene linkages in molecules that can yield carbonyl groups sharing ethylene linkages. (Lecture, The Laws of Chemical Structures that Determine

Immunity to Diseases, 1939, p. 4.)....

"Substances of this type can be extracted from heart and brain. Such extracts demonstrate the same curative results as the synthetic products, and like them correct a definite blood coagulation deficiency. Because of this physiological property, I named them 'Tissue Thrombin' and showed that they are able to cure cancer, in a paper published in the New York Medical Record in Oct. 1920....

"The oxidation catalysts we use therapeutically are depolymerization agents and while the toxin is being depolymerized to its simple burnable structure, it passes through the various phases that were active during the pathogenesis, and so fleeting accentuation of these changes come and disappear in the reversed order while recovery is going on. Thus when the patient is treated in the cancer stage of the poisoning and retraces the symptomatology of pathogenesis, the last toxic expression to come is the first to go and the first to come is the last to go. Therefore, an acute inflammation in some old cicatrix that imprisoned the causative infection is the last change to take place....

"The demand for activated oxygen on the part of the tissues is also expressed by poor sugar oxidation as observed in diabetes mellitus, cancer, the thyroid diseases, and others. By removing the basic pathology, that is, by restoring the oxidation catalysis to normal or better, all expressions of the intoxication are removed, and the metabolism, the blood pressure, and the tissue functions are again able to run along as they should. The focus of infection is wiped out and the disease is cured in its totality....

"After the remedy is injected one should watch for periodic reactions which play their part in the recovery process. These have already been described (Cancer and Its Allied Diseases, 2nd. edition, American Printing Co., 1929, p. 151). They generally come at three and a half day or three week intervals until recovery is complete. If an interfering factor prevents recovery it should be identified and removed and the dose repeated."

<u>"The Functional Carbonyl Group In Pathogenesis And Its Reversal"</u> (1967) was the last paper written by Dr. Koch on his work and theories. I quote from this paper the following:

"INTRODUCTORY STATEMENT"

"In tissue chemistry there is scarcely a reaction that does not involve or produce a **carbonyl group** as an intermediary or as an end product. And yet its significance in energy production has been overlooked, except in a passing way, by nearly all biochemists. Many **carbonyl groups** do not hold vitally critical positions, and indeed

only a few are of deep interest to us. However, these take preference above all other carbonyl groups in the tissue metabolism by the fact that they are 'activated.' By activation, we mean that their inherent properties have been accentuated, giving them the advantage of being able to carry through all the reactions they are disposed to mediate.

"One property is the electro-negativity they possess by virtue of being able to attract and accumulate electrons in the carbon-oxygen double bond. These are mobile electrons, and are designated by the Greek letter pi (π), which are enhanced by migrations of electrons from other electron-contributing groups in the molecule and by electron attracting groups that influence external electrons. For our short discussion we must avoid the many other associated properties though they admit of mathematical expression and hold a great theoretical interest. Those that we will deal with are of high interest to us in matters of health and happiness, our ability to maintain good vitality, and because of the place they hold in the cure of all forms of disease as it affects all cellular life from the smallest micro-organisms to the highest adult tissue cells. They hold the position of a least, common denominator by initiating the normal aerobic metabolism of function and nutrition, and hence their unabridged activity eliminates parasitism in micro-organisms and tissue cells and the virulency associated with pathogenicity.

"They thus hold a key position in the great biological economy, and this is due to the fact that they serve as the initiators of oxidative energy production for function and nutrition. And when not blocked in this action, they do away with the need for parasitism in micro-organisms and in tissue cells, and thus also when this ability is restored, pathogenicity is eliminated from bacteria, and neoplasia can no longer exist in tissue cells. So the best way to get rid of infectious disease and neoplasia is to cure the germ or tissue cell of its metabolic deficiency. The purpose now is to show how that is done."

"SOLUTION BY DATA FROM THE PARATHYROID INSUFFICIENCY PROBLEM"

"This study was started over a half century ago when present day techniques of high refinement did not exist, nor did the established theories on atomic structure that are in common practice today. One had to accept data one met and it was necessary to interpret it on the basis of crude results one was able to elicit.

"In 1912 when the writer was given a position .... at the University of Michigan (with) laboratory and budg-

et facilities to investigate the function of the parathyroid glands. The subject had been investigated by the eminent physiologist Carlson of the University of Chicago, and by others who reported that the parathyroid glands controlled the calcium metabolism of the body. They based the conclusion on the finding that the fatal convulsions that followed removal of these glands could be ameliorated by injections of calcium solutions and because excessive amounts of calcium were eliminated in the urines during parathyroid deficiency.

"However, it was evident to one, that other solutions of salts as sodium chloride and even distilled water also ameliorated the convulsions but only so long as the kidneys could eliminate, and the same fact held for the calcium injections as well. So it was evident that the benefit came from washing a toxic convulsion producing substance from the blood until other changes took place that blocked liver and kidney function. One therefore set out to isolate the toxic substances from the urine that caused the convulsions and other fatal changes observed at autopsy. These were primarily a loss of the colloidal dispersion of the blood contents so that they separated as striated clots in the large veins and capillaries before death took place.

"Analysis of the urines after parathyroidectomy in dogs yielded two toxic bases, methyl guanidine and guanidine that were present in fatal amounts and which caused the fatal convulsions and the other pathological changes. The results were published in the **Journal of Biological Chemistry** of 1912 and 1913, and were fully confirmed 3 years later by the department of physiology of the University of Glasgow, and for the excellency of their work in this confirmation, they (Professor Patton and his staff) were awarded the Triennial Prize in Medicine from Harvard University. My work was thereby confirmed and I set about learning how guanidine did its mischief.

"One significant finding was that the urines carried large amounts of lactic acid which meant that the oxidation mechanism was too badly handicapped to provide the energy for the tissue activities including the convulsions. So, too, the autopsy findings of striated blood clots meant that the tissue colloids were not sufficiently charged to give them good dispersion especially in the blood which let the elements settle out, and also reduced their fluidity and carrying power of oxygen, calcium and other elements. So the sum-total meant that the oxidation mechanism was blocked by the guanidine bases.

"Two facts stood strikingly in mind, namely that the amine groups of guanidine were highly activated by conjugation with the imide group which made them highly reactive toward condensing with carbonyl groups to form axomethionine condensations, whereas when the nitrogen

atom of the imide group was replaced by oxygen as in urea, these urea amine groups were not-toxic, and did not bother anything. The second striking fact was that carbonyl groups could inactivate them. So it appeared that guanidine had, with its two amine groups, condensed with and inactivated two united carbonyl groups. So one provisionally concluded that guanidine had blocked the tissue oxidations and thus the tissues that survived longest after parathyroidectomy were richest provided with a two chain carbonyl group system that started the tissue oxidations, and the longest surviving tissue was observed to be the heart muscle. So in heart muscle one expected to find an activated carbonyl group as referred to previously, a group that took the preference over all the other carbonyl groups as a dehydrogenator, for the double bonds of each adjacent carbonyl group must activate the other, and increase the electron content in its small area.
"So one concluded that heart muscle carried the two adjacent system of carbonyl groups, (one may look upon this system as one in which the double bonds of one carbonyl group are conjugated with those of the adjacent carbonyl group by the covalent bond in between). The next step was to see if such a carbonyl system aided an inhibited oxidation. It was found that after removing the pancreas no changes took place, for indeed the pancreas had to remain in the animal, and that the pathology was essentially there and not in the tissues in general.

"It appeared also that in cancer growth there was no appreciable function, as seen also in their anaplasia, so evidently the carbonyl system was absent. Indeed the carbonyl activation could not be by conjugation with other double bonds as of an ethylenic linkage, so we treated far advanced terminal cases of cancer in three instances where early autopsies were expected, so one could study the changes that followed administration of activated carbonyl groups. Extracts of heart muscle were used and the responses confirmed the hypothesis. All three patients recovered. Then the smallest possible molecules with carbonyl activated by conjugation with other carbonyl group double bonds and with ethylenic double bonds were also fruitful. The heart muscle extracts were reported in the **Medical Record of New York**, on October 30, 1920, and the attempts to make further reports were blocked by the requests of the **Journal of the A.M.A.** made to the official journals to refuse me the right to report my findings further.

