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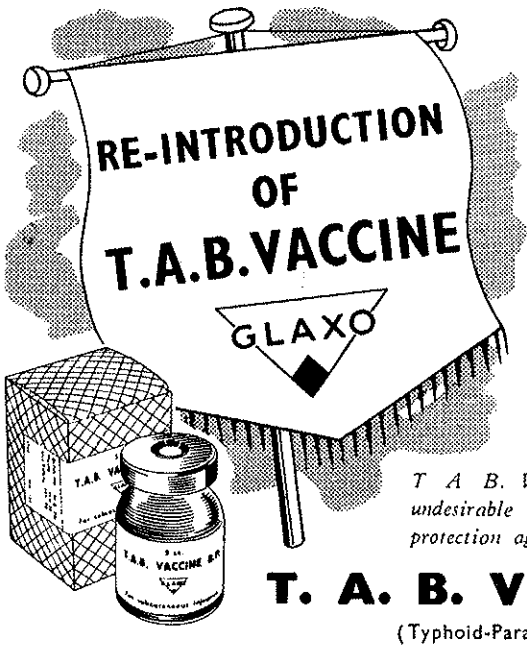

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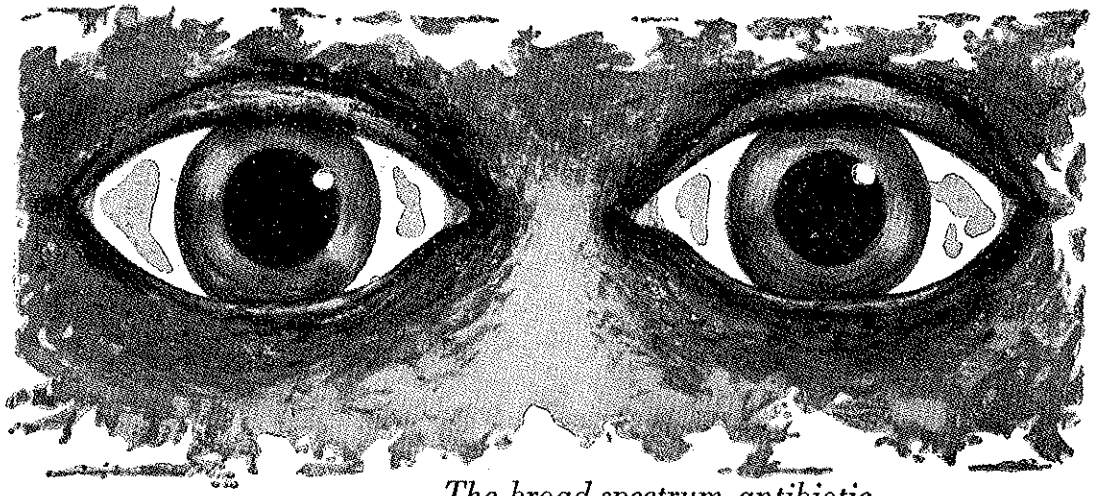

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INDIAN JOURNAL OF PUBLIC HEALTH

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VOLUME I APRIL, 1957 NUMBER 2

FOOD AND BEVERAGES IN RELATION TO CANCER.*

By
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The emphasis placed by the World Health Organization and the International Union against Cancer on the role played by food in the maintenance of human health is particularly gratifying as "nutrition is the cornerstone of preventive medicine, the handmaiden of curative medicine and the responsibility of every physician"[1]. In spite of all the extensive research throughout the world into the nutrition of man and his animals and the important results already obtained, this is a sphere still bristling with problems and opportunities for research.

All of us are no doubt in agreement with the recent statement of Sebrell (Jr.)[2] of U.S.A. that "A reorientated nutrition program in this country is much needed, with increased emphasis on clinical research aimed primarily at obesity, chronic diseases, and borderline deficiencies. In addition there is need for intensified research on the special nutritional requirements of the aged and persons under stress". These remarks certainly apply, not only to the United States of America, but to all countries. Nutrition undoubtedly plays a role in the causation of some of the most prevalent ailments and diseases in man, for example, anaemia, indigestion, gastric and duodenal ulcers, ulcerative colitis, tooth decay, liver disease, certain forms of nephritis, urinary calculi, atherosclerosis, arteriosclerosis and essential hypertension, cardiac failure, diabetes, obesity, allergy, diseases of the thyroid gland, rheumatism, gout, loss of vigour, low resistance to infection, abnormal births[3], cancer and diseases of the nervous system. The author would like to make a special plea for intensive and extensive research into the role of nutrition in cancer and in afflictions of the nervous system. These are two of the most prevalent and tragic diseases afflicting man, and his food undoubtedly plays a role, in some cases a major one, in their causes[3, 8, 12, 15, 16, 17, 18, 61]. In studies of the role played by food and beverages in the causation of cancer, we have to consider (1) all the potential factors involved in the stimulation of normal cell-growth to malignancy, and (2) all the possible ways in which such malignancy may come, or be brought about. The above study consequently becomes most involved and constitutes an enormous problem which could be profitably and successfully investigated only by well-organized teams of research workers. The literature on cancer and its causes is tremendous. However, most useful and important information (summaries) on the causes of cancer and their possible nature is to be found in publications by Wolf[18], Potter[19], Woolley[20] and Rhoads[21].

The literature on the potential part of food and beverages in the aetiology of cancer is most extensive. It is therefore impossible for the writer, with the limited time and space at his disposal, to enter into a discussion of all the aspects and he can only refer briefly to

* Presented before the Symposium of Potential Cancer Hazards from Chemical additives to foodstuffs held by the International Union Against Cancer, Rome, Italy, August 10-21, 1956.

the more important points, some of which have already been discussed by him in various publications[3, 11, 13, 16]. Suggestions as to the organization of intensive research into this problem are made under "Discussion".

II. FACTORS PRESENT, OR LACKING, IN FOOD AND BEVERAGES WHICH PLAY, OR POSSIBLY PLAY, A ROLE IN THE AETIOLOGY OF CANCER.

A. Food

(a) Substances added to, or contaminating, food.

1. *Dyes*

In regard to the dyes the seriousness of the present state of affairs is reffected in the fact that a number of those which have for years been in use in our food and beverages have been proved either toxic or carcinogenic, and consequently their use is now prohibited by law. Such dyes are, for example, butter yellow, Oil Orange E, Orange 1, Nigrosine, Benzopurpurine, Light Green SF Yellowish.

As early as 1942 Hueper[22] drew attention to the danger of cancer being caused by the use of synthetic dyes in food, and suggested more extensive investigations. Mention may be made here of a few of the more recent and more important publications, such as those of Allmark and his collaborators[23], Wilson[24], Dutch investigators[25], Druckery[26, 27] report by the German "Kommission zur Bearbeitung des Lebensmittelfarbstoffproblems"[28] and Truhaut[29]. It is interesting to note that Wilson[24] established that "Azo Blue" has teratogenic properties. He also refers to the investigations of Gillman and his collaborators who proved that "Trypan Blue" is teratogenic.

If we consider (i) the extensive use of food dyes, (ii) the enormous consumption of dyed foods (including candy and beverages), especially by children, and (iii) the unsatisfactory and unreliability of the methods used in investigations into the chronic toxicity and possible carcinogenic properties of most food dyes, we begin to realize the dangers to which man is bing exposed to the dangers of cancer and poisoning solely for attractive appearance and commercial purposes.

Personal Investigations

In the author's own investigations (the expenses of which were defrayed by the South African Council for Scientific and Industrial Research) the effects of Orange G, Benzopurpurine, and Nigrosine were ascertained on rats. The histological examination of several hundreds of specimens of organs has unfortunately not been completed, but a few salient issues already evident so far may be mentioned.

A total of 24 groups of young rats was employed. Each group comprised 10 male and 10 female rats varying in age from 21 to 25 days, thus making a total of 480 rats. The experiment was planned in such a way that the effects of a ration deficient in protein, vitamin D and the B complex, and containing excessive quantities of carbohydrate, could be ascertained when used by itself and when used in conjunction with any one of the three dyes tested. These results were compared with those of the rats on a ration containing all the essential nutrients. Needless to say, the necessary control groups were included in the series of experiments. It was, further attempted to ascertain the effects of black coffe and aspirin (acetylsalicylic acid) in conjunction with any one of the three dyes. The dyes and aspirin were added to the rations. The former were added to the rations and drinking water in the concentration in which the manufacturers concerned recommend their use in food and beverages. Black coffee was prepared from pure coffee on the same basis as is done in homes and the rats were permitted to drink it *ad lib.* instead of water. The rats drank on an average daily approximately 30 to 50 cc of black coffee per kg. of bodyweight. Aspirin, mixed with the ration, was ingested at the rate of approximately 30 to 40.0 mg. per kg. bodyweight. This was done in order to establish (1) whether the ulcerogenic effect to caffeine and aspirin will have a co-carcinogenic effect with any one of the three dyes tested, and (2) whether the potential presence of carcinogenic agents in burnt coffee beans [see A(b)(1)] could aggravate the possible harmful (toxic or carcinogenic) effect of any one of the dyes tested. The experiment ran over a period of 88 weeks. As already stated the histological examination of the organs of the experimental animals has not been completed and at the moment the author is in a position to report only on the macroscopic findings, namely:

(1) The ulcerogenic effect of black coffee (caffeine) and acetylsalicylic acid (aspirin) has been confirmed.
(2) Black coffee had a pronounced detrimental effect (alopecia, retarded growth, disturbances in balance, paresis

and paralysis, cachexia, early death) on the young rats, especially those on the deficient diet.

(3) Also aspirin had a detrimental effect on the growth and health of the young rats (alopecia, retarded growth, pronounced conjunctivitis, early death).

(4) Black coffee and aspirin showed synergistic ulcerogenic effects.

(5) The rats receiving Nigrosine showed retarded growth, loss in weight and general weakness.

(6) The results obtained with Organge G were indefinite and no reliable conclusions can be drawn. It is essential that the effects of this dye be further investigated.

(7) The rats receiving Benzopurpurine showed harmful effects at an early stage in the experiment (15 weeks after commencement).

There were pronounced retarded growth, marked alopecia, very early deaths (not a single rat survived the test), pronounced susceptibility to infections of the lung, general weakness, and pronounced apathy. Autopsy revealed pronounced cirrhosis of the liver, hydroperitoneum, and pronounced gastric ulceration.

(8) The rats on the deficient ration showed much greater susceptibility to the harmful effects of the dyes, coffee and aspirin than those animals on the ration containing all the essential nutrients.

(9) It also appeared that the deficient ration rendered the rats more susceptible to gastric ulcers.

No opinion as to the possible carcinogenic effects of the three dyes tested, can however, be expressed until the large number of organ specimens have been examined histologically.

As it was not determined whether the dyes used in these experiments were chemically pure, it is impossible to state whether their harmful effects were due to the dyes themselves or to chemical impurities present in them. As a result of these experiments the Union Department of Health removed Benzopurpurine and Nigrosine from the approved list of dyes.

Investigations are being conducted by the National Nutrition research Institute, Pretoria, under the auspices of the South African Council for Industrial and Scientific Research on dyes which although still permitted are nevertheless suspected of being toxic and/or toxicogenic.

It is also essential that immediate attention be given to the dyes used in drugs and cosmetics.

2. *Preservatives and Antioxidants*

It suffices here to mention the publications by Lehman[30], Souci[31], [32] and van Genderen[33] who have compiled excellent summaries of our knowledge of the danger associated with the uses of the above chemicals. The suggestion made by the author (Steyn[11]) that boric acid be excluded from the list of approved preservatives on account of its toxic action. Souci's[31] suggestion that research should be concentrated on finding more effective and less dangerous preservatives should be actively supported.

Vivario[34] states that the only methods of food preservation that can be safely recommended are the physical methods (cold storage, drying, etc.).

3. *Sweetening Agents*

The use of Dulcin (Valzin, Sucrol, paraphenetolcarbamide, paraphenetylurea) as a sweetening agent should be prohibited as it is too toxic and induces liver cancer in animals[11], [30], [35].

Fitzhugh *et al.*[35] compared the chronic toxicities of P 4000 (2-amino-4 nitrophenylpropylether), cyclamate sodium, and saccharin. It is on sound grounds that the United States Food and Drug Administration banned the use of Dulcin and P 4000 as sweetening agents in food and expressed reservations regarding their use in drugs. The author personally feels that the use of Dulcin *in drugs* should also be banned, as everything in our power should be done to exclude all carcinogenic agents, even those under the slightest suspicion, from our food, beverages, drugs and cosmetics.

4. *Flavouring Agents*

No flavouring agents are known to induce cancer (Steyn[11]). However, more reliable longterm experiments are essential before definite conclusions can be drawn.

