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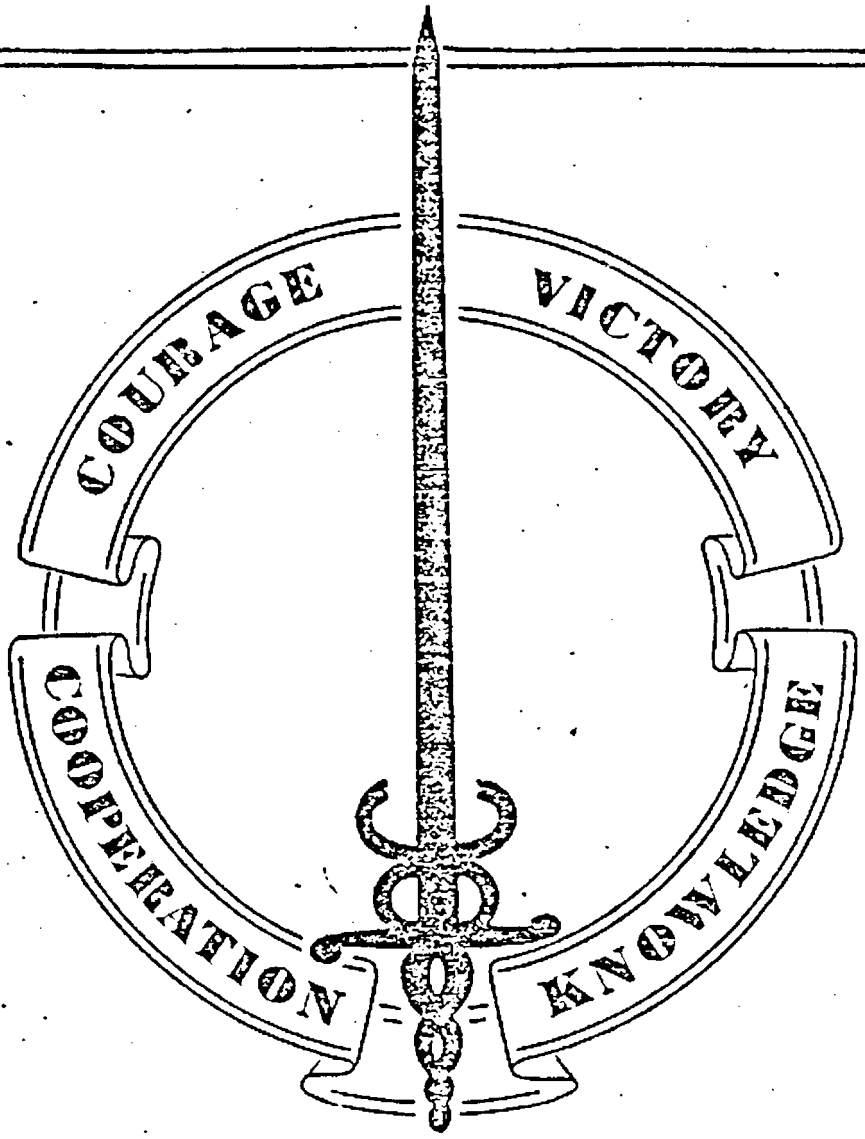

"The Drawn Sword"

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But how are we to improve the methods for cure of the already developed cancer? Since the tough cells which compose the cancer cannot be reformed into normal civilized and controllable cells, they must, like our enemies, be destroyed utterly. All modern treatment of cancer is based on this principle of killing. We attempt to destroy the cancer by the use of x-rays, radium, or surgery. Unfortunately, whereas these methods are very useful, some cancers have progressed to such a stage when the patient first comes under the care of a doctor that no procedure now known can be expected to be completely effective. Better treatment by new methods is required. How can they be devised?

Probably a new and more effective attack will be developed, based on the fact that the cancer cell, in getting tough, has become dependent on ways of living different from those of the normal cell. It is exactly like the criminal drug addict who under the influence of his drug can perform extraordinary feats of daring and strength, and who feels no need for food. But even when the drug is removed, the damage has been done and the addict cannot live a normal life. He is still a menace to society and must be treated accordingly.