"The patients treated with glyoxal and methyl glyoxal and by parabenzoquinone as the molecules offering **least steric** hindrance were put into use in 1918,...and then were augmented by the use of longer chains of carbonyl groups as in Rhodizonic acid, triquinoyl, and the long straight chains, all of which are described in the

text, 'THE SURVIVAL FACTOR IN NEOPLASTIC AND VIRAL DISEASE.'.... The object was to build up the highest carbonyl negativity possible, and indeed in triquinoyl this is attained to such a degree, that the electron content is so high that the molecule is highly unstable and one of the carbonyl tends to jump off and reduce the electron tension.

"Later we produced diphenoquinone in which the two carbonyl groups are widely separated, but five intervening ethylenic linkages are in conjugation. This molecule has an oxidation-reduction potential of 0.954 volts as compared with that of parabenzoquinone with its good 0.7 volts. Obviously the dehydrogenating power here is all that is needed to dehydrogenate any member of a biological system, and the dilution of the former must be made appropriately higher than that of parabenzoquinone for treatment uses.

"Using the most vigorous dehydrogenators may cause such rapid breakdown of large cancer masses that the products are absorbed more rapidly than the destroyed areas can be healed with normal parenchyma, and when blood vessel walls are involved, serious bleeding can take place. It is therefore advisable to use high dilutions of such substances as Glyoxal, Methyl Glyoxal, triquinoyl and diphenoquinone which are used in concentrations of preferably 10^{-9}, or 10^{-12} and even as high as 10^{-30} concentration, whereas benzoquinone can be used very nicely in 10^{-5} and 10^{-6} concentrations.

"And even though cancer tissue undergoes rapid lysis and adsorption, the process is not a destructive one, but a corrective, constructive one. The reason for a highly rapid disappearance of a malignant tumor instead of slower one is that more cancer cells are being corrected and absorbed than the healing power can compensate for in a given time. Likewise, in cases that have been heavily irradiated with cobalt isotopes or radium or X-rays, the rapid absorption of the irradiated material may be too great in amount for the patient to contend with systemically, and such cases should be treated with great care if at all.

"Recent cases of cobalt application should not be treated, and time must be awaited until the cobalt effects are worn out as seen by the recurrence of neoplastic progress in the treated lesions.

"All of these troubles we avoided by taking our time. Indeed, once the recovery is started it tends to go on as a chain reaction until all traces of neoplastic tissue is digested and absorbed, and understanding that the recovery process is based on the phenomena of the free radical, we clear the field of all interfering factors, and let the recovery go on leisurely to completion.

"The first of all scientists to demonstrate the ex-

istence of the free radical in chemistry was Dr. Moses Gomberg and he demonstrated its salient properties. This was back in 1900, when he was professor of chemistry.... In 1910 he was my professor at the University of Michigan. His finding which was the most important of the century was much discredited for years, and him with it until the plastic industry that is based on it grew to become a financial giant. But up to 5 or 10 years ago, interest in the Free Radical was held practically--only by a few gas-phase kineticists, and plastic experts. The medical and biochemical professions had entirely passed it by, and for the year up till now to speak of the Free Radical to them was an invitation for abuse.

"....(It) was not until the Great Szent-Gyorgyi spoke of a possibility of free radicals having something to do with cancer five years ago that the profession took a deep interest in it,....

"What is the position of the Free Radical in carcinogenesis and its reversal? Please recall that the activated carbonyl group of function the FCG for short, dehydrogenates fuels and pathogens that enter its field to oxidatively destroy them to liberate energy. If now the dehydrogenation of a virus or carcinogen takes place in the absence of adequate oxygen, the Free Radical that is formed must add to something other than oxygen and the closest position it can take is one of the poles of the double bond that activates the FCG, and here it makes its addition and thus becomes integrated with the energy-producing mechanism. If it is a virus that makes the addition, it is in a favorable place to take energy from the host cell to support its vegetation, and after the cell is exhausted of energy and material, the viral progeny are set loose to swarm outside and infect other cells.

"Cancer cells however undergo many reproductions themselves with the virus in symbiosis with it and liberate a comparatively small amount of viral progeny. And of course when the cancer cell dies and breaks up, the virus colony is liberated and can infect other cells of the same type. Even the paralyzing viruses may not always cause a lytic destruction of the host cell but may live in symbiosis with it. Both are inactivated by the Free Radical union they hold as we described.

"They behave as if dead, as neither can receive the energy required for activity. The situation is described in the SURVIVAL FACTOR BOOK. However, both are alive and when a sufficiently energetic carbonyl dehydrogenator comes along, it dehydrogenates the pathogen at its point of integration, and here the free radical formed adds molecular oxygen and is split off, leaving the host cell in good functional status while the virus is oxidized further destructively. The return of function to fully

paralyzed atrophied limbs for as long as 20 years, with perfect muscle reconstruction demonstrates this fact.

"Evolution is a subject of many conflicting and imaginary theories, but one thing is certain that every physician must know. It is that no species can evolve into another species, as the proteins of each are most exquisitely so different that they mutually destroy each other on contact either by a lytic or an agglutination process. So no species can develop into another or ever hybridize with it. However, the patterns of many vital processes may be common to many different species, each modified somewhat to accommodate an adaptation to the environment in which it has to survive.

"The oxidation process is one example where a common pattern is evident in many species all the way from the simplest micro-organism to the most differentiated cell of mankind. We described it before. This is not an evolved affair but a universal creation common to aerobic life. Then it is also evident that any interference capable of blocking the oxidation mechanism of one species may also have the same effect on some other species. The inactivation of the functional carbonyl group of a micro-organism may also follow the same pattern of interference as in a human tissue cell. And consequently, the pattern of removal of the interference should apply in both in the like manner.

"Interference with bacterial specific created function in the biological economy must also interfere with nutrition, and to survive a similar pattern of parasitism will be adopted and only altered as differences in environment may dictate. And then too the restoration of an efficient oxidation pattern as we have describe must restore both function and nutrition, and so parasitism is no longer possible. Virulence is also eliminated since there is no need to attempt survival by cell reproduction. This thesis is demonstrated abundantly in the Survival Factor text. Two examples taken from it will demonstrate the thoroughness of its proofs.

"The first exhibit is a culture plate divided into halves to accommodate the test culture on one side and the control culture on the other. Both were seeded equally with highly virulent hemolytic streptococcus taken from a child, and was highly antibiotic resistant. The test culture was exposed to a solution of the reagent of the text carrying serial systems of carbonyl groups, diluted one part to a billion parts of water in an amount of only one cubic centimeter. The control culture was not disturbed. They were incubated for two weeks and thereafter it is seen that the control culture was heavily invaded with the streptococcus, while the test culture was free. Thus the virulence was wiped out by the reagent. Many tests of the filtrates from such cultures

have been made and while the test cultures are nontoxic, the control cultures in equal dilutions are fatally toxic. So the restoration of active carbonyl facility restores health to the organism. It shows no virulence nor pathogenicity. Observations on living animals show that it shows normal biological function.

"The other exhibit is of a baby girl of only four months of age, who, on exploration of the abdomen, was found to have a grade IV primary cancer of the liver, 80 percent of which was involved and of course the whole abdomen besides. She was given the same dosage of the same reagent used on the culture plate. Here the pathogenicity, virulence and parasitism of tissue cells are seen to be reversed to normal by a chain process mediated by the free radical sequences initiated by an activated carbonyl group. The chain reaction was not completed until every vestige of neoplastic tissue had been reversed to normal and then digested and absorbed as food material, which, of course, nourished the baby. The photographs show the steady progress of this reaction complex to full normalcy, and, of course, completely and permanently on but one dose of the reagent in a terrifically high dilution - one part per billion. Two months ago she was happily married. So here in animal tissues, the restoration of carbonyl energy produced function is seen to dispose of neoplasia with its pathogenicity, its virulence and its parasitism."