5. *Detergents, Emulsifyers and Antifoam Agents (Surface-Active Agents)*

Harris and his collaborators,[37], [38] found that sorbitan monolaurate, polyoxyethylene sorbitan monolaurate, polyoxyethylene monolaurate, and polyoxyethylene monostearate induced retarded growth in rats and hamsters, which was most pronounced in the case of sorbitan monolaurate. In longterm experiments these substances, except the monostearate, induced

severe diarrhoea, anaemia, increased—mortality, and necrosis of the tail extremities in the rats. Histologic examination revealed degenerative changes in the parenchymatous organs and these investigations should be pursued over long periods. But the toxicological investigations,[39, 40, 41, 42, 43, 44, 45, 46] conducted with the above substance do not show the appearance of cancer in any of the experimental animals or human beings.

6. *Bleaching agents, bread improvers, softeners, and shortening, anti-staling, anti-sprouting and wetting agents*

To the author's knowledge (Steyn[11]) no cases of cancer in experimental animals have been reported. T. Graham and Grice[47] and W. D. Graham and Grice[48] fed the following chemicals which are being used in the preparation of bread, to rats in a concentration 50 times that normally found in bread: Chlorine dioxide, propyl gallate, butylated hydroxyanisole, polyoxyethylene monostearate, and sodium propionate. The period of experimentation was 32 weeks. They noted no harmful effects except that sodium propionate caused a depression of growth during the first few weeks of feeding. As bread and other meal products and candy are extensively used daily the dyes and chemicals used in the preparation of these food products should receive special attention.

7. *Pesticides* (*insecticides, fungicides, and herbicides*)

A large number of pesticids are extensively used on practically all our foodstuffs (animals and plants) and some of them are extremely dangerous. It is most gratifying that the World Health Organization is also directing attention to this serious problem.

In the very extensive literature on the results of investigations into the toxic properties of numerous pesticides there are no reports of any of these chemicals, except arsenic and selenium, inducing cancer. However, recently organic insecticides have been replacing arsenical preparations almost completely.

The danger of pesticides is chiefly chronic poisoning and consequently the greatest danger is associated with those chemicals which are (1) not, or very slowly, metabolized to less toxic, or non-toxic, substances in the system, and (2) excreted very slowly and consequently show a tendency to accumulate in the system.

It is because of these characteristics that DDT, and chemically closely related insecticides, should be considered the most dangerous of all insecticides. The fact that DDT is so very prone to accumulate in body fat, even when extremely small quantities find their way into the body, renders it practically impossible to lay down *maximal allowable concentrations* in foodstuffs and beverages. Much of this important information are due to investigations conducted by members (Lehman, Nelson, Laug, *et al.*) of the Division of Pharmacology of the U.S.A. Food and Drug Administration. Could it be considered as conclusively proved that the liver tumours induced in animals by DDT will in no circumstances, and under no conditions, eventually become malignant? (See III Discussion. Methods of Investigation). Another important aspect of the danger of DDT is its pronounced effect on the nervous system. This effect of DDT assumes increased significance when we consider that modern man already is a victim of so many varied diseases of his nervous system.

8. *Hormones*

Owing to the carcinogenic properties of diethyl stilboestrol, (Hueper[50]) caponizing of cockerels by hormone tablet implantation was prohibited by the Government of the Union of South Africa. Its use in cosmetic preparation should also be prohibited.

9. *Antibiotics*

Antibiotics are very extensively used in some countries in feeds in order to promote growth in young animals. This is also permitted in the Union of South Africa. The author is opposed to the use of antibiotics as food preservatives for the following reasons:

(i) They are prone to increase the coagulability of the blood, and hence aggravate the already very serious problem of thrombosis.

(ii) Their continued administration, or ingestion, induces the development of pronounced resistance in pathogenic organisms which are naturally susceptible to them. In the treatment of diseases with antibiotics, acquired drug-resistance by the pathogenic organisms has become a major problem. Of almost equal importance is the problem of acquired hypersensitivity in the human being to this group of drugs.

(iii) If administered in repeated small quantities, they suppress the growth of virulent

pathogenc organisms with the result that less virulent organisms, which are not susceptible to antibiotics. increase and cause disease and death. For example, patients undergoing treatment with antibiotics are rendered extremely susceptible to infections with pathogenic fungi (aspergillosis and moniliasis).

(iv) They not only suppress the growth of antibiotic-susceptible pathogenic organisms whose presence *in small numbers* in the human body is essential for the development of immunity, but also affects the flora, and possibly fauna, which are esential for the maintenance of health (e.g., members of the B complex vitamin group preventing pellagra and ariboflavinosis).

(b) Harmful substances produced in, or contaminating, food during its preparation.

1. *Excessively heated and burnt (partly carbonized) Foods*

From the results of his experiments upon mice with alcohol or petroleum extracts of (a) horse muscle treated at a temperature of 275°C, (b) browned butter, or (c) roasted coffee, Widmark[51] concluded that extracts of roasted foods contain one or more carcinogenic agents.

Liu and Hu[52] failed to produce cancer in mice with extracts prepared from the dry "destructive distillation" of polished rice, pea flour, soybean, casein, wheat gluten, whole wheat, corn, cabbage, pepper, beef, and pork. However, it is not clear from their publication whether, and if so, to what extent, the foods were burnt (roasted or carbonized). Liu and Hu[52] report that: (i) "Fukida and Kinosita found that tar from rice bran is carcinogenic to the skin of mice", (ii) "Kenneway produced cancers and papillomas by human skin tar and yeast tar", (iii) "Shibata reported on the carcinogenic action of the tar from sugar", and (iv) "Roffo found tumor growths in the stomach, liver, and caecum of rats fed on bread and milk to which was added animal fat or olive oil that had been heated to 350°C for half an hour".

Beck and Peacock[53] found that heated fats (equal parts of cottonseed oil and whale oil) which were heated to 200-220°C in a closed iron saucepan for 20 to 30 minutes on 30 consecutive week-days and fed to rats, caused papillomatosis of the fore-stomach as a result of induced vitamin A deficiency. They were unable to detect carcinogenic agents in the heated fats. These authors (Beck and Peacock[53]) state that Waterman was able to show that the presence of carcinogenic hydrocarbons in heated food was capable of inducing tumours in the forestomach of mice.

The fact that the same fats and oils are frequently used daily, over long periods and are consequently repeatedly exposed to high temperatures, should receive due consideration in research projects.

In experiments conducted by Peacock and Beck[54] they produced multiple mesenteric sarcomata in 4 out of 71 rats maintained on (a) an adequate diet, and (b) a restricted diet to which was added lard heated to 220°C or 350°C.

Petersen and Hirst[55] demonstarated the toxicity of heat-polymerized linseed oil when fed as either 10% or 20% of the rat diet. They believe that monometric material of a cyclic, or possibly a branched chain nature is the toxic fraction.

Frohlich[56] found that the more the biological value of foodstuffs is damaged by overheating, the more they are inclined to adsorb (bind) phthalein dyes.

The possibility that food dyes may be adsorbed by gastro-intestinal ulcers, or lesions on mucous membranes, should receive serious attention, as, if this were the case it could render chronic ulcers and lesions prone to become malignant.

As 2-4 benzpyrene has been found in the soot of coffee beans and in view of the disturbing information supplied above, it is most urgent that further research be conducted into the potential carcinogenicity of all partly carbonized (burnt) foodstuffs and of overheated fats and oils, keeping in mind the fact that in many cases fats and oils are repeatedly overheated.

2. *Cooking utensils*

ALUMINIUM UTENSILS

Betts[57] states that according to his "Experiences and observations" metal poisoning, including aluminium, has been noticed to cause gastric diseases, and also cancer. Information on this aspect of aluminium poisoning is, however, very meagre and incomplete.

During World War II experiments were conducted by the author upon dogs with food cooked in aluminium pots. Those animals, except the controls, were fed on meat and porridge cooked in aluminium pots. One group received meat cooked in an alkaline medium (sodium bicarbonate) and one group meat cooked in acid medium (vinegar). The

dogs which received meat cooked in an alkaline medium developed symptoms of chronic poisoning within 4 to 6 months, *viz.*, lack of appetite, loss in weight, constipation and apathy. One of the animals died after eight months and autopsy revealed a severe chronic gastroenteritis. From examination of the aluminium pots it was evident that an alkaline medium causes much more severe corrosion of the pots than an acid medium.

In view of the extensive use of aluminium cooking utensils and the pronounced corrosion caused by alkaline media, it is of the utmost importance to establish without doubt whether there is a possibility of danger in their use. It is obvious that in the execution of such investigations a large number of factors should be taken into consideration. The fact that Dr. Joseph Gillman, Professor of Physiology, University of the Witwatersrand, Johannesburg, had found the gall-bladder contents of many corpses heavily contaminated with aluminium, lends greater significance to the problem of chronic aluminium poisoning. In what way did this aluminium find its way into the system? Through food, beverages, drinking-water or drugs?

(c) Nutrients lacking in foods.

1. *Vitamins*

The literature on the effect of diet and various vitamins and enzymes on the appearance, period of latency and duration of cancer is voluminous. Some vitamins appear to suppress, while others stimulate, malignant growth, while deficiencies in certain vitamins (B complex and vitamin A) cause lesions on mucous membranes which are prone to become malignant (Bicknell & Prescott[58]; Cramer[59]).

It has been established that in vitamin A deficiency popilloma appear on the mucous membranes, preceded by precancerous conditions in the tongue such as leukoplakia, subacute or chronic inflammation, vascular injection, atrophy or hypertrophy of the papillae and erosion of the epithelium and the three precancerous conditions in the gastric mucosa, namely: (i) Gastric polypi, (ii) Atrophic gastric ulcer, and (iii) Chronic atrophic gastritis.

It therefore appears that deficiencies in vitamin A, riboflavin, and nicotinic acid may possibly induce precancerous lesions on mucous membranes and that these lesions may become malignant in the presence of a carcinogenic agent.

Day *et al*[65] refer to the procarcinogenic effect of vitamin B_{12} on rats fed p-dimethyl-amino-azobenzene.

2. *Iodine*

Axelrad and Leblond[60] who conducted experiments upon rats, state: "Tumors of the thyroid and pituitary glands have thus been produced in the absence of radiations or exogenous carcinogens by the prolonged *physiological* overstimulation of these glands resulting from a chronic deficiency in iodine". It appeared that the carcinogen, 2-acetylamino-fluorene, shortened the latent interval required for the induction of thyroid nodules. One case of metastasis to the lung was also recorded, but no animal died, as a direct result of invasion by the abnormal cells". In connection with the problem of cocarcinogenic agents, thyroid tumours, could be obtained in rats if the thyroid had previously been made hyperplastic by administration of allyl thiourea.

B. BEVERAGES

The fact (a) that some of the cool drinks contained appreciable quantities of caffeine, organic and inorganic acids, and synthetic dyes, (b) that many complaints of severe gastric irritation are received from individuals who consumed these caffine-containing cool drinks, drinks, and (c) that these drinks were being consumed in enormous quantities by children, and even by toddlers and babies, prompted the author to investigate their possible harmful and carcinogenic effects for which he received a grant from the South African Council for Industrial and Scientivc Research.

The experiments were planned in such a way that the effects of a ration deficient in protein and vitamins A and B complex could be compared with those of a ration containing all the essential nutrients. Three hundred and sixty young rats were employed in the experiments which ran for 17 months. The rats were permitted to consume the cool drink daily or on alternate days at the rate of approximately 25 to 50 cc/kg. bodyweight daily. This is equivalent to a child, 30 kg. in weight, consuming $3\frac{3}{4}$ to $7\frac{1}{2}$ bottles (each 200 cc) of cool drink daily. An important point to be considered is that the rats had food *ad lib.* and that children more often than not consume large quantities of cool drink on an empty stomach. Each batch of cool drink was chemically analysed and the biological effects on the rats reflected the nature and quantity

of the ingredients. The different batches of the cool drink yielded different results according to the nature and quantities of the ingredients present. This was also reflected in variation in the taste of the beverage. At the termination of the experiments all the surviving experimental animals, including the controls, were killed and specimens for histological examination collected but not yet fully examined. In the meantime the following remarks may be made.

(a) Diet played a most important role in the susceptibility of the rats to the harmful effects of the cool drink. Protein and vitamin deficiencies caused a most pronounced increase in susceptibility to the harmful effects of the beverage (See photograph).

Cool Drink Experiment

Right : A young rat on a ration deficient in protein and vitamins A and B complex, and receiving the cool drink daily.

Left : Control rat receiving only the deficient ration.

If we were to apply the results obtained upon rats to human beings, we begin to realize more and more to what extent the underprivileged and undernourished, especially children, who live so extensively on white bread and cool drinks, suffer from the effects of the presence of appreciable quantities of undesirable and harmful ingredients of some cool drinks. An important aspect of the cool drink trade is that in hot and dry climates enormous quantities are consumed. The experimental rats consumed approximately twice to four times the quantities of cool drink that children in the Union of South Africa do. The animals preferred the cool drink to water.