To kill or to control these criminal cancer cells, we must take advantage of the dependence of cancer on abnormal chemicals or drugs and on the abnormal way of living which the drugs have caused. We must not only cut off the drug supply, but we must find a way to liquidate this lawless member of society, the cancer that has developed. To do so we must find out what the cancer tissue thrives on and how it can be exterminated completely. Experiments of this type are in progress, and although the results are incomplete, it is not impossible that we may be successful in the future.

At the present time, however, do not forget the fact that there is no procedure which offers anything to the patient with cancer except the use of surgery, x-ray, and radium. You must not be misled by the published reports of experiments on the cure of cancer in small animals. Little evidence exists to prove that cancer in rats or mice is produced by the same agents which cause cancer in man. Indeed, it is very unlikely that different species acquire cancer from the same source. For this reason, the public should be on its guard and should not accept discoveries reported concerning cancer in animals as applicable to cure or prevention of cancer in patients.

The last question is: What is the future of cancer research? Success in this field will depend upon two factors: 1—adequate financial support, and 2—the study of cancer in man rather than in animals. Facilities for the intensive study of the disease in human beings are not at hand now, and they are urgently needed. It is not possible to study and treat properly human patients with cancer without an expenditure of at least $500,000 annually; and very possibly more than this sum will be required. This may seem like a large amount, but it is no more than is necessary in view of the enormously complex, detailed and specialized work required. It represents an outlay of only $1.00 annually for every individual afflicted with cancer.

This money must not be scattered, but should be concentrated in support of closely integrated studies. When a special research organization can be set up and provided with real financial support, it will be possible systematically to study every feature of the chemistry of the invididual with cancer. The results of this study should prove that abnormality allows the cancer to occur and how it can be rectified. Furthermore, it should be possible to prove in what way the cancer tissue differs chemically from the normal tissue. Once this difference is known precisely, it should be simple by chemical means to attack the cancer at its weak point, to starve or otherwise to destroy it, and leave the normal organs unharmed.

This program may seem to be an ambitious one. The fact should be recalled that the policy of appeasement can be applied no more successfully to the cancer problem than to the Japanese and Germans. If we wish to win the war against cancer, we must concentrate and intensify our efforts. We must intensify them to any degree which will insure success, and we can be satisfied with nothing short of success. Cancer kills 160,000 individuals annually in the United States, and mutilates 500,000 more. This is an annual loss of life far in excess of that which can be expected from war. If we can spend unlimited billions to win a war, we should be able to spend a few millions to finish our fight against cancer.

Cancer in Its Relation to Occupation and Environment

W. C. HUEPER, M. D.*

SINCE the beginning of plant and animal life on this planet environmental factors have exerted a powerful influence upon the evolution and the cessation of the various species which populate or have populated this earth. Paleontology teaches us that severe changes in the environmental, particularly climatic factors, accompanied and conditioned the fundamental and radical alterations in

*Warner Institute for Therapeutic Research, New York City.

the fauna and flora which took place during the different earth periods. This control over life, disease and death exerted by the natural environmental factors over all living matter has existed without much interference from other sources up to the early part of the nineteenth century, when mankind began to revolutionize its natural inanimate environment by the development of modern industry and the general use of its products in daily life, creating thereby a new artificial environment. While we have become conscious in general of the numerous advantages and beneficial effects which the transformation of the former agricultural civilization into an industrialized one has brought to us, only relatively few have a proper appreciation of the fact that this new artificial environment also possesses eminent disease producing properties which act upon its creators and beneficiaries alike. The powerful impact of the rapid rise of modern industry in all its multifarious ramifications upon the inanimate exogenous environment affects mainly and primarily the industrially employed parts of the present-day population, but extends also to a considerable degree to practically all other portions of the population and influences all branches of human activity, including personal and public hygiene, medical care, nutrition, clothing, living quarters, communication, transportation, lighting, habits and customs.

The numerous new diseases directly attributable to the contact of industrialized man with the new environmental agents involve practically every organ of our body, including the skin, the brain, the lungs, the heart and blood vessels, the liver, stomach, intestine, blood forming organs, the kidney, the bones, the bladder, etc. This increase in the number and types of industrial and environmental diseases occurring during recent decades is reflected by the appearance of many new special branches in natural sciences and particularly in medicine. Industrial medicine, aviation medicine and radiology are products typical of this era.