Other Publications and Facts

After Dr. Koch's October 20, 1920 publication appeared in the New York Medical Record, he sent a subsequent paper to its editor, Dr. Steadman for publication. This article was returned to Dr. Koch and he was told by Dr. Steadman that the editor of the Journal of the American Medical Association told Dr. Steadman that he (Dr. Steadman) must not publish anything from Dr. Koch. Dr. Steadman told Dr. Koch that he (Dr. Steadman) would rather be at peace and not get into any controversy and that he would not publish any more articles by Dr. Koch. A few years later, in the Cancer Journal, edited by Dr. Francis Carter Wood, there was published an article by a couple of Englishmen (Kendall was one of the workers) and in the bibliography they had made a reference to Dr. Koch's work with a number. In checking this text, there was nothing in this article to which the bibliography referred, so evidently the editor had erased this Koch reference from the text. As a result of the organized pressure of the leaders of the medical profession in the 1920's and which pressure continued to the time of Dr. Koch's death in 1967, his research and favorable reports about his research were banned from orthodox "JAMA" approved medical publications in this country.

It should be noted that the American Medical Association and its District of Columbia affiliate had been charged and convicted for the violation of the Sherman Anti-Trust Law as a result of their joint actions in 1937 and 1938 in that they combined and conspired against the Group Health Associations, Inc. in its business of providing medical care and hospitalization and to restrain the doctors on its staff, as well as other doctors, in the pursuit of their calling, and they conspired to restrain Washington hospitals in the operation of their business, etc in the District of Columbia. This conviction was upheld by the United States Supreme Court in January 1943. (Detroit News - January 18, 1943)

Due to the effectiveness of the A.M.A. "black-out", Dr. Koch's scientific papers were accepted only by a limited number of scientific and medical publications. In October, 1924, the "Cancer Journal"(Phil.) did publish Dr. Koch's paper, "The Function of Cancer". In this article, Dr. Koch pointed out the relationship of cancer growth to toxins, including the toxins that are production in the body. That these toxins produce the cancer cells which results in the cancer cells producing more harmful poisons resulting in loss of weight and strength and a progressive anaemia - the symptoms of the growth period. That by the removal of the toxin from the body and by destruction of the toxin source, through the use of the method of treatment he had developed, a complete healing of the region involved can result with a return to health and with the absence of growth and pregrowth symptoms. After this paper was published, Dr. Koch received the following November 12, 1924 letter from Dr. A. R. Mitchell (who was on the Board of Trustees of the American Medical Association at that time.):

> "I had the pleasure of reading your article in the October number of 'Cancer' and it is certainly the most intelligent and enlightening discussion of the subject I have ever read. For years I have been convinced of the utter uselessness of surgery in true cancer cases and have made myself disliked somewhat by my opposition to surgeons going about the country lecturing upon a subject of which they themselves know nothing. I hope that a little more time will prove that your work is really an epoch making work and that you will ultimately secure the full credit and profit to which your service entitles you."

Additional articles and papers by and about Dr. Koch's work did appear in a few publications such as The Journal of the American Association for Medical-Physical Research, The Osteopathic Journal of Laboratory Diagnosis, The Journal of The American College of Proctology and the Bulletin of the Koch Cancer Foundation in this country. In England, in Europe and in South America (where the J.A.M.A. did not have influence over the free publication of scientific and medical information) scientific research articles and papers by and about Dr. Koch's work did appear in medical and

scientific publications such as The Medical Press And Circular; Bulletin de L'Association Francaise Pour L'Etude du Cancer; C. R. de la Soc. de Biol.; Erfahrungs-Heilkunde, Germany; Virus y Cancer, Buenos Aires, Argentina and Veterinaria Janeiro-Marco, Brazil. Also research reports on the successful treatment of cattle appeared in the Department of Agriculture Reports for 1944, 1945, 1946, 1947 and 1949, Province of British Columbia, Canada, etc.

In the United States it became necessary for Dr. Koch to publish most of his own scientific research, articles, papers, books, etc due to this A.M.A. "black-out" of his research work. These publications included some of the following: "Cancer and Its Allied Diseases", 1929; "Cancer and Its Allied Diseases, 2ed.", 1933; "Natural Immunity, 2ed.", 1936; "The Chemistry of Natural Immunity, Revised Edition", 1939; and "The Survival Factor In Neoplastic And Viral Diseases", 1961; together with such booklets as "The Prevention of Cancer", 1926; "Pathogenesis and Immunity as Conveyed by Ethylene and Carbonyl Groups, In the Cause and Cure of Cancer, Allergy and Infection", 1938; "Clinical Demonstration of the Laws of Chemical Structure that Determine Immunity to Disease, and their Application in the Treatment of Patients", 1939; "Natural Immunity", 1942; and "Neoplastic and Viral Parasitism, Their Basic Chemistry And Its Clinical Reversal", 1963. Other booklets by or based upon Dr. Koch's work, such as "A Least Common Denominator In Antibiotics" by Albert L. Wahl, M.D., C.M., 1947; "The Basic Chemistry of Our Diet", 1950 and "The Functional Carbonyl Group In Pathogenesis and Its Reversal", 1967, by Dr. Koch were independently published.

Contacting the Scientific Community, etc.

In 1921 and 1923, Dr.Koch contacted the Department of Welfare for the War Department, Washington, D.C., in an effort to interest the government in his work. His efforts were without success. Dr. Koch received the following November 2, 1923 letter from Charles E. Sawyer, Brig. Gen., M.R.C.:

> "Your letter of October 18th, inclosing Bulletin of St. Mark's Sanitarium, came duly to hand and I thank you for your courtesy in forwarding this information.
>
> "The status of the Department of Welfare remains about the same as indicated in my letter to you of July 13, 1921, and, as stated therein, there are no cases coming under my jurisdiction in which your treatment could be used."

After learning about the "International Symposium Held Under The Auspices Of The AMERICAN SOCIETY FOR THE CONTROL OF CANCER" to be held on September 20-24, 1926 at Lake Mohonk, New York, Dr. Koch wrote to this society on September 17, 1926 requesting the privilege of presenting to them the results of his studies

on the subject of cancer and its treatment. After this symposium was over, the Managing Director, George A. Soper, Ph.D., in a reply letter dated September 27, 1926 wrote the following to Dr. Koch:

> "You have apparently misunderstood the scope of the Mohonk meeting. It was not a suitable occasion for the presentation of new facts and opinions before the medical profession nor could such a presentation have been arranged for in the interval between the receipt of your letter and the opening of the symposium."

However, on page 5 of the printed report for this symposium; OPEN SESSION, Dr. Soper described "The Purpose And Plan Of The Meeting" as follows:

> "This meeting may be looked upon as affording an answer to the question: "<u>What is the world doing to control cancer?</u>" (emphasis added) And on page 6, he went on to say:
>
> "You may be interested to know how the meeting came to be held. For thirteen years the American Society for the Control of Cancer has been carrying on a campaign of education throughout the United States and Canada designed **to give the public and the medical profession the latest and most helpful facts which could be used to save lives and suffering from cancer."** (emphasis added)

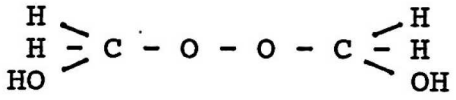
It should be noted that among the many international doctors, cancer experts and speakers who attended this meeting were: Professor Joseph Maisin, Louvain, Belgium, Director of the Cancer Institute of the University of Louvain and Professor at the University of Louvain; Dr. Francis Carter Wood, New York City, Professor of Clinical Pathology and Director of Institute of Cancer Research, Columbia University; and Dr. Isaac Levin, New York City, Director, New York City Cancer Institute, Professor of Cancer Research, New York University Medical School. Dr. Levin, who had no personal knowledge about Dr. Koch and his research, vilified the Koch Cancer Foundation in the presence of all of the doctors and experts attending this conference (p. 100). The printed record from this Symposium makes it very obvious that Dr. Soper, and his group, were close-minded to a new and different look at resolving the cancer problem. Their refusal to hear the scientific evidence and see the clinical records in support of Dr. Koch's theories on the cause and treatment of cancer was contrary to the purpose for which this symposium was held: "<u>What is the world doing to control cancer?</u>"

It should be noted that it was this same Dr. Francis C. Wood, in 1936, who sent a telegram to Professor Joseph Maisin, Director, Institut du Cancer, Louvain University, Belgium, in an attempt to persuade Dr. Maisin not to grant Dr. Koch any authority at a conference at Louvain University. On January 29, 1943, while

testifying as an expert witness for the FDA, Dr. Wood claimed he was trying to save Dr. Maisin from any embarrassment. In court, Dr. Wood said: "I was trying to protect Dr. Maisin." **Protect him from whom and what? How arrogant could Dr. Wood get?** Dr. Maisin telegraphed back that Dr. Koch had already demonstrated so much that he (Dr. Maisin) preferred to continue to work with Dr. Koch in spite of this warning from Dr. Wood.