(b) The cool drink had harmful effects on the young rats in that it caused alopecia, general weakness, paresis, pronounced retarded growth and loss in condition (see photograph), tooth caries, and early death. Autopsy revealed petechiae in the gastric mucosa, and small gastric ulcers were very prevalent.

The Department of Health should exercise strict control over the cool drink trade. It is essential that all the ingredients of cool drinks offered for sale to the public, and the quantities of the ingredients, should be registered with the Department of Health, and that, if they were permitted to contain caffeine, the quantities should be disclosed on the label (Steyn[13]).

Discussion

Although the author has not gone into great detail regarding our knowledge of the potential harmfulness, or otherwise, of the chemical used and processes employed in the preparation of foodstuffs he would like to draw special attention as to how, and what, steps could, and should, be taken to ensure due protection to man especially to children, as far as food additives and food processing are concerned. The problem of food additives, food contaminants and food processing in general is so enormous and of such grave importance to human health that immediate well-organized intensive and extensive research into the carcinogenic and toxic properties of all food additives, especially dyes, at present in use, and of food processing in general is urgently needed. It is suggested that all experiments should be conducted on the following lines:

(a) *Experimental animals.* Investigations should be conducted not only on mice, rats, guinea pigs, rabbits and cats, but also on dogs and monkeys, the latter being as a rule closest to man in his susceptibility to poisons. If at all possible, as a last resort, experiments should be completed upon human beings with the foods to which the chemicals have been added. As allergic reactions to many substances are common in man, it is essential that the necessary skin tests also be conducted on man.

The possibility of photosensitivity (direct sunlight), especialy in the case of dyes, should receive due consideration.

(b) *Number of experimental animals in each test.* It is essential that large numbers of animals be included in each test in order to achieve reliable results. The minimum number in each dosage-level group should be 20 (ten females and ten males, mice or rats) and a smaller number in the case of dogs and monkeys.

(c) *Diets of experimental animals.* It is essential to conduct experiments on animals fed out only adequate diets, but also diets which in their deficiencies (Proteins, vitamins, minerals, fats) resemble those of the millions of the under-nourished and malnourished. According to reports of the World Health Organization 60% of the people of the world are underfed.

(d) *Period of experimentation.* The period of experimentation should be at least two years and in large animals (dogs and monkeys) it should be much longer.* Only in such studies it is possible to determine the effects of small and repeated quantities of poisons and other harmful factors in food on (i) growth, (ii) weight, (iii) food intake, (iv) fertility, (v) oestrous cycle, (vi) pregnancy, (vii) lactation. (viii) foetuses (mitotic poison), (ix) life span (benzoyl peroxide used as a bleaching agent for flour, for example, decreases the life span of animals).

(e) Feeding experiments should be conducted not only with the pure chemicals but principally with the food products to which they have been added and with the solvents used after it has been prepared and is ready for consumption. It should be taken into consideration that chemical changes may take place in the treated foods only after long periods of storage. The possibility of producing carcinogenic substances when heating oils and other foodstuffs to high temperatures (burning, carbonization), should be further investigated without delay.

(f) Examination of the experimental animals should be done from all angles—clinically, urinalysis (including porphyrins), blood analysis, liver function tests, skin tests (allergy), and at post mortem, sections of all systems and organs, including all types of glands, should be collected for histological examination. At the end of the experiment the surviving animals should be killed and the weights of the liver, thymus and kidneys be compared with those of the controls. According to Smyth *et al.*[62] and increase in the weight of the liver or the kidneys usually indicates increased stress in the metabolism and elimination of the material under study.

Seifter and Ehrich[65] stated that the thymus is a most sesitive indicator of general disturbances caused by poisons, starvation, etc. Its weight is an excellent measure of the alarm reaction.

(g) Studies on the metabolic products of chemicals in the body and their excretion should be made.

The above suggestion is made in the spirit of a sincere desire to co-operate with the industries concerned in attempts directed towards the finding of chemicals and processes in food manufacture which are harmless to human health. The investigation will undoubtedly be expensive and time consuming, but these should not count in the interest of human health. It is, however, desirable that the investigation of this problem is organized and directed by the World Health Organization and the International Union against Cancer with specific duties and research, projects assigned by them to each country and that there should be close co-operation with all industries concerned.

In the planning of research into the above points, the following may also be kept in mind:

(1) the extensive use of irritant laxatives and purgatives in the battle against the problem of chronic constipation, and (2) the presence of irritant spices (paprika, mustard, etc.) in our food, (3) an individual is more endangered by carcinogenic agents, the younger he is at the time of exposure (Druckery[64]), (4) the synergists may not only have additive but also multiplied harmful effects, (5) the satisfactory proof of the harmlessness of any new food additive, contaminant or process should be brought by the manufacturer, or firm, who wishes to manufacture or market such a chemical or apply such a process in food manufacture.

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I am most grateful to Professor R. Truhaut, President of the Committee on Research into the Factors concerned in the Causation of Cancer and of the International Union against Cancer, to Professor H. Druckrey, President of the International Commission on Cancer Research, and to Dr. P. R. Peacock, Honorary

* "Hutper is of the opinion that arsenic is so weak a carcinogen that its latent period is longer than the life-span of experimental animals such as the rat or mouse and that therefore, arsenic cancer, though relatively frequently observed amongst human beings, can but be rarely induced in animals" (Wolf 18).

Treasurer of the International Union against Cancer who through their kind efforts have made it possible for me to attend this Symposium.

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THE ROLE OF VARIOUS FATS IN THE PATHOGENESIS OF ATHEROSCLEROSIS

(An Experimental Study in the Chick)

By

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INTRODUCTION:

The influence of exogenous lipids in the diet has been emphasized and is considered as an important contributory factor in the pathogenesis of atherosclerosis. A clear appraisal of this subject is very important as upon this would be based all future programme of the prophylaxis of this disease, by relevant dietary restrictions. At the moment diagonally opposite views exist as to, whether or not such measures have any part to play in retarding or retrogressing the march of the atherosclerotic process[1].

The workers in the field cannot deny that the dietary fats are in some way etiologically related to atherosclerosis, but what is still undecided is the relative importance of the various types of fats in the diet. To evaluate this problem experimentally, the work was launched in this department two years ago.

From this study Gour and Tayal[10] reported that 0.5% cholesterol-feedings in the diet produced atherosclerotic lesions in the aorta and coronaries of the chick in 13 weeks. This was accompanied with hyper-cholesterolemia and raised C/P ratio. The animal fats like egg yolk even when containing 0.5% cholesterol of the diet did not produce such lesions in the same period, despite raising plasma lipid level and C/P ratio. Gour and Garg[11] further reported that even as low as 0.25% cholesterol was capable of producing atherosclerotic lesions in the chick in 12 weeks. These were also associated with the hypercholesterolemia and raised C/P ration.

In the present work we have attempted to study the role of some of the fats of Indian dietary origin, both from animal (buffalo ghee) and vegetable sources (dalda, cocoanut and mustard oils) in the pathogenesis of atherosclerosis.

MATERIAL AND METHODS:

Twenty-four chicks of four-weeks age were selected for the present study. These were of the same breed and approximately of equal size and weight. They were divided into six groups of four chicks each. These groups were:—

A. Control Group.
B. Cholesterol Group.
C. 'Ghee' Group.
D. 'Dalda' Group
E. Cocoanut Oil Group.
F. Mustard Oil Group.

This study was carried out in the Experimental Station of S. N. Medical College, Agra, for a period of 32 weeks. 'Bajra' (millet) was given to all the groups as the basic diet. This served as control for the first group. The second group was given 0.5% cholesterol. The remaining groups were given different fats (according to the name of the fat) in 15% concentration. The average daily dietary intake in gm. of all groups at different periods of study is given in Table O (next page).

General condition, growth and weight were recorded at regular intervals. Plasma total cholesterol (Method of Myers and Wardroll)[18] and Plasma lipid phosphorus (King's trichloracetic acid precepitation method)[17] were estimated after every four weeks. At the end of the study all the chicks were sacrificed and the different organs studied in detail both in gross and under the microscope.

OBSERVATIONS:

A. Histopathological

From the table No. 1 it is evident that 0.5% cholesterol feeding with 'bajra' diet produced

atherosclerotic lesions in the thoracic aorta of all the four chicks of this group in 32 weeks. These lesions were present boh in macroscopic and microscopic examinations. The chick No. 4 which died after 12 weeks did not show gross lesions.

15% ghee containing 0.4% cholesterol or 15% vegetable oils with the Bajra diet could not produce atherosclerotic lesions in 32 weeks. However, fatty changes in the liver was a constant finding in all these groups (Photo I/A, B, C, D). 'Bajra' feeding to the control group also did not result in any type of the lesion in any organ (See table 1).

In the cholesterol group atherosclerotic lesions were also present in the coronaries of the male chick No. 2 after 32 weeks (Photo 2/A and in the thoratic aorta (Photo 2/B, while

TABLE 0

Average Daily Dietary-intake in Gms. of all Groups at Different Periods of Study.

Period of Study	Control A	Cholesterol B	'Ghee' C	'Dalda' D	Cocoanut Oil E	Mustard Oil F
Initial	6.0	6.0	6.0	6.0	6.0	6.0
4 Weeks	10.0	10.0	9.0	8.5	8.5	8.5
8 ,, ...	15.0	16.0	13.0	11.0	12.0	11.0
12 ,, ...	21.0	22.0	17.0	16.0	15.0	16.0
16 ,, ...	28.0	30.0	22.0	21.0	19.0	20.0
20 ,, ...	36.0	38.0	28.0	25.0	25.0	25.0
24 ,, ...	45.0	47.0	35.0	30.0	29.0	30.0
28 ,, ...	52.0	53.0	38.0	30.0	31.0	32.0
32 ,, ...	58.0	59.0	40.0	32.0	33.0	34.0

TABLE I

Showing lesions in different organs of various groups after autopsy.

Group	Aorta (Atheroma) Thoracic	Aorta (Atheroma) Abdominal	Coronaries Atheroma	Liver Fatty Infiltration	Other Organs Kidney & Brain
1. Control—					
Chick No. 1 ...	—	—	—	—	—
Chick No. 2 ...	—	—	—	—	—
Chick No. 3 ...	—	—	—	—	—
Chick No. 4 ...	—	—	—	—	—
2. Cholesterol—0.5%					
Chick No. 1 F ...	+	—	—	—	—
Chick No. 2 M ...	+	—	+	—	—
Chick No. 3 F ...	+	—	—	—	—
Chick No. 4 M ...	+	—	—	—	—
3. 'Ghee'—15%					
Chick No. 1 ...	—	—	—	+	—
Chick No. 2 ...	—	—	—	+	—
Chick No. 3 ...	—	—	—	+	—
Chick No. 4 ...	—	—	—	+	—
4. 'Dalda'—15%					
Chick No. 1 ...	—	—	—	+	—
Chick No. 2 ...	—	—	—	+	—
Chick No. 3 ...	—	—	—	+	—
Chick No. 4 ...	—	—	—	+	—
5. Cocoanut Oil—15%					
Chick No. 1 ...	—	—	—	+	—
Chick No. 2 ...	—	—	—	+	—
Chick No. 3 ...	—	—	—	+	—
Chick No. 4 ...	—	—	—	+	—
6. Mustard Oil					
Chick No. 1 ...	—	—	—	+	—
Chick No. 2 ...	—	—	—	+	—
Chick No. 3 ...	—	—	—	+	—
Chick No. 4 ...	—	—	—	+	—

— denotes Lesions absent. F ,, Female Chick.
\+ ,, Lesions present. M ,, Male Chick.