Industrial cancers constitute an integral part of the various pathological reactions elicited by a prolonged contact with some specific chemical or physical factors composing the new and artificial environment. Although a few of the occupational cancers have been known or have existed without correct recognition prior to the advent of the modern industrial era, the great majority of them appeared after the start of this development. In fact, the overwhelming number of occupational neoplasms has been placed on record during the last forty years. During this period there was not only a constant increase in the absolute number of these industrial neoplastic diseases but also a marked rise in their organic types and in the exogenous sources. The variations which the numerical and organic incidence of industrial cancers have displayed in recent decades and in different countries and industries, reflect, to a certain extent, the general and local growth of modern industrial enterprises with their great variations in the type of raw produc used, in the methods of production employed, an in the kind of finished products manufactured.

The medical, medico-legal, sociological, and sc entific significance of occupational cancers extend far beyond the limited importance these disorde possess as industrial diseases. Industrial cance are, at preesnt, with the exception of a few tumo of non-occupational, environmental origin, the onl cancers in man of which the approximate cause known. They have attained additional importanc as the study of these tumors has resulted in th discovery and synthesis of a large number of chem ical carcinogenic substances, some of which we found to be closely chemically related to substance occurring normally in the body, such as bile acid sex hormones, or forming constituents of our foo and our cells, such as cholesterol and vitamin D The scientific investigation of the causation of o cupational cancers has furnished the basis for on of the greatest advances ever made in the knowled of cancer in general.

Occupational cancers are elicited by a gre variety of chemical and physical agents such arsenic, chromates, nickel carbonyl, radium, mes thorium, asbestos, crude mineral oil, pitch, tar, soo paraffin oil, anthracene oil, creosote, aromatic amin compounds, such as aniline, naphthylamine, ar benzidine, benzol, ultraviolet rays, roentgen-ra and rays of radioactive substances, and certain par sitic worms, such as schistosomum hematobia. I dustrially important substances suspected of ha ing carcinogenic properties are iron, lead a nitrates. In causal respects occupational canc are thus closely related to the non-occupational vironmental tumors which are the result of traneous influences of various kinds. Habits responsible for cancer of mouth, lips and cheeks tobacco smokers and betel nut chewers, or can of the skin of the abdominal region in carriers certain heating appliances such as kangri in K mir or kairo in Japan, and the custom among ored races of decorative scarring is the cause keloids or scarry overgrowths of the skin. Clim factors elicit cancers of skin and lips among l pigmented individuals in dry and sunny regi such as Australia, Argentina and the Midwes States. Geological influences are operative in production of cancers of the skin among inhabit of areas in which the water supply is contamin by arsenic from arsenic containing ores, such Silesia and Argentina, they account also for increased incidence of adenomas and carcinom the thyroid among the inhabitants of region which endemic goiter occurs because of iodin ficiency of the soil, such as Switzerland and Great Lakes region. Endemic parasitic infec particularly schistosomiasis, are the source of cer of the bladder, rectum, and liver among th habitants of Egypt, South Africa, China and J Additional first cousins of the occupational ca are the medicinal cancers which are elicited b

therapeutic use of certain physical or chemical agents already mentioned in connection with the occupational cancers, such as arsenic, tar, roentgen-rays, radio-active substances, and possibly, some of the aromatic medicinal benzol derivatives. Exogenous agents constituting a part of our new artificial environment thus are responsible for the following three types of environmental cancers: The occupational cancers, the non-occupational environmental cancers, and the medicinal cancers. At the present state of our knowledge one can only speculate as to the number of individuals among the general population who contract cancer by contact with carcinogenic substances of the new environmental nature contained in the food we eat, the air we breathe, the tobacco we smoke, the medicines we take, the water we drink, the clothes we wear and the cosmetics we use.