In the early 1930's, Dr. Maisin learned the truth about Dr. Koch's research through two Belgian priests who had been treated by Dr. Koch. They had become interested in his research and work, and through them, in 1934, a meeting was arranged between Dr. Koch and Dr. Maisin. At this meeting, Dr. Koch discussed his theories and the results that he had had, in the treatment of patients. For about nine months, Dr. Koch remained in Europe teaching Professor Maisin and his associates the technique of compounding Dr. Koch's drugs. They conducted experiments on animals, and used this treatment on their patients. The experience at this institution was sufficient to cause them to adopt these remedies and use them in their hospital. During Dr. Koch's trips to Europe, prior to World War II, he met many eminent European physicians who adopted his method of treatment. Among them were Professor Auler, of Berlin University, who reported to Dr. Koch that he (Professor Auler) had successfully used this material in treating cancer and infectious diseases. Based upon their research, Professor Maisin and his associates published articles on their work with the products that Dr. Koch had taught them how to make. For example: "The Use of Peroxide of Diformaldehyde and Organic Unsaturated Compounds in the Treatment of Anergy and Hyperergy", by Joseph Henri Maisin, M.D., (The Medical Press And Circular, September 7, 1938, Vol. CXCVII, No. 5183) where he describes the Koch products that they were using in 1938.

> "The substances in question are of very simple chemical composition and are easy to prepare.
>
> "The first group of products comprises the organic peroxides, of which several have been used with a measure of success. We will describe here one only, the peroxide of diformaldehyde, since it has been particularly studied and is very efficacious.
>
> "The formula of this peroxide is:



> "It is readily prepared by allowing a saturated solution of hydrogen peroxide in anhydrous ethyl ether to react with a saturated solution of formaldehyde in an anhydrous ethyl ether,
>
> "The second group of compounds comprises certain highly unsaturated chemical substances, of which we do

not know the exact formula, but which may be prepared by the action of phosphoric acid on malonic acid, or by the action of sulphuric acid on ether, or also by the action of sulphuric acid on a solution of acetaldehyde in ether. The first reaction should theoretically give as a final product, malonic anhydride, having a formula of OC=C=CO. We have reason to believe that the general formula of those active products would correspond with the structure R=C=C=R."

Dr. Maisin wrote the following in his "Discussion" to this article:

"The results obtained are clear, and can be repeated easily by anyone wishing to do so. They are obtained with doses of extremely high dilution, which serves to prove that the active substance can act when exhibited in extremely small traces, as do catalysts, or enzymes. The injections have a lasting action, and do not often have to be repeated, which is an advantage from the patient's point of view. The treatment is absolutely harmless. We have given several thousand injections without the least untoward incident, except that some may have a passing malaise, due to a fall in the blood pressure. It is still too early to be able to say with certainty exactly how these substances act, but we know already with certainty that peroxide of diformaldehyde has a deep and prolonged action on the catalase of the blood.

"There is no doubt that we are dealing with new phenomena, which deserve to be carefully investigated, and whose application in therapeutics appears to us to be of interest.

"This work is not finished, but is leading us to believe that these two substances are not alike in their action. Finally, curious fact which we have proved and one which we would stress, is the lengthy effect produced in a large number of cases, as well as the prophylactic action which we have proved the peroxide of diformaldehyde to have on benzpyrene cancer produced in white mice."

Dr. Maisin's "Conclusions" were:

"I. Peroxide of diformaldehyde and certain unsaturated compounds have a definite physiological action on the organism when only minute traces are injected.

"II. Their therapeutic use is indicated since they are very effective in the treatment of various infections and hyperergic states.

"III. The results obtained are better than those obtained with any other shock-producing therapeutic agents, especially from the point of view of the general

health of the patient.

"Investigation carried out at the Cancer Institute at Louvain. Director, J. Maisin."
"References listed:
W. Koch and J. Maisin: C.R. Soc. Biol. T. 120, p. 106, 1935.
J. Maisin and F. Robert: C.R. Soc. Biol. T. 123, p. 156, 1936.
J. Maisin and Y. Pourhaix: Ileme Congres Internat. de Cancerologie Bruxelles. Sept. 1936
J. Maisin, Y. Pourbaix and P. Caeymaex: C.R. Soc. Biol., March 1938."

In 1936, Dr. Koch tried to get the Georgia Warm Springs Foundation, Inc. interested in his work for the treatment of poliomyelitis, but without success. This type of investigation was "Out of my bailiwick entirely" said Michael Hoke in his letter of March 16th, 1936 to Dr. Koch, from the Georgia Warms Springs Foundation. This Foundation showed no further interest. *(See notation on page 36.)*

In the late 1930's, a member of the Chicago McCormick family (of the Harvester Company) arranged an appointment in Washington, D.C., with the head of the U.S. Public Health Service. At this meeting, which was attended by a couple of Boston doctors, the McCormick member and Dr. Koch, they explained the cures that Dr. Koch had effected and asked permission to treat the lepers in the Federal Leper Colony in Louisiana. The Government refused to allow the treatment of the lepers by Dr. Koch even though this McCormick family member would finance the work; thus the Government denying these lepers the one hope of recovery.

In January 1944, Mr. George H. Maines wrote to H. A. Wallace, Vic. President of the United States, about the use of the Koch Treatment for mastitis of cattle. Mr. Wallace took this matter up with the Bureau of Animal Industry, United States Department of Agriculture. Even though this bureau had information on the success of the Canadian research in British Columbia, the bureau show no further interest in this matter..

South American Adventure

In the summer of 1941, Dr. Koch took a trip to the east coast of South America with my brother Bill and me at the suggestion of my college roommate, Almir Castro. This was to be a business trip for Dr. Koch and a rest and relaxation trip for all of us. Dr. Koch had planned on going to Uruguay to see Dr. Arturo Gusman while my brother Bill and I would stay in Rio de Janeiro visiting Almir Castro. At the time of sailing, the ship's doctor was called into the military service. Thus, at the request of The Delta Line, Dr. Koch agreed to be the ship's doctor for part of the

trip until The Delta Line could get a replacement for him. While on the boat, an influential member of the Brazilian government became seriously ill and Dr. Koch was called upon to treat him. This gentleman became interested in Dr. Koch's methods of treatment. He introduced Dr. Koch to Dr. Renato de Souza Lopes and a number of leading physicians in Rio de Janeiro, including some of the physicians connected with the Brazilian Army. Dr. Koch remained in Brazil about 5 months teaching these doctors his theories and methods of treating different diseases. He was requested to give demonstrations and lectures and to assist in the treatment of numerous patients suffering from diseases in various hospitals, whose cases seemed resistant to all ordinary medication. In November 1941, Dr. Koch returned home to attend to business matters in the U.S.A. Before leaving Rio, he promised his colleagues in Brazil that he would return in April or May of 1942 to continue his work there. This return was first made impossible because of the U.S. involvement in World War II and also because of the F.D.A.'s false criminal action that was brought unjustly against him. After 2 five-month trials and the government's failure to prevail, the F.D.A. dismissed its criminal action on August 18, 1948. In November of 1948, Dr. Koch returned to Brazil to continue his work there, six and one-half years after the time he had promised that he would return to Brazil. While in Rio, Dr. Koch, a widower, married the widow of a doctor he had worked with in 1941. Brazil became his home where he continued his research. On several occasions, Dr. Koch made trips for business and scientific purposes to Europe and to North America during the balance of his life.