PHOTO 1

(MICRO-PHOTOGRAPH)

[A, B, C, D]

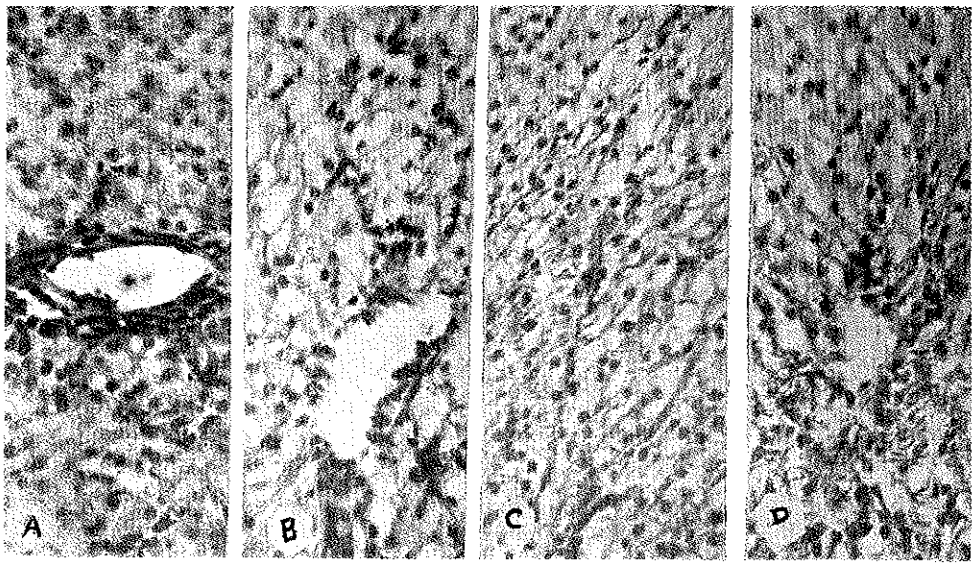


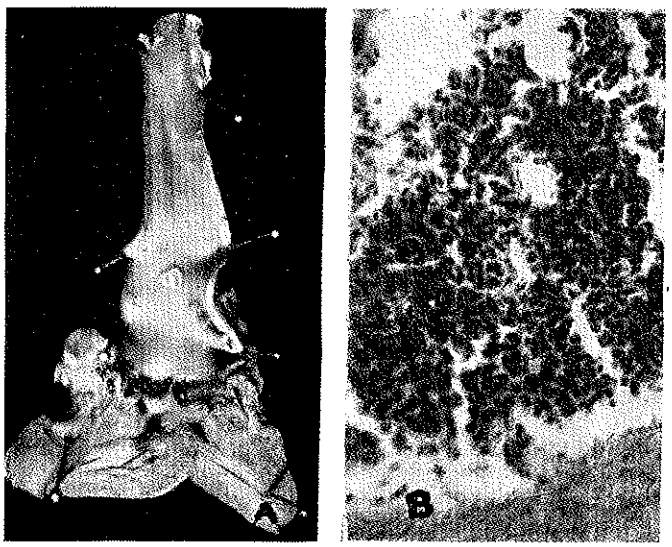
PHOTO 1A—Section of liver of a chick of 'ghee' group showing a central vein as a few vacuoles of fatty infiltration.

PHOTO 1B—Section of liver of a chick of 'Dalda' group with normal central vein and prominent vacuoles of fatty infiltration.

PHOTO 1C—Section of liver of a chick of 'cocoanut oil group showing vacuoles of fatty infiltration and a fibrous band in the lower part.

PHOTO 1D—Section of liver of a chick No. 2 of the Mustard oil group showing vacuoles of fatty infiltration without fibrous.

PHOTO 2



these vessels of the male chick No. 4 and of female chick were completely free from such lesions.

From the table 2 it will be seen that the plasma total cholesterol levels are the highest in the cholesterol group at all the periods of study. These levels are also slightly raised in the remaining four groups when compared to the normal. However, amongst each other they do not significantly differ at any period of study. These levels have progressively been increasing up to 28 weeks, while at the 32nd week it has not shown any appreciable change.

B. BIOCHEMICAL

TABLE 2

Showing average Plasma Total Cholesterol (P.T.C.) levels in mg.% at various periods of study of the six groups.

Period of Study	Control A	Cholesterol B	'Ghee' C	'Dalda' D	Cocoanut Oil E	Mustard Oil F
Initial	90.0	90.0	91.2	90.0	90.0	89
4 Weeks	91.5	120.5	92.5	91.5	91.0	92
8 „	102.0	169.0	113.2	108.5	107.0	109
12 „	100.0	235.5	128.0	123.5	119.0	120
16 „	103.0	289.3	137.5	138.0	129.0	133
20 „	106.5	355.3	149.5	152.0	146.0	148
24 „	109.0	353.3	159.3	157.3	153.0	149
28 „	113.0	366.6	156.6	152.0	153.0	151
32 „	112.5	352.6	156.6	155.5	152.5	153

TABLE 3

Showing average Plasma lipid phosphorus (P.L.P.) levels in mg.% at different periods of study of the six groups.

Period of Study	Control A	Cholesterol B	'Ghee' C	'Dalda' D	Cocoanut Oil E	Mustard Oil F
Initial	7.0	7.0	6.9	6.9	6.9	6.9
4 Weeks	7.1	7.3	7.0	7.0	6.9	7.0
8 „	7.7	7.9	7.4	7.8	7.6	7.7
12 „	7.6	8.7	7.6	8.7	8.4	8.1
16 „	7.6	9.5	7.8	9.0	8.7	8.7
20 „	7.7	10.3	7.9	9.6	9.4	9.5
24 „	7.8	10.3	8.0	9.8	9.6	9.4
28 „	8.0	10.5	7.9	9.6	9.5	9.6
32 „	7.9	10.3	8.0	9.7	9.6	9.6

TABLE 4

Showing average Plasma total cholesterol lipid phosph orus (C/P ratio) at various periods of study of the six groups.

Period of Study	Control A	Cholesterol B	'Ghee' C	'Dalda' D	Cocoanut Oil E	Mustard Oil F
Initial	12.8	13.0	13.3	13.0	13.0	12.8
4 Weeks	12.8	16.8	13.2	13.1	13.1	13.1
8 „	13.2	21.3	15.3	13.9	13.9	14.1
12 „	13.1	27.0	16.8	14.7	14.3	14.7
16 „	13.5	30.6	17.7	15.4	14.8	15.1
20 „	13.8	34.4	18.9	15.9	15.5	15.3
24 „	13.9	34.3	19.9	16.2	15.9	15.7
28 „	14.1	35.0	19.7	16.0	15.9	15.4
32 „	14.1	34.3	19.7	16.1	16.0	15.8

From tables 2, 3 and 4 it will be found that C/P ratio is running parallel to P.T.C. or P.L.P. values. This finding as in table 2 is the highest in the cholesterol group at all the periods of the study. However, in the 'ghee' group it is increased as compared to the control and the vegetable oil groups. Amongst vegetable oils there is no appreciable difference though these are slightly higher than the control group.

Therefore, from the above observations it is clear that 0.5% cholesterol feeding considerably raises the plasma total cholesterol and C/P ratio. 'Ghee' and different vegetable oils can also do so but not to significant level. To correlate the histological picture described before with the biochemical findings it is observed that the atherosclerotic lesions were associated with raised plasma lipid levels and the C/P ratio.

C. *Effect of Various Fats on Growth, Weight and Feed-intake*

'Ghee' and different vegetable oils in 15% concentration of the diet produced stunting of growth and retardation in development. These chicks had small, scanty and greasy feathers, diminished weight, difference in size and generalized malnutrition. In the beginning they also passed loose motions. Out of these fats buffalo 'ghee' produces comparatively less retardation of growth and feed-intake than vegetable oils in general. Their difference in size, weight and feathers was of a lesser degree. Amongst the vegetable fats, 'dalda' produces the worst effects on growth and development (Table 5 and fig 1). The chicks of this group manifested gross malnutrition and underdevelopment along with the changes in the feathers.

TABLE 5

Average Weight in Ounces at Various Periods of Study of the six groups.

Period of Study	Control	Cholesterol	'Ghee'	'Dalda'	Cocoanut Oil	Mustard Oil
	A	B	C	D	E	F
Initial	5.1	5.1	5.1	5.1	5.1	5.1
4 Weeks	8.3	8.5	7.3	6.75	7.0	6.8
8 ,, ...	14.5	13.8	12.3	11.3	11.1	11.3
12 ,, ...	20.4	19.3	17.0	13.0	13.0	13.0
16 ,, ...	25.9	26.6	21.2	17.4	17.4	17.4
20 ,, ...	30.5	30.6	22.5	18.8	19.0	18.8
24 ,, ...	33.5	34.5	26.8	19.7	20.3	19.7
28 ,, ...	36.3	36.6	28.0	19.8	20.7	19.8
32 ,, ...	38.0	38.5	29.0	20.2	21.0	20.2

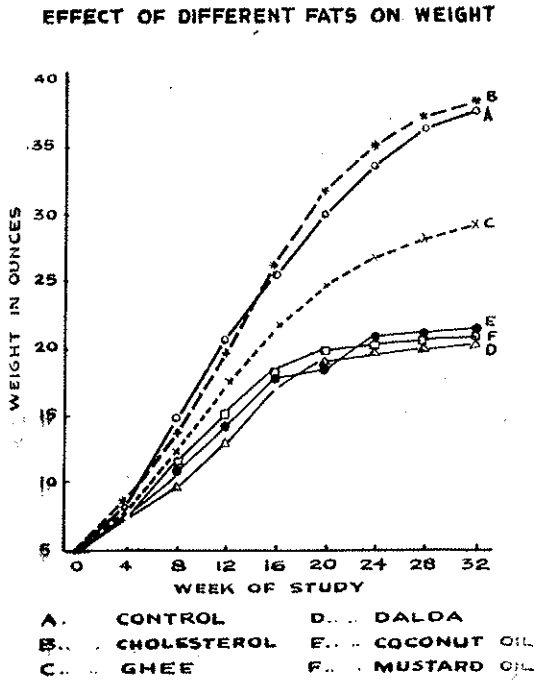


FIG. 1

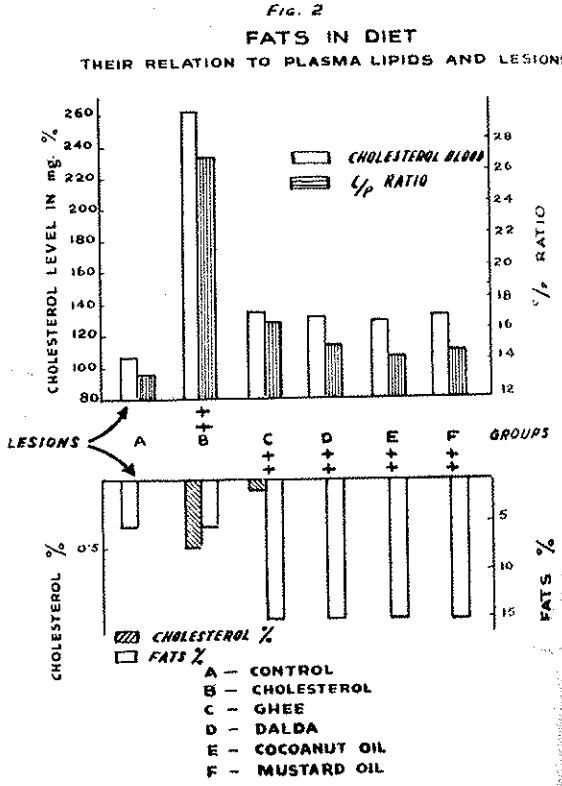


FIG. 2

comb and wattle. The mustard and cocoanut oils occupy an intermediary position between 'ghee' and dalda and do not differ significantly from each other. 0.5% cholesterol feeding produces no deleterious effect and its results are comparable to the control group in all respects. (See fiig. 2).

In this relation it is interesting to note that the fatty liver was associated with the malnutrition and underdevelopment in 'ghee' and vegetable oil groups. In the cholesterol group there was no disturbance of growth though atherosclerotic lesion was found in the aorta and coronaries. (Photo 3 A to I.)

PHOTOGRAPH 3

[A, B, C, D, E, F, G, H & I]

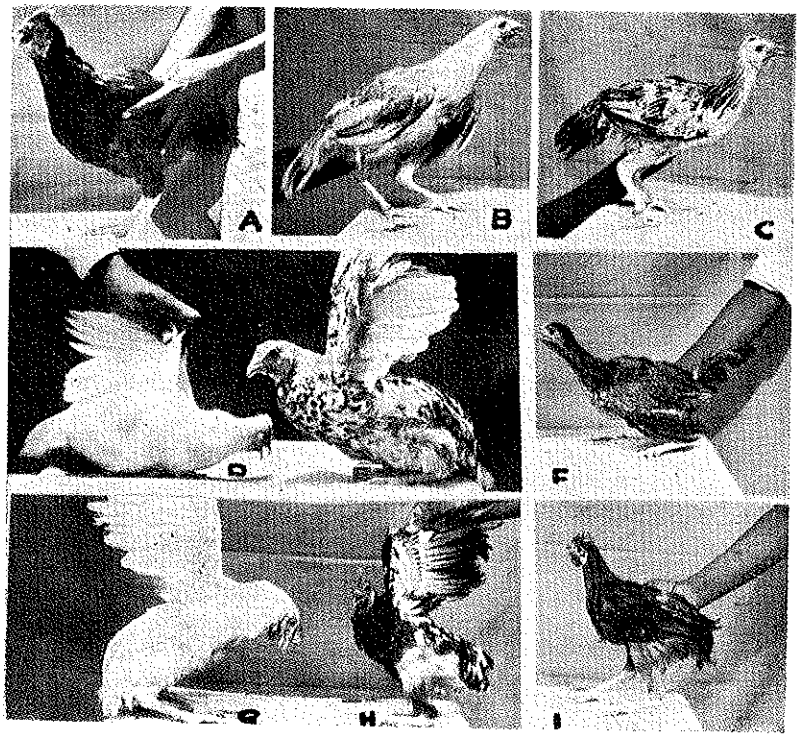


PHOTO 3A—Control chick study period—32 weeks.