However, it is only to a somewhat less considerable degree that this uncertainty exists in regard to the incidence figures of the recognized environmental and particularly occupational cancers. The figures available in this respect and to be cited later are based on information which is highly defective and does not reflect the actual incidence even to an approximate degree. The reasons for this lack of reliable data on recognized and serious public and industrial health hazards are as follows: Since relatively recent years in some but not in all of the industrialized states and countries laws exist which make the notification of all industrial cancers obligatory with governmental agencies and thus a matter of public record. It cannot be said that such laws are always faithfully observed by the parties concerned nor are they everywhere strictly enforced or enforceable, as many of these laws are defective in their wording and supply sufficient loopholes for an evasion of the laws. Industrial concerns are in general not particularly anxious to have the occurrence of occupational cancers among their employees or of environmental cancers among the consumers of their products made a matter of public records. Such publicity might reflect unfavorable upon their business activities, and oblige them to undertake extensive and expensive technical and sanitary changes in their production methods and in the types of products manufactured. There is, moreover, the distinct possibility of becoming involved in compensation suits with extravagant financial claims by the injured parties. It is, therefore, not an uncommon practice that some pressure is exerted by the parties financially interested in such matters to keep information on the occurrence of industrial cancer well under cover. It is for these reasons that the statistical data to be presented here concerning the incidence of occupational cancers as caused by the different industrial agents represent only those made public.

Before proceeding to the presentation of the statistical information on occupational cancer I wish to point out that behind these cold numbers there is hidden an untold mass of human suffering and misery, as occupational tumors appear usually at the end of a progressive chain of preparatory tissue changes which are the cause of prolonged disability and pain. It may also not be amiss to mention in this connection and at this time that the thousands of cancer fatalities to be recorded here are the victims of a continuous struggle in the economic field of human endeavor, a fight against disease and death which is carried on in all industralized countries to varying degrees and for varying lengths of time, a fight which is less obvious and spectacular than the military wars, but which goes on uninterruptedly and sometimes as ruthlessly as the latter.

Arsenic, a substance extensively used in various compounds, as a pigment, parasiticide, pharmaceutical, war gas, etc., present as a contaminant in numerous substances, and produced as a waste product, that is, released into the atmosphere, in huge amounts in the smelting of various ores, particularly copper, iron, silver and lead, accounts for a total of approximately 220 recorded cancers of occupational, medicinal, and environmental origin. The United States has contributed during the last ten years 24 cases of occupational arsenic cancer to a total of 54 cases and ranks in first place among the different countries. This fact deserves special mention as it has been stated recently by an official of the Bureau of Dermatoses Investigation, United States Public Health Service, that no case of industrial arsenic cancer has been recorded with this organization during the last six years and that this malignancy is formed only when arsenic is ingested, but not when arsenic is inhaled, the exposure usually present in industry and agriculture. It is obvious from the available and well authenticated data that both oral and respiratory introduction of arsenic may cause cancer in industrial workers as well as in the general population and may even affect wild and domesticated animals living in the fume zone of arsenic generating smelters and consuming the contaminated vegetation. More than half, or 125, of the 220 arsenic cancers are of medicinal origin. The rest are of environmental origin caused mainly by the consumption of drinking water contaminated with arsenic from arsenic containing ores.

The great majority of the arsenic cancers affect the skin usually after having caused an arsenic dermatosis with increased pigmentation of the skin. In eleven cases arsenic cancers were reported in internal organs, four of them affecting the lungs following inhalation of arsenic dust, five the alimentary tract and two the bladder.

In addition to the arsenicals which occasionally have given rise to lung cancers, there are the chromates and nickel carbonyl which when inhaled by workers engaged in their production have caused the development of cancers of the nasal passages and of the lung. It is interesting to note in this connection that the chromate cancers of the lung have been observed so far only in Germany from where during the last six years 30 cases were

reported affecting individuals 29 to 70 years of age, engaged in the production of potassium and sodium chromates and of chromate dyes.

The nickel carbonyl cancers of the nasal passages and of the lung, on the other hand, have been seen exclusively in South Wales among workers of two nickel refineries. So far there have been placed on record since 1924, when the disease was first recognized, 34 cases of cancer of the nasal passages and 24 cancers of the lung. Mention may be made of the fact that the nickel ores and the refining processes used in England are identical with those employed by American factories. So far reports on the occurrence of such tumors among American workers are nonexisting.

Asbestosis cancer of the lung is the most recent newcomer among the occupational cancers of this organ. First described in 1935, there are now 18 cases of this industrial cancer on record observed among asbestos workers in England, Germany and the United States. The latter contributed five cases. Inasmuch as the asbestos industry is most extensively developed in this country asbestosis cancer of the lung has for us a special hygienic and sociologic significance.

The inhalation of iron and lead dust has been suspected by some observers as an occupational cause of cancer of the lung. The evidence in support of such claims is still highly defective.