Post- F.D.A. Trials

The above is but a small bit of information on the life and research of Dr. William F. Koch. During the two long trials (1943 & 1946) brought on by the F.D.A., he explained his theories and presented his proofs to show the world the effectiveness of his form of medical therapy in the treatment of many diseases. The chemistry involved in the development and use of these medications was beyond the comprehension of the government's expert witnesses of that day. It should be noted that Henry Welch, Ph.D. (one of the Government's expert witnesses who testified in both trials against Dr. Koch) was found to have compromised his office, the antibiotic division of the F&DA in the 1950's, and by doing so "he was able to collect more than a quarter of a million dollars in seven years time through a formula that enabled him to see from month to month which drugmaker was contributing how much to his income". (Saturday Review, pp. 37-42, July 2, 1960) One wonders how many other government employees, at that time, may have received some kind of unauthorized financial benefits from non-government sources for the services they may have rendered for the benefit of these contributors without being caught?

Scientific Support of Dr. Koch's Theories

In a letter from Willard H. Dow, President of The Dow Chemical Company, dated June 21, 1946, to Mr. Laurence B. Thatcher; Dr. Dow said:

> "You may be interested to know, however, how we began to be interested in this method of treatment. Some years ago we decided it was up to us to apply ourselves to the chemistry of such diseases as influenza, and find out all we could. During the analysis of the problem entirely from a chemical standpoint, and not from a medical standpoint, we arrived at the conclusion that some medicinal of high oxidizing characteristics should be the method of medical cure. About that same time one of our people here discovered Dr. Koch's activity and found that his chemistry as applied to medical treatment was exactly the thing we were interested in. We proceeded to follow all his problems, and as a result of his observation of our interest, he began to concentrate a great deal of his attention in this neighborhood.
>
> "His recent trial in connection with the Pure Food and Drug Administration has brought him the support of some of our technical people on the basis of submitting technical information that is available here and has been proved up and which the government had attempted to misrepresent. Our intention all the way through has been to try to get at the truth of this whole matter, and whether it is Dr. Koch or somebody else, we would take the same attitude to try to prevent an innocent man from being crucified. We cannot understand what the Food and Drug Administration is driving at for the reason that all our information to date would indicate Dr. Koch has been exonerated from illegal practices as far as the Administration is concerned, and as for the mislabelling of packages, like everyone else it is merely a matter of interpretation rather than willful violation of the law. Before the present trial came up, Dr. Koch had appeared before the Washington representatives of this department and thought the whole matter was straightened out to their satisfaction, but apparently not so. It is strange, because the same procedure is run into time and time again by industry when it is necessary to get a label properly approved before it goes to the public, but in his case it does not seem to be possible without a trial. He has had no trouble in proving his points, but the government has spent a tremendous amount of money to try to prove he is wrong. It almost sounds as if a certain group is attempting to persecute him unjustly.
>
> "I am replying to your letter in some detail to give you the benefit of our background and our interest in Dr. Koch's work. He is not a representative of our

Company in any sense of the word. We have no control over his treatments....As far as I am personally concerned, I consider him one of the outstanding scientist in the medical profession, and he is so far ahead of the thinking of his profession that he is naturally being ridiculed somewhat....The mere fact that Dr. Koch has a treatment definitely affecting virus diseases is of itself sufficiently important that it ought to be analyzed from every angle by the medical profession....I think we all have an opportunity to see something new aborning in Dr. Koch's work....I sincerely hope some day the public will recognize him for his ability." (emphasis added)

William J. Hale, Ph.D., stated in his book "Farmer Victorious, Money, Mart, and Mother Earth" (Coward-McCann, Inc., N.Y., 1949), Chapter XVIII - "Chemotheraphy", the following about Dr. Koch:

"Starting back in 1918, Dr. William F. Koch of Detroit, now of Rio de Janeiro, Brazil, began his experiments striking at the heart of immunity. He employed parabenzoquinone in extremely dilute solutions (one to a million) and injected two cc. of said solution into the patient intramuscularly."

This world renowned organic chemist, wrote about the relationship of "Glyoxylide" (O:C:C:O), which is a polymer, and Triquinoyl which is a trimer of (O:C:C:O). He also wrote about the chemical relationship of rhodizonic acid and inositol to triquinoyl. [It should be noted that Inositol, which can be made by the body and intestinal bacteria, has been recognized as a component of food and was accepted as a vitamin in 1940. It should be further noted that Dorland's Illustrated Medical Dictionary, 23rd., (1957), p. 679, defines "Inositol" as follows: "A crystalline substance, hexahydroxycyclohexane, CHOH(CHOH.CHOH)2CHOH), resembling a sugar, that is found in muscle, urine, the viscera, and various plant substances. It is a vitamin of the B complex concerned in the growth of yeast, and curative of mouse alopecia and said to inhibit tumor growth."(emphasis added)]

Dr. Hale further wrote:

"In practice triquinoyl has been found to act almost identically with "Glyoxylide" (O:C:C:O), a compound that Dr. Koch had prepared by dehydration of glyoxylic acid (CHO-COOH). In brief, this so-called glyoxylide, which has proved so efficacious in the hands of Dr. Koch against diabetes, arthritis, poliomyelitis and even cancer, undoubtedly polymerizes under many conditions to 3(O:C:C:O) or triquinoyl, in which an oxygen atom is doubly linked to each of the six carbon atoms of the reduced (or saturated) benzene ring carbon structure, and

plays a most effective role in the treatment of disease. In the likely dehydrogenation of inositol within the body we can now interpret the phenomenal action of inositol in replacing insulin for diabetics." pp. 159-160.

"Now the role of these polyketocompounds is definitely oxidative. By their presence a higher level of metabolism is made possible in the system, and, like a passing wave over a golden wheat field, this wave of oxidative influence continues unabated for months upon months-sufficient, indeed, to heal improperly nourished organs and slough off decadent tissues. All of this is in accordance with findings of H. Wieland proving first the hydration of an active carbonyl group in body fluids into $:C:(OH)_2$ and its subsequent dehydrogenation by enzymes into a peroxide type, :C:O:O, whereupon nascent oxygen is liberated and the carbonyl group (:C:O) regenerated to repeat the process." Just as Pasteur identified the microscopic organisms that led to plant disease, so Koch identifies the chemical agents that are capable of combating microorganisms." p. 161. (emphasis added)

Other scientific Information Of Interest

Linus Pauling, Ph.D., N.L., in his book, "How To Live Longer And Feel Better" (1987) discusses the reversible chemical reaction between ascorbic acid, a strong reducing agent, and dehydroascorbic acid, a strong oxidizing agent, and the importance of this reversible reaction to physiological properties of Ascorbic Acid. It should be noted that dehydroascorbic acid contains a dicarbonyl (O = C - C = O) group and that free radicals are formed during this reversible reaction in the cell. Dr. Pauling was of the opinion that some of the physiological properties of vitamin C are likely due to the reducing power of ascorbic acid and the oxidizing power of dehydroascorbic acid. (pp. 89-90) It should also be noted that para-benzoquinone (BQ) has a similar oxidation-reduction relationship with hydroquinone where hydroquinone is a reducing agent and para-benzoquinone (BQ) is an oxidizing agent and that during these reversible reactions, free radicals are formed. In Dr. Pauling's book on General Chemistry (Dover Ed., 1988, p. 279) he points out that free radicals are usually highly reactive and that they are difficult to prepare except in low concentration.