PHOTO 3B—Chick No. 1 of cholesterol group-in which atherosebrotebsion was detected weight 38 oz.

PHOTO 3C—Chick No. 1 of mustard oil group 20 oz.

PHOTO 3D—Chick No. 3 of ghee group 28 oz.

PHOTO 3E—Chick No. 3 of cholesterol group—(better grouth ghee group) weight 36 oz.

PHOTO 3F—Chick No. 2 of Dalda group showing the deleterious effect of 15% dalda on the size and general development weight 20 oz.

PHOTO 3G—Chick No. 3 ghee group showing the retarding effect of 15% ghee on the grouth and size of feathers weight 28 oz.

PHOTO 3H—Chick No. 3 of Dalda group showing small scashly and denuded feathers weight 20 oz.

PHOTO 3I—Chick No. 1 of Dalda group showing worst efferry Dalda on grouth and development weight 19 oz.

Discussion:

The foregoing experiment reveals certain aspects of the role of various fats in the pathogenesis of atherosclerosis and their effect on the general growth of the chick. These observations clearly point out that 0.5% cholesterol has got an atherogenic property in the chick. As the lesions could not be produced with 0.04% cholesterol contained in the "buffalo ghee", during the same period, it is probable that some minimal concentration of cholesterol is required in the diet so as to produce these lesion. Further, it is also possible that the form in which the cholesterol is ingested in the diet and the duration for which it is administered, are the important factors in the production of atherosclerosis. The form of cholesterol is important, because, in group 2 of our study cholesterol was given in a chemically pure amorphous form whereas in group 3 ('ghee' group) 0.04% cholesterol was made available from the 'ghee' itself. The duration of administration is significant because, 0.5% cholesterol was capable of producing gross lesions in 32 weeks but was unable to do so in 12 weeks. Therefore, the concentration, the form and the duration of cholesterol ingestion, combined or individually, may play an important role in atherogenesis.

The atherosclerotic lesions in the coronaries were present only in the male chick No. 2. The male chick No. 4 (which died after 12 weeks) did not show any coronary lesions. In the female chicks no coronary lesions were detected. These observations point that the sex may have some relationship to the development of coronary atherosclerosis.

At present the observations regarding the sex relation to experimental cholesterol-induced coronary atherosclerosis are fragmentary and inconclusive[14]. However, two facts are well established in this relation. (1) There is experimental evidence that oestrogens are effective both prophylactically and therapeutically against cholesterol induced atherogenesis in the chicks[15]. We have to await the results of further investigations on this subject which has been undertaken in this department. (2) There is clinical evidence that women below 40 years of age enjoy relative immunity to coronary atherosclerosis as compared to men[8]. In a clinical survey of the rural population of 5,000 Gour and Tayal[10] found no female case of coronary atherosclerosis below 40 years of age. In a similar study Gour and Garg[9] reported six cases of anginal attacks in males but no case was detected in females. These differences may be the basis for the sex differentiation in susceptibility to coronary atherosclerosis.

In this relation it may be mentioned that as small amount of cholesterol has not produced any lesion in the coronary or aorta, it may be injudicious to curtail all fats and fat containing articles from the diet

Gross hypercholesterolemia was observed in the chicks fed on 0.5% cholesterol in the diet and the atherosclerotic lesions were also discovered only in this group. It is, therefore, inferred that cholesterol ingestion leads to a rise in the plasma total cholesterol which may be an important factor in the induction of atherosclerosis. The control and other vegetable oil groups which were not being given cholesterol did not show atherosclerosis lesions.

Similarly plasma cholesterol/lipid phosphorus (C/P) ratio was also much raised in the chicks which developed hypercholesterolemia and exhibited atherosclerotic lesions in their vessels. The role of C/P ratio has been studied in the experimental cholesterol-induced atherosclerosis in the chick[20], [21], rabbit[13], dog[2] and in the human coronary atherosclerosis[5-7]. A raised C/P ratio was uniformly found to be associated in all these studies.

It is further obvious from this study that the neutral fats of vegetable and animal origin are not important factors in the production of atherosclerosis in the chick, when fed for 32 weeks in 15% concentration of the diet. Nevertheless, they are capable of producing organ lipidosis like fatty infiltration of the liver. This infiltration of the liver in the chick may be the result of inefficient metabolism of the ingested fat. The liver overloaded with the lipids becomes defective in all its functions. This may account partly for the associated states of malnutrition and underdevelopment.

When the maximum P.T.C. figures of the 'ghee' group are compared with that of the control group (Table 2) the difference of 46.3 mgs% may have some significance. It is probable that the highest values of P.T.C. in the 'ghee' group amongst the neutral fats and this appreciable deviation from the control, could be accounted by 0.04% cholesterol content of the 'ghee' group, because the control and other vegetable oils (dalda, cocoanut and mustard oil) did not contain any cholesterol. However, this fact alone cannot offer sufficient explanation for the whole of this discrepancy because the P.T.C. levels of the oil groups were also slightly higher than the control. It is therefore, possible that in addition to the cholesterol content of the diet, other neutral fats which

are even devoid of cholesterol have in some way an enhancing influence on the plasma total cholesterol. The P.T.C. level amongst the 'dalda', cocoanut and mustard oil groups were almost the same, probably because these oils are dealt with in a similar fashion in the body, so far as lipid metabolism is concerned.

"Caution is necessary to interpret these experiments as indicating that neutral fat ingestion is not a factor in human atherogenesis. Clinically, neutral fat and cholesterol ingestion are almost invariably combined. Considerable evidence exists that under such circumstances neutral fats influence cholesterol metabolism"[11, 12, 16, 19].

The role of excessive fats in inhibiting the appetite of human beings, is a well established physiological fact. To transpose this fact to our experimental study we find that only those chicks who were getting 15% of fat manifested diminished dietary intake. The control and cholesterol groups ingesteing 5% fat in 'bajra' did not exhibit any such effect. In this relation it may be added that the source of fat whether it be of animal or vegetable origin, is not very appreciably differentiated in the chick.

SUMMARY :

Six groups of chicks were fed on cholesterol, 'ghee', dalda, cocoanut and mustard oil for a period of 32 weeks. 'Bajra' was the basic diet of all ane one group fed on this served as control. It was observed that 0.5% cholesterol produced atherosclerotic lesions in the aorta and coronaries while 'ghee' and different vegetable oils in 15% concentration could not do so. However, these neutral fats produced fatty changes in the liver. The atherosclerotic lesions consequent upon cholesterol feeding were associated with gross hypercholesterolemia and raised C/P ratio while 'ghee' and vegetable oils did not produce any appreciable rise in these levels. The neutral fats however produced inhibited dietary intake and retardation of growth and development.

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SUGGESTIONS FOR THE NATURE AND CONTENT OF A HEALTH TEACHING PROGRAMME FOR SCHOOLS

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An Intelligent, self-directing, self-disciplined person, unmoved and unaltered by false or misconceived ideas and the practices of others, is a desirable result of health teaching. Health is considered to be a condition of the individual, therefore it exists only through proper health behaviour. Thus health must be developed through different motives and procedures, and daily living. Since health is a condition of the individual that results from daily living, it is not an activity. Teaching an activity is specific. To teach a child to build a toy or to add two and two is objective and the method is comparatively simple. The child learns the activity at school and he acquires interests and attitude according to the method of instruction. In health teaching we are not only concerned what the child learns at school but also in his continuous carrying out proper health practices in his daily life.

If it were only necessary to teach health rules to children because of an assurance that they would follow the rules, how easy that would be! Unfortunately, knowledge of what to do does not in the least ensure the carrying out of that knowledge. If knowing how best to live guaranteed healthful living, then teaching knowledge about health would be no more difficult than any other teaching.

It is not knowledge about proper health behaviour that is of primary importance, nor the stressing of health habits themselves. Even if it were possible in the school to teach all the important health practices, their mere repetition would not insure permanence. The problem is to teach so that the learner will want to follow healthful ways of living. An interest must be developed that is so great that health practices will be followed all the time. Interest is important then, but to develop an interest sufficiently compelling for the individual to become self-directing in all ways of healthful living is a large task.

Health teaching, then, is not primarily a matter of teaching rules, neither can we teach the health practices as such and hope through repetition to build up certain desirable ways of living. Health teaching calls for the development of interest,—an intangible factor. But here again we are met with difficulties. When the effects of an act were satisfactory, an individual tends to repeat the act later. He is interested in so doing. Proper health practices, for the most part, are not immediately satisfying. For example, while it is true that we want to eat when hungry, we eat what we desire. In other words, we like those foods that taste well and look attractive. It is the immediate satisfaction that directs our eating practices. We do not like to eat only those foods that are "good for us". It is annoying to have to pass up a rich sweet in order to eat food that is supposed to maintain good health. The effect of the rich sweet on the organism is not usually immediate, nor may it be apparent, but the taste of that particular food is immediately pleasurable. The task of health teaching is to develop an impulsion so great that it will overcome the interest only in those immediate satisfactions.

Health teaching includes guiding the child in development and maintenance of the highest level of health of which he is capable and interesting him in a constructive program of health for everyone. If this is to become a happier and better world and with higher standards of living, individuals from early childhood must broaden their interests to include the welfare of others. So, beginning with nursery school, health teaching must stress thinking of others and helping others to live effectively.

Personal health guidance is accomplished in several ways, but first of all, by creating a desire to live effectively. Unfortunately, there is no set recipe for developing this desire. If

an individual wants a thing he will strive for it. Artificial incentives do not produce enduring results. In each class the teacher should use the type of appeal effective with the age group of the children. Through progressive stages of development, satisfaction can result from adult adulation, from popularity or from planning for future vocational or social achievement. Therefore, if a skill is to be acquired, an incentive peculiar to the pupil's stage of maturity must be found. For example, it would be useless to attempt to interest a first year class child in brushing his teeth with the goal of looking ahead to social and vocational success; this child finds no immediate satisfaction in preparing for the future. Nor is the Fifth class pupil apt to brush his teeth to win the approval of adults. But if his age group accepts brushing teeth as a worthwhile practice and prizes beautiful teeth, he will expend such efforts.

The skill of the teacher is shown in building attitudes or appreciations. While this is being accomplished, teaching in part is providing information as the child is ready for it. But without the desire by pupils to attain and maintain the best health possible, little can be done by the teacher.

There is still another way in which the teacher guides the pupil in the development and maintenance of high level of health. This is by providing information necessary for him to solve his present health problems and to make decisions in future situations. In the lower classes few facts actually need to be taught; it is the stimulation of ideals and behaviour that claim first consideration here. The young child accepts the mother's and teacher's suggestions as to ways of behaving, usually without questioning the reasons. But with increasing years, he asks "Why?" and it is to answer this question that health information should be provided.

But mere knowledge does not guarantee desirable conduct. Proper attitudes toward values and procedures influence the individual to apply his knowledge and to react properly in a familiar environment. However knowledge gives meaning to attitudes and habits. It strengthens them. It will help the individual to avoid difficulties in an unfamiliar environment. Attitudes and habits are specific since they result from stimuli in the known environment. Man must depend upon knowledge for his protection when moving from environment to environment.

Another way of reaching goals in health teaching is helping the pupil to develop desirable behaviour by giving him increasing responsibility in directing his daily living. One frequently runs across a person who believes that if a habit is once formed it will function throughout life. Habits learned in the primary classes need continual reinforcement, for a habit persists only as long as there is satisfaction in its practice and there is a need for it. No more can be claimed for its usefulness. So the teacher should not expect such habit development to last forever, nor be disappointed to find a lapse when the child leaves her watchful eye. There is no doubt that a good health habit is worthwhile. Without it, it is certain that the pupil will not take care of himself. With it, combined with a suitable incentives, it is probable that he will protect his health reasonably well for a long time.

Solving today's health problem should be the first concern of the pupils. The best preparation for meeting future problems is successful handling of present problems. However, times and conditions change. Skills and habits that are adequate for today will most likely not fit the future. Therefore attention must be given to helping the student acquire skill in rendering decisions and in making certain that he knows how and where to obtain information on health and to procure available health services. In their school days, these parents-to-be can learn to appreciate the need for and the advantages of parental care, infant care, sanitation, and other public health services.