An important and extensive source of lung cancer is the exposure to radioactive ores sustained by miners of these ores and by the workers of radium laboratories and caused by the inhalation of radium emanation, thoron and of dust of radioactive ores. These occupational cancers occurring among the miners of the cobalt mines in Schneeberg and of the Uranium-Radium mines in Joachimsthal in Germany are historically the second oldest industrial tumors as they have affected these miners for a period of several centuries, and were known in olden times as "mountain disease" or "miner's phthisis," being confused with pulmonary tuberculosis. Reliable records on the occurrence of lung cancer exist in the Schneeberg district since 1869, while they are of very recent date (1926) for the Joachimsthal district. The estimated total number of fatalities from lung cancer among the Schneeberg miners between 1869 and 1939 is approximately 400, that is, three of every four miners died from neoplastic disease of the lung, and are still dying from it. The "radium disease" of the lung of the Joachimsthal miners has claimed so far only 15 cases between 1926 and 1935, that is, 50 per cent of the miners dying during this period had cancers of the lung, according to autopsy findings. The miners of the radium mines in the Belgian Congo and at Great Bear Lake in Canada as well as the workers in the radium laboratories refining the ores of these mines in Belgium and in America have so far not shown any signs of this disease, if credence can be given to the existing records and statements.

The name "radium disease" is connected in this country with another cancerous manifestation related to an occupational exposure to radioactive substances. I am referring to the epidemic like appearance of frequently fatal diseases among the female workers of several luminous dial plants in New Jersey and Connecticut in the years 1923 to 1934. These girls were engaged in painting watch dials with a luminous paint containing mesothorium and radium. During the first years of this period some of the girls developed necrosis of the jaw bone and severe anemia resulting in death in 15 instances. Those who survived these affections sufficiently long showed sarcomas of the bones. The eight osteogenic sarcomas observed among the dial painters between 1924 and 1934 represent 30 per cent of the total number of fatalities from radium disease. The victims of this occupational disease were always relatively young (20 to 30 years), indicating that old age changes are evidently not essential for the production of cancer when a proper carcinogenic stimulus is active. The present day use of radioactive luminous paint is much more extensive because of the war, as this paint is employed for numerous types of military equipment, such as sighting lines of trench mortars and guns, instrument boards of airplanes and submarines, field compasses, etc., and many persons are again engaged in this type of work in the United States.

Occupational contact with radioactive substances is responsible for two additional types of industrial cancer, those of the skin and leukemia. So far only two instances of occupational radium cancer of the skin have been placed on record. This figure contrasts sharply with the approximately 125 cases of cancer of the skin elicited by roentgen-rays, a physical energy similar to that of the gamma-rays emitted by the radioactive substances. Occupational radium cancers as well as roentgen-cancers of the skin are observed among radiologists and physicists and technicians manufacturing and handling radioactive substances and roentgen apparatus. The carcinogenic properties of this energy are attested moreover by the occurrence of several hundred therapeutic roentgen-cancers in persons subjected to treatments with this agent. Again it cannot be said that the number of known radium and roentgen-cancers of the skin approximates the actual number. It also cannot be said that modern equipment and precautions will prevent and have prevented their further occurrence. Chronic roentgen-dermatitis, the precursor to cancer, is still relatively frequent among radiologists and roentgen-cancers still occur, as I can state from observations made during the last two years.

The malignant condition of the blood, known as leukemia, is one of the more recent additions to the list of recognized radium- and roentgen-injuries. There is a total of 21 cases of occupational actinic leukemia on record affecting both radiologists and technicians in medical and commercial roentgen- and radium laboratories. This leukemic reaction to a prolonged exposure to roentgen- and radium rays

has come somewhat as a surprise, as these agents had become notorious for their hematopoietic tissue destroying properties, causing anemia and decrease in white blood cells.

However, similar contrasting effects were observed during recent years in connection with the occupational exposure to benzol. It was known for many years that the inhalation of benzol vapors by chemical workers and others caused a leukopenia and anemia which was not infrequently fatal.