In their book, "Cancer And Vitamin C", Dr. Linus Pauling and Dr. Ewan Cameron, Linus Pauling Institute of Science and Medicine, 1979, discuss the cause, prevention and treatment of cancer and that an important role is played by vitamin C in this matter; that nutrition and environmental changes for the patient play a part in the stimulation of the natural protection mechanism of the body to overcome cancer and that large doses of ascorbate are an important nutrient. (pp. 47-9) For the control of cancer, the most important nutrient may be Vitamin C. (p. 99) Ascorbic acid, a weak

acid, is a chemical reducing agent and can react with oxygen. (p. 208) When ascorbate reacts with molecular oxygen, free radicals can be formed. (p. 192) High doses of vitamin C are important not only to the body in the protection against cancer, but also in the protection against viral and bacterial diseases. (p. 107) And supplemental ascorbate will play a part in all future cancer treatment programs. (p. 196) For progress to be made in the fight on cancer, organizations such as the American Cancer Society and the National Cancer Institute must open their minds to new ideas. (p. 86) I believe that the independent research and the advanced ideas in cancer research, as illustrated by scientists such as Dr.Linus Pauling and Dr. Ewan Cameron, are of upmost importance in the present day fight against cancer and viral diseases.

The Importance of Aerobic Metabolism

In the October 15, 1936 letter, from R. G. Hoskins, a member of the Board of Trustees for The Memorial Foundation for Neuro-Endocrine Research, Harvard Medical School, to Dr. Koch, Mr. Hoskins stated:

> "The Warburg (chamber) work is looking quite favorable. The initial experiments indicate definitely that the glyoxylide makes an immediate difference in the oxidation rate of living tissue,--using liver as the substrate. We want to make a few more runs before saying anything definite but the present indication is that after a seven minute lag the first effect is a depression in the oxidation rate. This lasts, however, only a short time after which the oxidation picks up again. This of course is not the phase of the reaction that is of the most interest but it serves to show at any rate that the material has a real effect in an oxidation-reduction system. There are skeptics I suppose who would not have conceded even that."

In a subsequent letter, dated January 5, 1937, to Dr. Koch, Mr. Hoskins made the following report on their research:

> "...our results in the Warburg have been consistent in showing that tissue oxidation is at once increased by the material. Control studies indicate that the effect is not to be ascribed to any associated materials. Dr. Nickerson has become very much interested in the chemistry of the effect and we should like to study it further in connection with the oxidation of pyruvic and other acids that seem to be involved in the biological oxidation cycle. In particular, we want to see what it will do in removing the block that seems to be characteristic of the distorted cycle of cancer tissue. We hope before a great while to have cancer tissue available and

to study the oxidations of this as influenced by the glyoxylide in the Warburg chamber."

In the article published in Science, February 24, 1956, Vol. 123, Number 3191, "On the Origin of Cancer Cells" which was based on a lecture by Otto Warburg, Ph.D., N.L., he said in his summary:

> "Cancer cells originate from normal body cells in two phases. The first phase is the irreversible injuring of respiration. Just as there are many remote causes of plague--heat, insects, rats--but only one common cause, the plague bacillus, there are a great many remote causes of cancer--tar, rays, arsenic, pressure, urethane--but there is only one common cause into which all other causes of cancer merge, the irreversible injuring of respiration.
>
> "The irreversible injuring of respiration is followed, as the second phase of cancer formation, by a long struggle for existence by the injured cells to maintain their structure, in which a part of the cells perish from lack of energy, while another part succeed in replacing the irretrievably lost respiration energy by fermentation energy. Because of the morphological inferiority of fermentation energy, the highly differentiated body cells are converted by this into undifferentiated cells that grow wildly--the cancer cells.
>
> "To the thousands of quantitative experiments on which these results are based, I should like to add, as a further argument, the fact that there is no alternative today. If the explanation of a vital process is its reduction to physics and chemistry, <u>there is today no other explanation for the origin of cancer cells</u>, either special or general. From this point of view, <u>mutation and carcinogenic agent are not alternatives</u>, <u>but empty words, unless metabolically specified</u>. Even more harmful in the struggle against cancer can be the continual discovery of miscellaneous cancer agents and cancer viruses, which, by obscuring the underlying phenomena, may hinder necessary preventive measures and thereby become responsible for cancer cases." p. 312. (emphasis added)

In Warburg's paper, "Prefactor Chapter" he identifies benzoquinones and naphthoquinones (the latter compounds occur in nature as ubiquinones and vitamins K) as oxidants. In this paper he reports that through mouse cancer experiments it has been shown "that living animals tumors tissue alone lives anaerobically, as was expected since the discovery of the fermentative metabolism of cells....<u>Very likely this great difference in the life of normal and cancer cells will be the basis of a future selective cancer chemotherapy</u>." (p. 11, 1963) (emphasis added) Dr. Warburg continues:

"Owing to their anaerobiocity, and because anaerobic cells contain less catalase than aerobic cells, hydrogen peroxide acts selectively on cancer cells....To produce H_2O_2 in living cells we injected into mice quinones which produce H_2O_2 by alternate reduction and oxidation, in a way similar to that by which H_2O_2 is produced today in the chemical industry. Small curative effects were obtained, but the quinones were too toxic to be of practical value.

"More encouraging were experiments with glyceric aldehyde, which as has been known for a long time, inhibits fermentation of cancer cells at a concentration of 0.01 N."

Dr. Warburg goes on to explain the limitations of using the aldehyde in his experiments. At the end of his paper he added the following paragraph (c):

"Since this article was written, we observed that glyceric aldehyde and cysteine react very rapidly at room temperature, at physiological pH. The compound contains one molecule of the aldehyde to one molecule of cysteine and is a relatively stable thio-hemi-acetal of the aldehyde. Other SH compounds react much more slowly, for example, glutathione and coenzyme A; yet it may be that a reaction with an SH group is the cause of the rapid killing of cancer cells by the aldehyde. (p. 14) (emphasis added)

Dr. Warburg in his lecture at the meeting on June 30, 1966 at Lindau, Lake Constance, Germany, and in the revised editions of this lecture (1969), came to the conclusion that anaerobiosis is the prime cause of cancer and that this (anaerobiosis) meets the demands of Pasteur. (p. 14) In the preface to the Second Revised German Edition of the Lindau Lecture, "The Prime Cause and Prevention of Cancer, he wrote:

"Since the Lindau lecture of June 1966 many physicians have examined - not unsuccessfully - the practical consequences of the anaerobiosis of cancer cells....The cure of human cancer will be the result of biochemistry of cancer and of biochemistry of man.

"There exists no alternative today to the prevention of cancer as proposed at Lindau. It is the way that attacks the prime cause of cancer most directly and that is experimentally most developed. Indeed millions of experiments in man, through the effectiveness of some vitamins, have shown, **that cell respiration is impaired if the active groups of respiratory enzymes are removed from the food; and that cell respiration is repaired at once, if these groups are added again to the food. No way can be imagined that is scientifically better founded**

to prevent and cure a disease, the prime cause of which is an impaired respiration. Neither genetic codes of anaerobiosis nor general cancer viruses are alternatives today, because no such codes and no such viruses in man have been discovered so far; **but anaerobiosis had been discovered."** (emphasis added)

"It has been asked after the Lindau lecture why the repair of respiration by the active groups of the enzymes was proposed as late as 1966, although the fermentation of cancer cells was discovered as early as 1923. Why was so much time lost?

"He who asked this question ignored that in 1923 the chemical mechanism of enzyme action was still a secret of living nature alone. The first active group of an enzyme, 'Iron, the Oxygen-Transferring Part of the Respiratory Enzyme' was discovered in 1924. There followed in two decade the discoveries of the hemoproteins, the flavoproteins and the pyridinproteins, a period that was concluded by the 'Heavy Metals as Prosthetic Groups of Enzymes' and by the 'Hydrogen Transferring Enzymes' in 1947 to 1949.

"Moreover, during the first decades after 1923 glycolysis and anaerobiosis were constantly confused, so that nobody knew what was specific for tumors....Anaerobiosis of cancer was an established fact only since 1960, when methods were developed to measure the oxygen pressure inside of tumors in the living body.

"This abridged history shows that even the greatest genius would not have been able to propose in 1923, what was proposed at Lindau in 1966. As unknown as the prime cause of cancer was in 1923 was the possibility to prevent it.