The health of an individual is the result of heredity, environment and behaviour. Although heredity and environment may be considered important factors in influencing the individual, the activity of the person is, in the last analysis, the major factor in the control of his health. Activity includes not only all the overt motor movements of the body, but also thought processes and impulsions, variously termed as emotions, drives, wants, interests, feelings, and attitudes.

Activities of life may be grouped under three main types, which are (1) those that aid in development, (2) those related to survival, and (3) those concerned with adjustment.

The development activities refer to those physical experiences which develop organic power, nerve stability, desirable personality traits and wholesome interests. They include all the manual and muscular activities with their potential to develop interesting skills and worthwhile appreciations and hobbies; all the communicative activities which constitute the fundamental tools and the social and natural

sciences, that enable the individual to interpret the world and man, his nature and his group relationships. This group of activities consists of work and play that develop the various potentialities of the growing boy or girl. They educate, and it is from this group of activities that the school curriculum is built.

The second group, the survival activities, are those upon which life depends. One has to sleep a certain amount in order to live. Eating is of paramount importance. Breathing, elimination, and temperature regulation of the body are other survival activities.

The third group, activities of adjustment, are differentiated from the first two, in that they are not primarily educational in the same sense as are the development activities, nor is life dependent upon them as in the case with survival activities. Although they have an education or development aspect, their primary function is to enable the individual to best adjust himself to the customs of the world in which he lives. They are also concerned with better emotional adjustment.

These development, survival and adjusting activities, suggest the following content experiences in health teaching:

1. Educational or developmental. This is a pure educational process and is the developmental basis of health.

It involves the development of organic and nervous powers and the instinct-emotional tendencies; that is, desires and impulses.

2. Sleep and rest. Time, amount, and conditions of sleep; preparation, moods.

3. Eating and diet, kinds, amount, ways.

4. Elimination. Time, regularity.

5. Oxygenation. Breathing habits. Time in fresh air and sunshine. Control of ventilation.

6. Temperature regulation, Clothing, Control of housing and heating.

7. Protection of the organism from injury.

(a) Correction of growth defects.

(b) Avoidance of accidents, Safety first, Emergencies.

(c) Avoidance of infection. Personal and group co-operation in control of health problems.

(d) Avoidance of stimulants and drugs.

(e) Cleanliness and care of the skin and appendages, nails, hair, etc.

(f) Care of the teeth.

(g) Use and care of motor mechanisms in activities. Posture and carriage.

(h) Care of sense organs in activities.

(1) Eyes.

(2) Ears.

(i) Care of respiratory mechanism.

(1) Nose.

(2) Throat.

8. Vocational adjustments. Efficient vocation; vocational health.

9. Recreative adjustments is an essential social need. It is emphasized as an important objective of the developmental program of activities. There is an increasing need for this adjustment in order that the leisure of people may offer an opportunity for a fuller and richer life, and not result in a breakdown in moral fiber.

10. Fellowship adjustment brings about those social satisfactions that result from group association. Man likes company and doing things with others. Such social contacts make up a large part of life, and an essential element for adequate fellowship adjustment is the ability to understand, appreciate and get along with others.

11. Everyone lives in a community and as a resident, has certain functions and responsibilities. That feeling of satisfaction in belonging to some community is heightened by participation in civic affairs; therefore, civic adjustment is essential for all-round health.

12. Philosophic adjustment refers to a philosophy of life. Whether or not we realize it we all have some theory about life and our success or failure at living is dependent in some measure upon our philosophy.

13. Personal sex adjustment is significant for health. Part of one's time is spent at some place called "home", and primarily the family is the result of the sex function. A happy family life, harmonious, peaceful and yet stimulating, contributes to the health of members of the family.

The content of an adequate health teaching program should provide means for acquainting children with health conserving resources; public health services; forms of medical and surgical aid, and nursing and hospital service; and the means and conditions for using these. School activities should lead into activities in the home and community wherever and whenever possible.

Health teaching must be carefully planned to avoid ,duplication and to meet the needs interests, and capacities of the particular group. Phases of personal, home, school, and community health, including nutrition, respiration, excretion, exercise, rest, play and recreation, mental health, social relationships, personal care, community and industrial health, safety and first aid, chronic diseases, geriatrics, preparation for marriage and parenthood, heredity,

eugenics, or any other content experiences that may be helpful to the individual or the community in which he lives are those which may be within the content of such teaching.

At the primary school level, health teaching should be a way of helping children to live healthfully at home, school, and at play. It is questionable whether any particular period or specific topic should be set aside for health teaching at this level. In the primary classes teaching can be effectively accomplished through (a) using daily experiences of children for guidance in health behaviour, (b) stimulating healthful practices in the school, (c) developing an understanding of environments and activities of people, and (d) using creative expression as in dramatization. The extent to which each is used will depend upon the needs of the group, the availability of materials, and the understanding of the teacher.

The health teaching programme for middle school classes will in many respects be similar to that suggestion for the primary classes. Guidance in daily living, recognition of the health experiences of other curricula, reading, dramatic expression, these are continuing methods used throughout the primary school. In addition, the older child has need for more information, more understanding, and more knowledge. He needs to know more of the reasons for health behaviour and to be able to solve problems arising from the adaptation of behaviour to changing situations. Continued emphasis on developing proper health behaviour and health attitudes is desired.

Health teaching will continue to center around the same areas as in the primary classes, but the content for older pupils should be adapted to their level of intelligence and understanding, challenging them to thought and action. Teaching the same concepts and repeating the same health rules year after year may develop in children a widespread dislike for health classes.

Much has been written about the distribution of health topics for different age levels. Proper health practices are right ways of living. Everyone from childhood on is faced with certain needs. The child in the kindergarten eats and he is given foods which are supposedly good for him. His problem is to eat what is set before him in the right way and to enjoy the food. The older student eats. His problem is to select the right foods. If he does, then the problem of food selection does not need to be included in the class discussion. Proper eating, then, will probably continue as an objective from the time the child enters kindergarten until he has finished college. It is the same with other activities. Unless proper sleep and rest practices have been acquired by the group, no matter what the age level, then adequate sleep and rest practices become the problem of the group.

The more effective the teaching at the lower age levels the fewer may be the problems of the group as they go from class to class. The inclusion of any practice for class discussion depends upon the needs of the group, and the extent of the factual information desirable will depend upon the age and background of the learner. It would seem, therefore, that the content cannot be arbitrarily determined by allotting, for example, proper eating to one or two classes, proper cleanliness and care of the body to another, and so on. Neither is it wise to set up a rule as to when, during a school year, certain living problems shall be studied; for example, habits of cleanliness in September, avoidance of infection (colds and minor ills) in October, and so on. What is to be taught can be determined only by a study of needs. It is advisable for both the teachers and the pupils to plan together the specific objectives sought, and the content experiences, changing them as occasion demands.

In the secondary schools reality comes to being through the problem-solving approach. Undoubtedly, this technique provides good opportunities for student participation, for the development of self-direction, and for the understanding and practice of the democratic principle. Solving problems about personal and community health encourages application of knowledge, concepts and practices for the removal of doubts, insecurities, and misconceptions about health. Problems such as "what foods should be selected for an adequate diet", "how can the sanitation of the community be improved", "what health services are needed in our community to improve the health of our people", and "what responsibilities can we take in personal health development" are examples of those for which students can work out solutions.

Values of group experience cannot be ignored and its utilization is a necessary part of health teaching. Social problems cannot be solved by repression, or by other negative methods. The group process is the means by which an individual can participate with satisfaction to himself and not feel that his efforts will be lost or submerged by forces too great for him to cope with. The effectiveness of the group process is found in its involving the student so that he is responsible for his pro-

blem selection and so that he will work to the limit of his capacities for an optimal contribution toward group decision and action. This method is one of democratic socialization and is a framework within which the individual improves his health as he contributes to the health improvement of his immediate environment.

The question has been raised as to the organization of health teaching in the high schools. If it is only a question between integration and a formal course, the answer appears obvious. Teaching for health in the high school requires more time than can be allotted in the integrated program, a place in addition to and outside of the regular classroom where experiences in healthful living must take place, and a teacher with the training and qualifications needed to guide the student in proper ways of living. Of necessity, these three factors cannot be properly met through the integrative process alone. A certain amount of health learning and practice can take place through various school experiences but no great amount occurs without the foregoing essentials.

Consider integration as a possibility of teaching health in the high school. Integration may be regarded as being incidental to the specialized subject with which it has relationships. This being the case and since teachers are usually judged by the courses they teach and not the integrating aspects, then it would seem logical for a teacher of Geography, for example, to emphasize that subject in which he has a vested interest,—not health, of course. Special subject teachers are primarily interested in their own fields and may fail to utilize opportunities for the improvement of student health. When only the integrating process is used and teaching for health is the business of every teacher, it becomes scattered and neglected because it is not the liability of any single person. Let us make an analogy, good Hindi usage is the responsibility of all teachers yet what educational accomplishments would result if there were no central course in Hindi? Health teaching too, must be centered in a well-organized course in order to be effective.

Considerable criticism has been levelled at subject matter specialization in the high schools with the attitude that subjects are taught and not boys and girls. To obviate this, integration has been proposed at the secondary level. Proponents of such a thesis also note that integration considers the whole child in a natural learning environment and that health is vital to life and enters into all parts of life, thus they ask, "why restrict it to a classroom?" Since health *is* a way of life and not merely relegated to subject matter to be studied and passed, then health education should be given its due share of importance for the fulfilment of a basic objective of living. This should take place in a systematically organized experience that will give direction and value to the place of health education in the life of the child.

What are the values of a systematic course in health in the high school? It serves as a focal point for all general health knowledge and experience in the school; it is of great importance for specific knowledge. The teacher in this area is one who has specialized, and being properly trained can be more aware of the needs of the group and in a better position to guide youth because of a recognition of their differences. Surely, there is value in making someone definitely responsible for health teaching. In addition, such a course helps to obviate the feeling on the part of the student that it is a minor area and of little consequence; and in this course is presented the best opportunity for handling personal health problems. A systematic health course is needed because the development of healthful living in an individual needs careful organization and regular presentation not entirely feasible in an integrated course.

Is integration of school health teaching the only answer to solving health problems? The answer, of course, is "no". Well, what about a single course in health teaching? Without doubt, the organized class would yield excellent results, but it is still not the complete answer. To provide the richest kinds of teaching and experiences in health education there must be, as a core or common learning, a systematically organized total school planning for health teaching. Since health is the base of education, every teacher should have some responsibility for health teaching, consequently, integration should supplement the organized classroom instruction. Integration then implies the need for co-ordination, so there must be a trained teacher to bring together all contributions and relationships of the health teaching program to the greatest completeness and satisfaction.

To prepare students for living, health teaching should provide three kinds of closely related elements, namely (1) activities and situations affording direct motivation for health teaching, (2) knowledge and understanding of some facts and procedures to make health practices intelligent and (3) practice and appli-

(Contd. on page 118)

STUDIES ON THE EFFECTS OF DDT RESIDUAL SPRAY ON MALARIOMETRIC INDICES

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I. INTRODUCTION

In an earlier communication discussing on the effect of DDT on anopheline incidence the author (Sen, 1956) reported that DDT in its various formulations and at proper dosage sprayed over rural areas consisting mostly of mud and thatch huts although capable of effecting a complete suppression of anopheline incidence in the treated rooms for a fortnight to a month during the first year failed to keep up the same efficiency in the second and subsequent years if mosquito reduction was aimed at. The redeemable feature was that this rise in incidence in the subsequent years did not involve *Anopheles philippinensis,* the vector species, which was scarce throughout the operational period.

What impression these spray operations with varying formulations and dosages had on the malaria incidence of the areas concerned could not be discussed in the earlier report for obvious reasons. The present study deals with that aspect, as mere rise or fall in anopheline incidence has little consequence unless its effect on the malariologic factors are at the same time pursued.

II. METHODS

The various formulations and dosages of DDT used in the present series of observations have been fully described in the paper referred to above (Sen, *loc. cit.*). Different intervals, long or short, beginning from a massive dose of 112 mg per sq ft, once during the season, to two rounds of 56 mg at three monthly spacing, or even as many as five rounds of 45 mg per sq ft, once every month, have been tried.

Periodic spleen surveys of children aged 2 to 10 years, both of pre-DDT and post-DDT periods as also during the operational phase were conducted for proper assessment of result. Spleen indices of children of a group of comparison villages were similarly taken. Blood smears from both treated and untreated areas were also obtained for studying the parasitic indices.

III. EFFECTS OF DDT SUSPENSION

In the first year when the operations were initiated, certain villages received only one round of spray with DDT suspension at 45 mg per sq ft during October and November (Table I). The endemicity index was not very much reduced by this late spray. In fact it was followed by a slight rise in the village Niala, the probable reason perhaps lay in the partial treatment of the village by keeping out of operations the cattle sheds.