It has become increasingly apparent that such contact may result also, while less often, in leukemoid and leukemic reactions, of both the myeloid and lymphoid types. There are at the present time approximately 15 cases of occupational benzol leukemia on record. The most recent additions of five cases have come from the United States and were observed mainly among workers in fast-press rotogravure printing plants and shoe factories. Inasmuch as benzol is used therapeutically in the treatment of leukemia, it assumes in regard to the production of this disease the same position which roentgen-rays and radium occupy in regard to the treatment and production of skin cancer.

With the consideration of benzol as a cancerigenic agent of industrial importance, mention was made of the first member of that group of carcinogenic agents which are responsible for the overwhelming number of known industrial cancers. I am referring to crude mineral oil and coal tar and their numerous derivatives, such as pitch, soot, creosote, lubricating and fuel oils, shale oil, paraffin oil, coal oil, anthracene oil and the various aromatic amino-compounds produced in the chemical industry and used particularly in the manufacture of dyes, pharmaceuticals, explosives, ingredients in the manufacture of rubber, flotation vehicles for ores, etc.

Occupational tar and pitch cancer of the skin was first described in 1875. Since that time there have been recorded in continental Europe approximately 180 to 200 cases of this neoplasia. Of these 67 cases were recorded from Germany, 55 from France, 20 from Belgium, 13 from Switzerland, 12 from Italy, 7 from Holland, and single cases from a number of smaller countries. These at best 200 cases from Continental Europe observed since 1875 contrast sharply with approximately 1400 cases registered since 1892 in England and Wales. In the United States about 65 cases have been placed on record since 1910. The relatively small number of tar cancers in the United States has been attributed by Heller to the fact that here a noncarcinogenic petroleum tar is mainly used in place of the coal tar employed in other countries. There is, however, some doubt as to the correctness of this statement as well as to the apparent scarcity of tar cancer in our country. Other countries and continents have contributed only a few cases of tar cancer to the total number recorded. An exception is Kashmir in which the shepherds carry under their cloaks a container with hot wooden embers, the kangri. Neve observed there during a period of 50 years about 2000 cases of kangri cancer of the abdominal skin elicited by the tarry combustion products given off by the charcoal. The total of tar and pitch cancer of the skin of occupational origin placed on record stands at about 3600 cases.

To this number of tar cancers of the skin must be added the tar cancers of the lung, bladder and lip. The only proven cases of tar cancers of the lung were reported from Japan, where 27 cases were observed in workers of generator gas plants who inhaled hot tar fumes. There are nine cases of bladder cancer on record occurring in tar workers with preceding or simultaneous tar cancers of the skin in six of them. Henry, Kennaway and Kennaway have shown, moreover, that workers in tar and pitch exhibit a distinctly increased incidence of bladder cancer, ranging up to 400 per cent and suggesting that tar might produce both cancer of the skin and of the bladder. Tar cancer of the lip has been reported in fishermen from this country and England in about a dozen cases.

Similar conditions exist in regard to workers coming into occupational contact with the various oily and greasy fractionation products of crude mineral oil, shale oil, paraffin oil, lignite, and coal tar. It is interesting to note in this connection that the different crude petroleums vary greatly in their carcinogenic qualities, thus oil obtained in certain parts of the United States exhibits a small degree of carcinogenicity (Pennsylvania oils), while those from other parts (Midcontinental) possess higher carcinogenic qualities. The first case of oil cancer of the skin was reported from Germany in 1875. Since that time 18 additional cases were recorded from that country. Approximately 25 cases were observed among the workers of the Austrian-Galician oil fields. No reliable information is obtainable from the Rumanian and Russian fields. France contributed two or three cases of oil cancer of the skin. None were seen in Belgium and Holland. In Great Britain, on the other hand, the incidence of oil cancer among the shale oil workers, paraffin workers, and particularly mulespinners runs into very high figures. There are approximately 150 cases of paraffin oil cancer of the skin on record from England and about 1500 cases of shale oil and lubricating oil cancer. These figures contrast sharply with the 60 cases of paraffin oil and 12 lubricating oil cancers reported in the United States.

There exists only little evidence indicating that the inhalation of mist of crude paraffin oil or lubricating oil may cause cancer of the lung and of the stomach in mulespinners and paraffin workers. But some of these workers have died with both cancers of the skin and cancers of the lung and of the stomach.

Industrial cancers of the skin elicited by contact with anthracene oil or creosote have been reported in about 40 cases, mainly from England and Germany.