"Life without oxygen in a living world that has been created by oxygen was so unexpected that it would have been too much to ask that anaerobiosis of cancer cells should be accepted at once by all scientists. But most of the resistance disappeared when at Lindau it was explained that on the basis of anaerobiosis there is now a real chance to get rid of this terrible disease, if man is willing to submit to experiments and facts. It is true that more than 40 years were necessary to learn how to do it. But 40 years is a short time in the history of science." (pp. 1-3) (emphasis added) (August 1967) Otto Warburg

At the end of Dr. Warburg's lecture in 1966 he said:

"But nobody today can say that one does not know what cancer and its prime cause is. On the contrary,there is no disease whose prime cause is better known, so that today **ignorance is no longer an excuse** that one cannot do more about prevention. **That the prevention of cancer**

will come there is no doubt, for man wishes to survive. But how long prevention will be avoided depends on how long the prophets of agnosticism will succeed in inhibiting the application of scientific knowledge in the cancer field. In the meantime, millions of men must die of cancer unnecessarily." (p. 16) (emphasis added)

Dr. Warburg has shown through his work on cell metabolism that normal respiration (aerobic metabolism) of a healthy cell is changed to anaerobic metabolism in cancer cells. That viruses, chemical agents, etc are remote causes that lead to anaerobiosis and it is this anaerobiosis that is the primary cause of cancer. Dr. Warburg believes that once anaerobiosis occurs, this process cannot be reversed.

In 1963, Dr. Koch wrote:

"Warburg credited anoxia with the power to produce cancer, and while anoxia is essentially provocative, we have found that in addition two carcinogenic agents are also necessary. They are the initiating and sustaining carcinogens. One and the same chemical structure may serve in both capacities....However, the initiating carcinogen or allergen may be a virus, a product of germ activity in the intestine, a mercaptan or other structure carrying a sulphidryl group, or a free radical produce by the sun's rays on a ripening pollen, or present in some plastic material. The sustaining allergen or carcinogen-is in our experience a product of germ activity. It is brewed in an old scarred in focus of silent infection where enough oxygen is not admitted to burn the free radicals produced in its slow metabolism, thus giving them a chance to polymerize. Both are joined to the energy receiving mechanism of the host cell by free radicals addition, and hence by a single covalent bond. The intergration of a virus is with the energy producing mechanism, likewise by a single covalent bond and so the phenomena associated with viral infection and allergy including cancer producing as well as their reversals are of the same pattern and may be discussed together. Though the single covalent bond is well known for its easy rotation under environmental influences, it appears fixed for each disease entity, a fact that gives a good clue to the nature of the critical atomic groups both of the pathogen and of the host cell energy producing and receiving mechanism." (Neoplastic And Viral Parasitism, Their Basic Chemistry And Its Clinical Reversal; p. 7, 1963)

Dr. Koch has shown how the cell can be injuried to produce Warburg's anaerobiosis and how the resulting anaerobiosis can be reversed. This can be corrected by the removal of the in-

jury causing agent (carcinogen, etc) and by restoring the cell to its normal aerobic chemistry. Thus, through the use of the proper oxidation catalyst, by removal of all toxins from the body and by following a proper diet, the reversal of the disease process becomes possible.

In 1993, Yannis Gounaris, Ph.D., a research molecular biologist, did an electron spin resonance (ESR)) test on a product made from the oxidation of inositol with chlorine under ultraviolet (UV) light and then precipitated it with barium chloride (a process developed by Dr. Koch in the 1940's). His test showed that this procedure produced a product containing a free radical. He also made a homeopathic solution (12x potency; 10^{-12}) of a mixture of this product with benzoquinone, glyoxal and triquinoyl obtained from commercial sources. His homeopathic product was given to a person with a 12 year history of a herpetic condition that would break out every 20 to 30 days. Three months later, Dr. Gounaris reported that there had been no outbreaks from this condition and that no adverse effects of any kind were observed from using this product.

It should be noted that there is a reversible oxidation-reduction reaction between ascorbic acid, its asorbyl radical and dehydroascorbic acid where dehydroascorbic acid acts as a strong oxidizing agent due to its two adjacent "carbonyl groups" and ascorbic acid is a strong reducing agent due to its 2 adjacent "hydroxyl groups". Likewise, there is a similar reversible oxidation-reduction reaction between hydroquinone, the semiquinone radical and para benzoquinone where para benzoquinone is the oxidizing agent and hydroquinone is the reducing agent. I believe that it will be found that there is a multi-step biological oxidation-reduction series of chemical reactions between inositol with its 6 hydroxyl groups and triquinoyl with its 6 carbonyl groups where rhodizonic acid (with its 4 carbonyl groups and its 2 hydroxyl groups) acts as one of the intermediary structures between inositol and triquinoyl. The intermediary free radicals which are formed during the oxidation-reduction transformation between inositol and triquinol could be the most important part of the chemistry of the body's natural immune system. Thus, when the immune system breaks down, it becomes necessary to "jump start" this system with a strong activated carbonyl structure, such as triquinoyl, in a non-toxic catalytic homeopathic dilution. In fact, triquinoyl may be found to be the body's most perfect oxidation catalyst.

The Importance of Diet to Avoid Toxicity

M. Beddow Bayly, M.R.C.S., L.R.C.P. said in his lecture on "Diet as a Basic Cause of Disease" in 1937:

> "Mr. J. E. R. McDonagh, one of the most eminent of modern bacteriologists, regards intestinal toxaemia as the basic cause of most chronic diseases, and has

declared:

'If it were possible to rid humanity of chronic intestinal intoxication, disease would become almost extinct.'

"It is here that the importance of the work of Dr. William F. Koch, of Detroit, may best be appreciated. By a series of brilliant investigations into the chemistry of the body, which were entirely unconnected with experiments on animals, he has shown that the absorption of certain products of the decomposition of animal proteids into the system results in their being eventually 'absorbed,' i.e., chemically attached, to the molecular particles of protoplasm which constitutes the cells of the body.

"The effect of this is that the oxidation processes of cell-life on which the healthy growth and normal functions of each individual cell depends is more or less inhibited.

"Just as one might imagine, by way of analogy, the effect of smoke on the glass of a lamp in which shines a light, so one can, I think, glimpse in some degree what the effect of a chemical substance intimately adherent to the minute cell-particles of every organ in the body might ultimately entail.

"Moreover, these chemical products of faulty diet have more than merely inhibitory properties. By virtue of their intrinsic power of altering the wave-length of radiations reaching the cell they may, and do eventually, elicit a vibratory response from the cell-life which takes the form of an exaggeration of one of the normal functions of the particular cell or tissue: for instance, of cell-division (i.e., growth) or of autolysis (i.e., death). The final result of this disordered metabolism is seen, according to Koch, in the development of malignant growths such as cancer, or of tuberculosis.

"It is not possible to do more than touch briefly upon this fascinating and illuminating theory here, and to add that its correctness finds convincing support in the effectiveness in practice of the chemical remedy which Dr. Koch has devised to destroy this basic toxin at its very point of attachment to the body-cells, its chemical point d'appui.

"It will be sufficient for our present purpose if these profounder concepts of disease causation are borne in mind when dealing, as now we must, with some specific instances of disease in relation to diet." (pp. 8 & 9)

"Sir William Arbuthnot Lane declared in 1933: 'Everyone can avoid cancer who is prepared to keep internally clean by eating natural foods and drinking plenty of water. I have never yet operated for cancer upon a healthy person.' While we need not necessarily accept this opinion as representing the whole truth about

the problem, for there is evidence that the adoption of such ways of living does not always prevent the development of cancer, there can be little doubt in our minds but that they are vitally important factors, and, combined with the system of detoxication devised by Dr. William F. Koch, provide us with the most hopeful means of ridding humanity of this menacing scourge." (p. 26) "Diet as a Basic Cause of Disease", A Lecture, by M. Beddow Bayly, M.R.C.S., L.R.C.P.; Published by The Health Education And Research Council, 15 St. Jame's Place, London, S.W.1, 1937.