TABLE I

Spleen indices of villages sprayed with DDT suspension at 45 mg. per sq. ft.

Villages	Population	Number of holdings	Number of spraying 1st year	Number of spraying 2nd year	Spleen rates (per cent) Pre-DDt figure	off-season fig. after 1st year	During operational phase, 2nd year	Off-season fig. after 2nd year
Matukpur ...	388	82	1	3	34.3	28.0	16.5	14.6
Niala ...	646	121	1+	3	46.1	50.0	25.8	16.6
Sarai ...	597	141	1	3	47.4	37.0	23.1	17.9

Plus sign (+) indicates an area where only the bedrooms were sprayed.

Early spraying in July, on the other hand, even after one application at the same minimal dosage produced considerable improvement in malariometry of a place as seen from the second year's result of operations by comparing the off-season spleen rate of February with that of September after the first round of spraying during the operational phase (Table 1): the result was a reduction in the spleen rate of nearly 40 to 50 per cent. This reduction when compared with the next off-season figure in May after the completion of three rounds of spraying at six to eight-weekly intervals in the second year showed evidence of accentuation, the spleen rate dropping by 66 per cent in Niala.

If the treatment were taken up late in the season during October and November even two rounds of spraying at eight-weekly intervals did not prove any better (Table 2), the reduction in the spleen rate was about 26 per cent only as against 18 to 21 per cent in the villages (Matukpur, Sarai) receiving only one round of spraying.

TABLE 2

Spleen indices of villages sprayed with DDT suspension at 45 mg/sq. ft. at monthly intervals.

Villages	Population	Number of holdings	Number of spraying 1st year	Number of spraying 2nd year	Spleen rates (per cent) Pre-DDT incidence	Off-season inc. after 1st year	During operational phase, 2nd year	Off-season inc. after 2nd year
Namajgram ...	576	110	2	3	55.7	41.2	18.3	22.2
Illumpur ...	361	67	L	5	37.0	50.0	15.4	10.0

'L' signifies treatment with DDT larvicide.

When instead of six to eight-weekly intervals between sprayings as in the three villages under Table I, a shorter interval of once a month aggregating five sprayings in the season was tried in the village Illumpur (Table 2), the reduction effected in the spleen index was no less than 70 per cent.

The best result with the DDT suspension at minimal divided doses was thus obtained by shortening the intervals between sprays to a month and increasing the total rounds of spraying. With the spraying intervals lengthened to once every two months, analogous result in the reduction of spleen rates was achieved only when the concentration of DDT in suspension was raised to 90 mg/sq ft as in Tinna and Jagannathpur (Table 3). The spleen rates in these two villages were reduced by 73 to 80 per cent following the increased dosage of DDT. An increase of the dosage to 56 mg/sq ft in the village Sripala was not conducive to a greater reduction in the spleen rate than that obtained in other areas with 45 mg dosage as in Niala (*vide* Table 1): the percentage reduction in both approximated 65.

TABLE 3

Spleen indices of villages sprayed with DDT suspension at 56 mg. and 90 mg./sq. ft.

Villages	Population	Number of holdings	Number of spraying 1st year $	Number of spraying 2nd year	Spleen rates (per cent) Pre-DDT incidence	Off-season inc. after 1st year	During operational phase, 2nd year	Off-season inc. after 2nd year
Sripala ...	72	19	1	3@	43.4	37.7	16.6	15.0
Tinna ...	468	99	1	2	44.2	33.0	12.4	9.4
Jagannathpur ...	136	31	1	2	60.5	50.0	26.4	10.0

'$' denotes 45 mg. dosage used in the 1st year: '@' 56 mg. used in the 2nd year.

IV. Effects of DDT Emulsion:

With DDT emulsion sprayed at 56 mg/sq ft in a few more villages at the proper season almost identical result as with suspension at minimal dosage was obtained (Table 4).

TABLE 4

Spleen indices of villages sprayed with DDT emulsion at 56 mg./sq. ft.

Villages	Popula-tion	Number of holdings	Number of spraying 1st year	Number of spraying 2nd year	Spleen rates (per cent) Pre-DDT Incidence	Off-season inc. after 1st year	Incd. During operational phase, 2nd year	Off-season inc. after 2nd year
Saibona ...	89	21	—	3	45.8	60.0	27.7	20.0
Daulatpur ...	137	25	—	3	60.0	45.6	25.7	20.0
Mahadevpur ...	30	14	—	3	—	25.0	20.0	10.0
Pirpukur ...	525	93	—	3+	29.0	20.0	8.0	11.4
Pandua ...	2626	656	—	2	42.1	46.5	32.1	20.7

+ Spraying patchy and not covering all holdings.

In the top three villages mentioned in Table 4 the spray operations were repeated three times at six to eight-weekly intervals beginning from July. The spleen rates in the next off-season recorded a fall of 56 to 66 per cent almost like the villages treated with suspension with the comparable dosage. In Pirpukur a number of houses was kept out of spray programme to see the effect of patchy spraying. This incomplete coverage resulted in the reduction of the spleen rate by 45 per cent only and indicated that the method produced less effective result compared to the areas where complete coverage was attained.

If the coverage was complete, even two applications of 56 mg/sq ft each during the transmission season at an interval of three months, as in Pandua, effected 56 per cent reduction in the spleen rate which compared favourably with that of an area receiving three rounds at shorter spacing discussed above.

With the dosage of DDT in emulsion increased to 112 mg/sq ft, even one application at the beginning of the season as in Shaikpukur (Table 5), was able to cut down the endemicity index by 74 per cent which approximated closely the reduction obtained with suspension at 90 mg dosage (*vide* Table 3) in other areas.

TABLE 5

Spleen indices of villages sprayed with DDT emulsion at 112 mg./sq. ft.

Villages	Popula-tion	Number of holdings	Number of spraying 1st year	Number of spraying 2nd year	Spleen rates (per cent) Pre-DDT Incidence	Off-season Incidence after 1st year	Incd. During opera-tional phase, 2nd year	Off-season inc. after 2nd year
Shaikpukur ...	257	56	—	1	85.4	73.7	25.7	19.5
Khirkundi ...	435	88	—	3+	45.3	38.3	23.7	11.6

+ 2nd and 3rd spraying at 56 mg. and 28 mg. dosages respectively.

Repeat sprays in Khirkundi with the dosages halved in every successive round after a massive dose of 112 mg at two-monthly intervals proved no better suggesting that the repeat operations with smaller dosages during the year after a heavy dosage were unnecessary.

V. Effects of DDT Solution:

The result of spraying DDT solution at the dosage of 56 mg sq ft in three other villages not contiguous in so far as it affected the spleen rates has been depicted in Table 6.

TABLE 6

Spleen indices of villages sprayed with DDT solution at 56 mg./sq. ft.

Villages	Population	Number of holdings	Number of spraying 1st year	Number of spraying 2nd year	Pre-DDT incidence	Spleen rates (per cent) Off-season inc. after 1st year	Spleen rates (per cent) inc. during operational phase, 2nd year	Spleen rates (per cent) Off-season inc. after 2nd year
Bagmoidan ...	84	15	1	1	54.2	60.0	38.8	28.5
Kalisunda ...	336	75	L	1	38.8	42.5	28.3	16.0
Thaipara ...	483	86	Cl	1	51.5	51.3	30.4	15.8

'L' signifies larvicidal treatment with DDT wettable powder. 'Cl' Signifies clearance of aquatic vegetation only

The reduction in the spleen rates of the three villages after one round of spraying with 56 mg dosage of DDT in solution early in the transmission season indicated this formulation was no less effective in cutting down endemicity of malaria in rural areas, but serious disadvantages in its use appeared to be its rapid absorption in the mud walls and high cost. The spleen indices of the three villages served with the solution were reduced by 53 to 69 per cent, a reduction closely comparable to that obtained with two rounds of emulsion at divided doses.

The tank clearance taken up in Thaipara and the antilarval work in Kalisunda during the previous year might have influenced the somewhat steeper fall by 62 to 69 per cent in the spleen rates of these two villages as compared to the 53 per cent fall in the other village in this series where no such measures were adopted.

VI. Spleen Record of Comparison Villages:

The comparison villages kept untreated lying in the periphery of the treated zone showed the highly variable nature of the spleen indices (Table 7). Out of six villages, in only two

TABLE 7

Spleen indices of comparison (unsprayed) villages.

Villages	Population	Spleen rates (per cent) corresponding to 4 sets of observations in the treated areas			
		I	II	III	IV
Ramnagar ...	265	20.3	15.8	40.7	26.6
Baramulti ...	250	57.8	50.0	40.0	23.7
Dhamasin ...	275	74.2	63.4	67.0	32.0
Rukmini ...	280	34.7	44.8	48.7	33.3
Berui ...	375	55.1	40.7	38.9	27.0
Marsit ...	345	69.7	58.8	40.3	28.5

the spleen rates either remained steady or slightly increased during the comparable period when the observations with the different DDT formulations were being carried out. In the remaining four villages, however, the spleen rates registered an unassisted fall; the reduction being in the neighbourhood of 30 to 40 per cent. In the absence of other apparent reasons this spontaneous fall in the spleen rates would lead one to suspect that the study was probably undertaken at a time when malaria was on its natural decline.

VII. Effect on Parasite Rates:

The parasitic indices of the sprayed villages taken during the progress of the DDT operations, as also taken before and after that, indicated on analysis a considerable reduction in the parasitic incidence in the area as a result of the spraying (Table 8).

TABLE 8

Parasitic indices of the zone under DDT spraying

Observational periods	Parasitic rates (per cent)	Infant parasite rate (per cent)
Pre-DDT ...	10.4	12.0
Operational phase ...	5.9	6.2
Post-DDT ...	1.9	0.0

Both *Plasmodium falciparum* and *P. vivax* were prevalent in the area but the former predominated. The result of examination of available infants has been included in Table 8. The parasitic indices recorded, show virtual absence of malaria transmission in the area after two season's spraying.

VIII. Statistical Significance of Data Obtained:

The data of spleen reduction obtained by the use of different formulations and methods discussed above were subjected to statistical analysis by using Sin-$^{1}\sqrt{p}$* transformation and given in Table 9.

TABLE 9

Results of Test of significance on the observed reductions of splenic indices in the control and treated villages.

Group of villages $	Formulation	Average reduction after transformation of %s to degrees during period of observation	S. E. of difference between average reduction in the control and experimental groups	Result
I	Suspension	19.3	2.75	Significant
ID	Suspension double dosage ...	21.9	2.54	Significant
II	Emulsion	18.5	2.54	Significant
III	Solution	18.2	1.75	Doubtful
	Control	11.7	—	

$ For explanation see Table 10.

It will be seen from Table 9 that in all the experimental areas except in Group III villages the spleen indices were significantly reduced.

To find out whether there was any significant difference among the few variations in methods followed under each formulation the data were further analysed statistically and the results are given in Table 10.

It will be seen from table 10 that among the three different methods used in Group I villages, significant difference at 5 per cent level was noted only between Group IB and ID, D‡/ $\sqrt{v}$† being 2.137. No significant difference was noted between the different methods used in Group II villages. Comparing the results obtained in the methods used in Groups I & II villages, the value obtained in IIC was significantly different at 5 per cent level from that of IC and ID sets of villages. In respect of other formulations and methods used, no significant difference was noted in the values obtained.

In summarising the results, it may be stated that DDT suspension at 90 mg dosage used two rounds (I D) yielded better result than with 45 mg dosage used four times (I B). The formulations used in villages II C, namely emulsion at 112 mg sprayed one round only gave better result than suspension at 56 mg dosage used four times (I C) or at 90 mg dosage using two rounds (I D). But it may be pointed out that the observation in Group II C villages was made on a smaller number of population.

P*—percentage.
D‡—difference between average reductions.
v†—variance.

IX. Discussion:

The observations recorded above on the effect of DDT indoor sprays on the malariometric indices of a group of villages have brought out points which are in essence complimentary to the conclusions reached earlier from the author's previous study dealing with the effect of the insecticide on anopheline incidence (Sen, *loc. cit.*) As malaria index of a place and its anopheline incidence particularly of vector species are inseparable, DDT formulations upsetting the balance of anopheline population would more certainly than not also affect the stability of the other. It was pointed out in the earlier publication mentioned above

TABLE 10

Results of tests of significance on the observed reductions of splenic indices in the different groups of experimental villages due to difference in methods and formulations.