Soot, the tarry product of the incomplete com-

bustion of organic matter, particularly coal and wood, is a carcinogenic agent which has been mainly responsible for the cancers of the skin of the chimney sweeps and workers in soot factories. Its causal relation to pulmonary cancer is controversial. The chimney sweep cancer of the scrotum and of the skin is a disease which was and still is found almost exclusively in England. There were 107 cases of this disease in England during the period 1911 to 1935. It was much more prevalent among the English chimney sweeps during the preceding decades and was noted a hundred years ago even in apprentices of this trade who were only 10 to 20 years old when they were afflicted with this ailment. This occupational tumor was rarely seen in Germany, France and Norway. This peculiar geographical distribution of the soot cancer in chimney sweeps is attributable to the use of a special type of coal in the fireplaces in England and to the peculiar structure of the chimneys in English houses necessitating the entering of the chimneys by the sweeps, thus bringing about an intimate contact of the skin with the carcinogenic soot. In Continental Europe the cleaning of the chimneys is done with the help of a broom brush which is lowered into the chimney from above. It may be noted that according to statistical data the cancer mortality of English chimney sweeps from all cancers is eight times that of the general population, indicating that the contact with soot elicits cancer in other organs beside the skin.

The last of the occupational cancers elicited by a derivative of tar is the bladder cancer of the dye workers. The particular tumor was first observed in German plants in 1895 and has since been noted among the dye workers in Switzerland, Austria, Russia, England, United States, Italy and Japan. The total number of reported cases stands at approximately 600. These tumors are caused by the inhalation or ingestion of vapors and dust from aniline, naphthylamine and benzidine, which are used extensively in the production of dyes and pharmaceuticals, in the vulcanization of rubber, and in the flotation of ores. The largest number of these so-called aniline tumors of the bladder were recorded from Germany, i.e., more than 300 cases; an additional 80 cases were reported from Switzerland, some 90 cases from England and at least 100 cases from the United States, and approximately 15 cases from Italy. However, the recorded American cases were observed in the plants of one American concern, and it is known that bladder cancer is prevalent among workers of other American chemical plants. While the total number of aniline cancers among chemical workers is not high, it must be stated that their incidence runs from 20 to 90 per cent for that small group of workers who come in direct and intense contact with these substances. Occasionally these workers show also tumors in the ureter, kidney and other organs.

Among the occupational physical agents which cause malignant growths reference has already been made to the rays from radioactive substances and to roentgen rays. Little credence is given at the present time to the claim that a prolonged exposure to heat rays may cause cancer, as such exposures are usually associated with an exposure to soot or tarry substances which are then the actual carcinogenic agents. Ultraviolet rays as contained in the solar rays, on the other hand, are well established sources of carcinogenic reactions in the skin of men and animals. The physicochemical effects exerted by a prolonged and intensive exposure of the skin to solar rays are commonly apparent in persons with outdoor work carried on in sunny, dry climate or in regions in which ultraviolet rays are especially strongly reflected as from surfaces of water, snow or white clay soil. The precancerous condition of the skin elicited thereby is known as farmer's skin or sailor's skin and is found in farmers, sailors, fishermen, ranchmen, gardeners, rural mail carriers, lumbermen, etc. It is observed almost exclusively in persons with lightly pigmented skin, that is, individuals of the Nordic strain with blue eyes and blond or reddish hairs. In the United States such dry and sunny regions providing a sufficient amount of solar exposure are Kansas, Oklahoma, Texas and New Mexico. The pampas of the Argentine provide another region fulfilling the necessary requirements, as do the sunny regions of Australia and Southern France. The cutaneous cancers elicited by such undue solar exposure are found on the exposed parts of the face, hands and forearms. They are much more frequent in men than women, as women usually wear hats with wide brims and more often try to protect their skin by the use of creams. It is interesting to note that solar cancer affects also the white coated cattle in Australia, while cancer of the eye is said to be frequent among the light pigmented strains of cattle about Bogota in Columbia.