I believe that over the years the independent research of both Dr. Szent-Gyorgyi and Dr. Koch have followed the same basic parallel path which has led them, individually, to the identification of the same "activated carbonyl" groups that are an essential ingredient of the body's natural immune system. Their individual basic research has complemented each other for the benefit of humanity. I further believe that Dr. Linus Pauling has recognized the importance of this dicarbonyl structure in dehydroascorbic acid and its relationship to ascorbic acid and the readily reversible reaction that takes place between dehydroascorbic acid (a strong oxidizing agent) and ascorbic acid (a strong reducing agent) and that Vitamin C is a general detoxifying agent. He further recognized the importance of the detoxification of the carcinogenic and other toxic substances by oxidizing these substances into nontoxic derivatives that can be eliminated from the body in the urine, all of which is in accordance with Dr. Koch's thesis. That Dr. Otto Warburg, Dr. Szent-Gyorgyi and Dr. Koch have recognized, independently, that cancer cells are normal cells that have reverted into an anaerobic state thus losing their normal aerobic biological direction and as cancer cells, they continue to reproduce out of control indiscriminately.

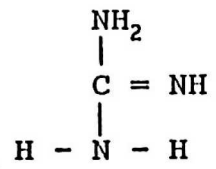
It was through the original <u>"basic"</u> research of Dr. Koch, starting at the University of Michigan about 1912, that he was able to develop his theories of pathogenesis and the chemistry of natural immunity. That by removing the pathogenic agents and their effect on the body chemistry and by restoring the cells metabolism to a normal aerobic state, it is possible for the pathogenesis to be reversed, the toxins metabolized and removed from the body and a victory over disease possible in cancer and its allied diseases.

<u>Conclusion</u>

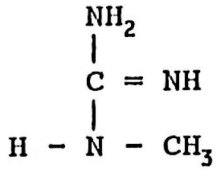
It is too late to help the millions of people who have died needlessly because of the actions and the "closed minds" of certain people in the medical field in this country. No one treatment or medication will cure everybody of every condition today because the physiology of the body is still not fully understood and because there can be unknown interfering factors that can derail the best methods of treatment known. All that one can as-

pire to do is the most good possible for the most people in the war against disease by working with the body's natural immune system. It is through a better understanding of the physiology of the body and by using all of the accumulated knowledge of the past together with "openminded" basic research programs of the present that progress will be made and accepted. At present, it seems that in the treatment of cancer cases, the treatment does more damage to the natural immune system of the body than the cancer, i.e., the experts try to kill the "Cancer" before they kill the "Patient" with their, "so-called", present day medical treatment. Does this sound logical? It is for this reason that I have written this paper. I believe that it is through <u>"independent basic research"</u>, unlimited in scope and free of prejudice, that scientific truth will be revealed and be accepted and that mankind will benefit by the application of this "truth in research".

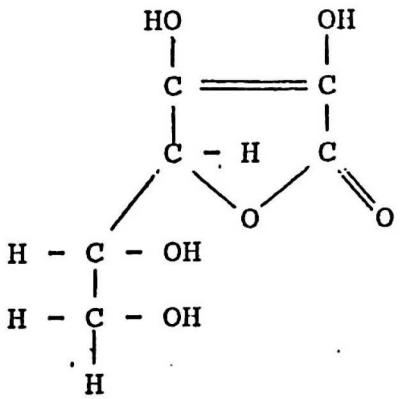
CHEMICAL STRUCTURES OF INTEREST



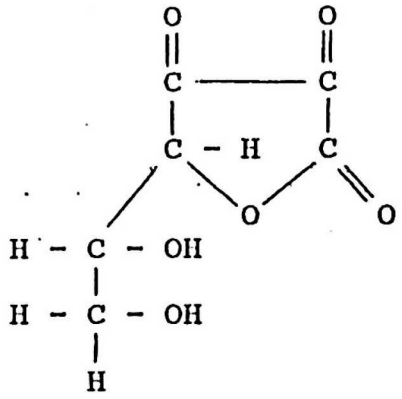
Guanidine



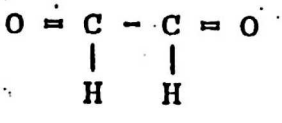
Methylguanidine



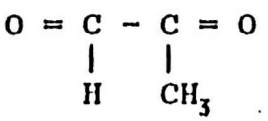
Ascorbic Acid



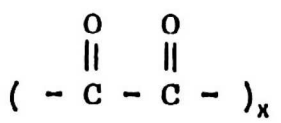
Dehydroascorbic Acid



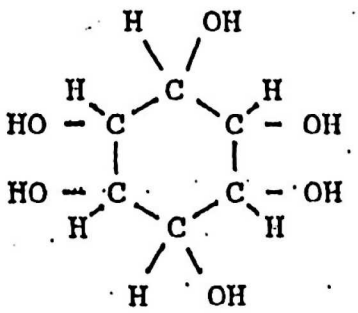
Glyoxal



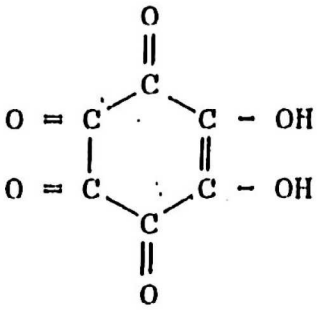
Methyl Glyoxal



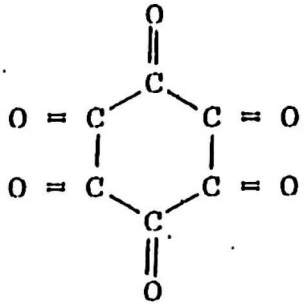
Serial System of Carbonyl Groups with free radical terminals



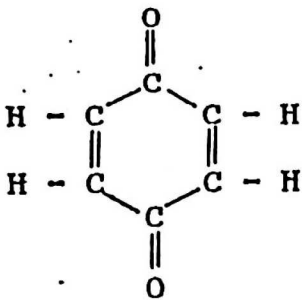
Inosital



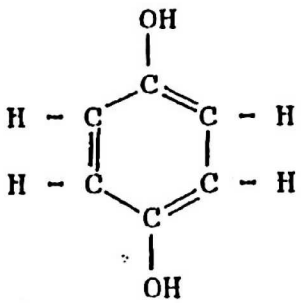
Rhodozonic Acid



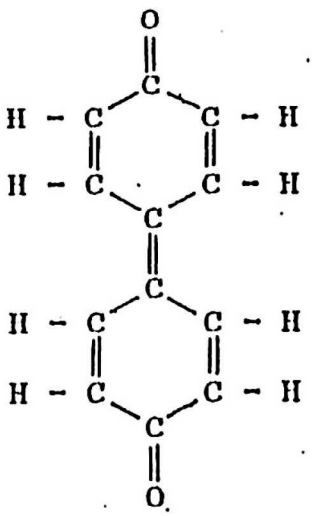
Triquinoyl



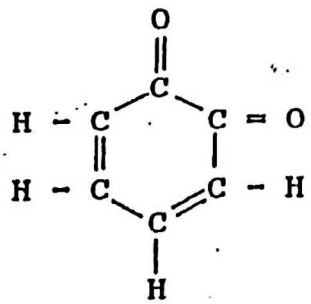
Para Benzoquinone



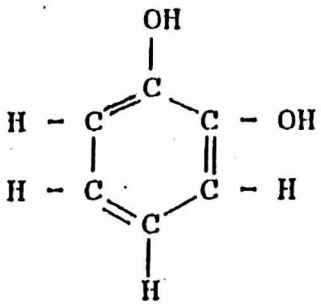
Hydroquinone



Diphenoquinone



Ortho Quinone



Catechol

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Note: In 1935, The Board of Trustees of the American Medical Association became an advisory committee to investigate and act in this capacity for the Georgia Warm Springs Foundation. (See "A History of the American Medical Association 1847 to 1947", p. 422, by Morris Fishbein, M.D.) This information explains why The Georgia Warm Springs Foundation was not interested in learning more about Dr. Koch's research in the treatment of poliomyelitis in 1936.