Among the various parasitic infections which have been connected with the production of cancers, schistosomiasis has a well established causal relation to the appearance of bladder cancer and a less certain connection with cancer of the rectum and liver. The bladder cancer on the basis of schistosomiasis, a worm infection, is observed among the fellahs in Egypt. It is historically the oldest occupational cancer known, as the symptoms produced by this bladder infection complicated with cancers are mentioned by the writers of the old Egyptian papyri. The fellahs become infected while cultivating their flooded soil or while bathing in the canals or drinking the water of these drainage channels containing the larvae of this worm, which later on develop in the human body and settle in the veins of the bladder wall eliciting their inflammatory and necrotic reactions. On the basis of these changes bladder cancers develop in some of the patients. The number of known cases is rather small and runs between 7.6 to 20 per cent of the patients coming to autopsy in Egypt. Schistosomiasis cancers of the

liver have been observed in Egypt and Brazil. Inasmuch as the present war will favor the infection of American soldiers with the causative parasites, it is not improbable that similar cases may come to observation some years hence in this country.

Approximately 8,000 to 9,000 cases of occupational cancers have been placed on record. No definite and reliable data exist in regard to the total number of nonoccupational environmental and medicinal cancers. It is obvious that the number of the occupational cancers is very small when compared with the large figures of cancer of unknown etiology. However, as indicated before, this latter group contains doubtlessly an undetermined number of occupational, nonoccupational environmental, and medicinal cancers which have not been properly recognized.

An effective control of occupational cancers depends upon the following measures:

1. Plant management, industrial workers and members of the medical profession must be made increasingly conscious of the fact that numerous agents of our new artificial environment possess carcinogenic properties. Physicians, therefore, should make close inquiries as to the detailed occupational history of every cancer carrier, so as to discover to an enhanced degree cancers of occupational origin.

2. Industry should devote considerably more effort than heretofore in determining the cancerous or noncancerous nature of their numerous products which may be suspected on general grounds in cancerigenic respects.

3. Wherever occupational cancer occurs in industry, serious and determined efforts should be made by the plant management to eliminate entirely the hazardous aspects of the respective operations by technical improvement in the production methods, by the observation of extensive sanitary measures and the introduction of a close medical supervision of the endangered workers.

4. All occupational cancers and their precancerous conditions should be made notifiable with the state department of industrial hygiene and should be made a matter of public record. The state department of industrial hygiene should be charged to conduct periodical inspections of such plants by competent persons so as to determine whether adequate precautionary measures are taken by industry.

5. Industry should make serious attempts to eliminate all potentially cancerigenic agents from further use by the development of suitable substitutes.

6. Inasmuch as occupational cancers are chance experiments on cancer in man conducted by modern industry on a large scale, which render direct reliable and conclusive information as to the cause and mechanism of human cancer, the investigative study of these conditions deserves a great deal more consideration than it has received heretofore.

Occupational cancers which involve the young and the old alike are preventable diseases. Their continued occurrence in countries laying claim to an intelligent civilization represents a challenge to human society which should be met squarely and determinedly. The experiences gained in occupational cancer control by the use of preventive methods should prove of great value in the future in fighting cancer in general at its source, i.e., eliminate the causes of cancer. In waging this struggle it should be realized that the fruits of such efforts take a long time to ripen, as the effectiveness of any measures taken cannot be fairly judged before the elapse of 10 to 20 years. Perseverance and determination is needed to win this battle, which concerns all of us that are living in our new and artificial environment.

Cancer Prevention Clinic Opened at Women and Children's Hospital

LAURA JACKSON*

CHICAGO on May 13, 1943, became the second city in the nation to have a cancer prevention clinic. The clinic, sponsored by the Women's Field Army of the American Society for the Control of Cancer, and directed by an advisory committee of the Chicago Medical Society, is being held weekly, on Thursday evenings, from 6.30 to 9.00 o'clock, at Women and Children's Hospital. Before the opening night, appointments had been booked through June 10, and the steady stream of requests indicates the need for and the interest in such a clinic, and the probability of its enlargement or extension in the near future.

The new clinic is patterned in essential particulars after the Strang Memorial Clinics at the New York Infirmary for Women and at Memorial Hospital in New York City, founded and directed by Dr. Elise S. L'Esperance. The former was founded in May, 1937, and the latter in March, 1942. Philadelphia has a somewhat different project in the experiment at the Women's Medical College of Pennsylvania started in 1938 by Dr. Catherine Macfarlane

*Deputy State Commander, Illinois, Women's Field Army of the American Society for the Control of Cancer; Director of Public Relations, American College of Surgeons.