Group of villages	Formulation & method used	Before treatment		After treatment	D/ √V
		Population examined	Average spleen rate	Average spleen rate	
I. A	Suspension 5 sprays at 45 mg/sq. ft. ...	260	51.15	17.26	7.81
B	Suspension 4 sprays at 45 mg/sq. ft. ...	394	42.89	28.79	3.82
C	Suspension 4 sprays at 56 mg/sq. ft. ...	23*	43.48	16.66	1.90
D	Suspension 2 sprays at 90 mg/sq. ft. ...	152	48.03	18.69	5.28
II. A	Emulsion 3 sprays at 56 mg/sq. ft. ...	187	40.64	17.09	4.48
B	Emulsion 2 sprays at 56 mg/sq. ft. ...	252	42.06	32.12	2.17
C	Emulsion 1 spray at 112 mg/sq. ft. ...	52+	85.4	25.71	3.79
D	Emulsion 3 sprays at 112, 56 & 28 mg/sq. ft. ...	135	45.3	23.76	3.47
III	Solution 1 spray at 56 mg/sq. ft. ...	261	46.74	31.22	3.45

* Total population=72

\+ Total population=257.

that both emulsion and suspension at divided dosages of 45 mg and 56 mg/sq ft proved almost of equal significance in the matter of anopheline reduction with a slight bias for emulsion in wider field use. These two formulations sprayed three rounds early in the active transmission season starting in July have now been observed to produce an almost comparable reduction in splenic index averaging 56 to 66 per cent. At the minimal dosage used in emulsion, the frequency of indoor spraying may be reduced to two rounds at eight-weekly or two monthly intervals within season with analogous result but not in suspension. In fact with suspension better reduction (70 per cent) in spleen rate was obtained with the frequency increased to five, once every month.

It had also transpired that when a heavy dosage approximating 100 mg or slightly more was used, one single spraying of emulsion early in the season could reduce the spleen rate in an area by over 70 per cent. When a similar heavy dosage 90 mg in suspension was repeated in mid season following an early dose of the same order, the reduction in the spleen rate was no improvement over that of emulsion in heavy dosage. The present study thus shows that in any spray programme DDT should best be applied initially at dosage of 90 to 112 mg/sq. ft. either as suspension or emulsion, followed by a second dosage of half the size for the sake of safety. This conclusion finds confirmation in present day practice in certain areas.

The massive dosage just mentioned, however, did not offer any additional advantage over the smaller ones in the matter of residual effect on anophelines (Sen, loc, cit). Despite this apparently conflicting situation arising out of the anopheline population, mostly of non-vectorial species, reappearing almost after the same lapse of time as in the areas sprayed with a smaller dosage, the position remains that the heavy dosage initially would interrupt the transmission more thoroughly than what

could be expected with the smaller dosage of 45 mg. or 56 mg. This would not be difficult to understand when we consider that the residual effect of DDT at least with some anophelines, whatever the dosage, is not sustained beyond a few weeks under tropical conditions.

The study has further shown that no cattle shed should be left out of the spray programme or incomplete coverage adopted if maximum benefit has to be reaped out of the operations.

SUMMARY:

1. DDT suspension and emulsion at 45 mg/sq ft and 56 mg/sq ft respectively sprayed three times during the transmission season at 6 to 8 weekly intervals brought about almost identical reduction in malarial endemicity of an area. Solution at 56 mg dosage has disadvantages in field use in rural Bengal.

2. When the intervals between sprays were reduced to a month, DDT suspension at minimal divided doses of 45 mg in five rounds proved better in reducing the spleen rates than when applied three times at longer intervals of 6 to 8 weeks.

3. A single massive dose of DDT emulsion at 112 mg applied early in season (July-August) or two rounds of suspensions at 90 mg proved superior in the matter of cutting down malariometric indices to those of smaller dosages in three or more rounds.

4. A late season spray (October-November) is not conducive to an efficient malariometric reduction. Partial treatment of a village by skipping over a few houses, or by spraying only the bed rooms leaving the cattle sheds untreated proved equally unsatisfactory.

ACKNOWLEDGEMENTS.

I take this opportuinty of recording my appreciation for the assistance rendered by Sri Rebati Mohan Choudhury, Malaria Inspector, in carrying out the laborious field work entrusted to him. My thanks are also due to Dr. S. C. Seal and Dr. P. M. Roy of the All-India Institute of Hygiene & Public Health, Calcutta, for their kind help with the statistical part of this paper.

REFERENCE

Sen, P. (1956)—Insecticidal effects of DDT on anopheline incidence. *Ann. Zool.*, I, pp. *93-116.*

"PUBLIC HEALTH as practised in many countries is largely ART, EMPERICISM or "SYMPTOMATIC TREATMENT" at best. PUBLIC HEALTH Administrator must also act. Modern Medical Practice is both ART & SCIENCE. Doctor MUST ACT; he cannot wait if Science provides no guidance for the time being. But Science must be pressed into the service of Medicine for continuous advancement. The Practice of PUBLIC HEALTH should be equally based on Science.

Are we developing PUBLIC HEALTH as a Science!

LAL.

(Contd. from page 112)

cation of health teaching that will help to establish desirable health attitudes and health behaviour.

Health teaching implies an integration of the total school life with an extension into the world. It necessitates making school activities joyous, engrossing, worthwhile ends to the student. And it requires that the individual be self-directing in his health practices. This self-direction can be gradually established through the conviction that proper health behaviour tends to improve conditions and that optimal health is important to each individual because it is necessary for the attainment of goals that make life worthwhile.

Improvement in living for any society depends upon the interest and intelligent efforts of individuals and upon their support of activity and legislation for the public welfare. Desirable health knowledge, attitudes and behaviour are like chemical agents, precipitating into a recognizable substance, which is identified as the fullness of life.

Schools can play an important part in the development of a scientifically critical school child; one who carefully weighs and makes proper health choices; one who can bring himself nearer to optimal healthful living than heretofore has been achieved.

(Contd. from page 122)

Acknowledgement.

Our thanks are due to the officers of the Directorate of Health Services, Assam, and of the Pasteur Institute, Shillong, for their ready help and co-operation in carrying out this investigation at Gauhati, Assam.

REFERENCE

Seal, S. C., Ghoshal S. C., and Bose P. N. (1951) Calcutta, Medical Journal, Vol. 48, pp. 149-155, May 1951.

"HEALTH" is a flexible state of body or mind, which may be described in terms for a range, within which a person may sway from the state at which he enjoys Physical, Mental, and Emotional experiences in consideration of his environment, age, sex and other biological characteristics, due to the effect of internal and external stimuli operating on him, and can regain that position without an external aid."—SEAL

PLAGUE IN GAUHATI, ASSAM

By

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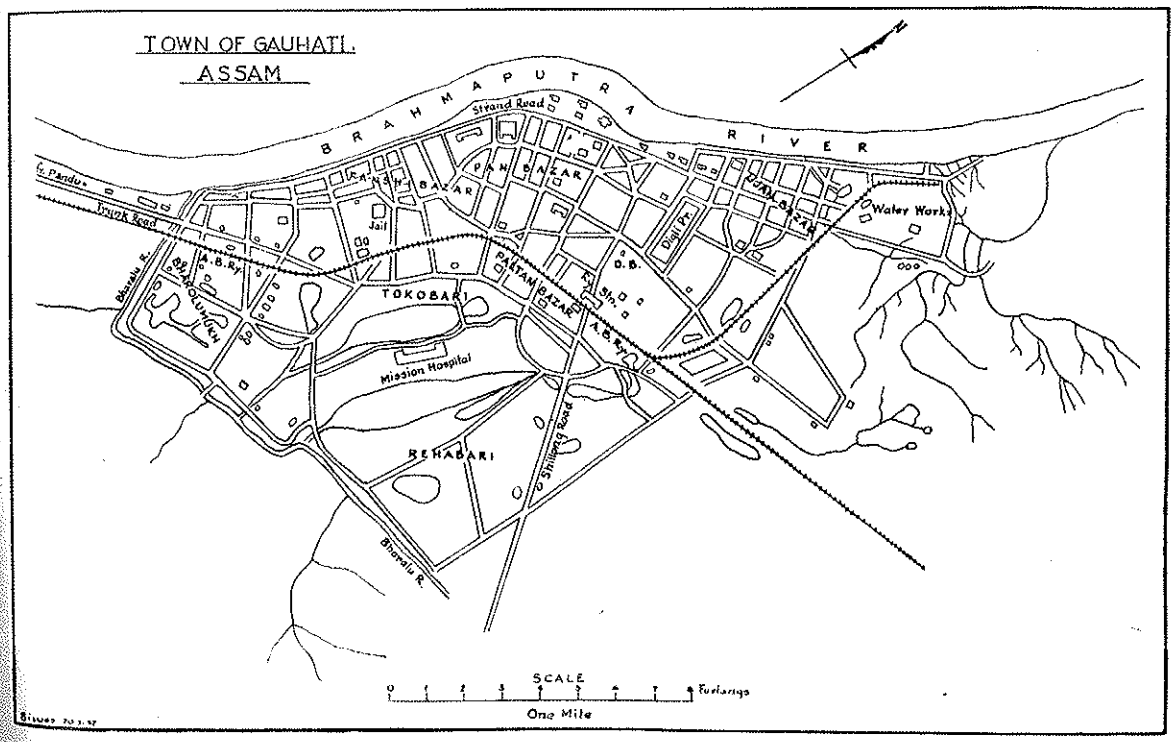
On the report of suspected cases of human plague and of rats dying in large numbers in the town of Gauhati, Assam, during the month of November, 1956, the authors at the instruction of the Director-General of Health Services, visited the town during the first week of December, 1956 for investigation, and if the report was confirmed, to prepare a draft scheme for its control. It may be mentioned here that no incidence of plague was noted in Assam within the living memory of any person. Even during the last pandemic which started in 1895 and involved a very large tract of India and ravaged the country for well-nigh quarter of a century, Assam particularly escaped. Also only a few years ago, in 1948, a huge number of rat deaths were reported in the Darrang and North Lakhimpur Districts of Assam without any human case and the authors had the privilege of investigating the cause of such deaths. This investigation yielded interesting results (Seal, Ghosal and Bose 1951). There was neither any evidence of plague infection nor any vector fleas could



be detected. Absence of any previous history of plague and the above personal experience of the authors in the State naturally made them somewhat sceptical about the results before they actually started the field investigation. They were, therefore, no less surprised than the local authorities when the plague infection was confirmed both in the rat population and in human cases and wondered about the consequence if the infection was not nipped in the bud in view of the fact that the town of Gauhati was entirely a virgin soil and once the infection was rooted, serious and prolonged efforts would be necessary to uproot it at a great loss of lives, financial involvement and and economic loss. Another importance of the town was that being connected with the neighbouring states and other parts of Assam through rail, steamer, air and other vehicular traffic, it served as the gateway of the State and that the spread of infection which might readily occur, would be disastrous. The authors were prompted by the above consideration to publish this brief report.

Gauhati Town

The town is situated on the bank of the river Brahmaputra covering partly southern and partly eastern sides, near the foothill of the Garo Hills (see map) and is approachable by rail, road, river and air. The total population is about a lakh and the number of holdings about 16,000. The town is the cultural hub of the State being the seat of the University, High Court and variety of colleges and institutions.

The history of the outbreak:

On the 22nd October, 1956, a report of a large number of rat deaths from the Fanshibazar area, a congested commercial locality, was received at the Municipal Office. Subsequent investigation by the authorities of the Health Department revealed that on an average 15-20 rats had been dying during the seven or eight days prior to the date of reporting. Nine dead rats collected on 26-10-56 and examined at the Pasteur Institute, Shillong did not reveal any plague infection. The health authorities, however, diverted the malaria gang to carry out intensive D.D.T. spraying operation in all the residences and godowns of the Fanshibazar—Machkhowa area on 26-10-56, which was continued for 5 days.

On the 16th November, 1956, a male adult patient from the house of a Marwari grocer merchant named Keshabdeo in the affected area was brought to the Civil Hospital with bubo, toxaemia and symptoms simulating acute abdomen. Plauge was suspected and the bubo material after operation was sent to the Pasteur Institute, Shillong, for bacteriological examination. This patient expired on 18-11-56 at the Emigration Hospital. On 17-11-56, another patient, a lady from the same house, was brought to the hospital with fever, toxaemia and bubo. This patient also died but the plague bacillus was isolated from a sample of blood taken from this patient and examined by animal inoculation at the Pasteur Institute, Shillong. This was actually the third case in one house, the first case having occurred in a young servant of the house who got ill on the 1st November, 1956 with fever, signs of toxaemia and right inguinal bubo which finally suppurated. The case, though undiagnosed, fortunately recovered after treatment by a local physician.

The result of blood examination of the third case having been declared positive of plague infection on 24-11-56, the Health authorities of the Assam Government immediately mobilized a large section of National Malaria Control team with equipments and chemicals to spray the whole town with D.D.T. by the 26-11-56 and intensive immunization campaign with anti-plague vaccines received from the Haffkine Institute, Bombay, by air, was started with the help of the local practitioners, Red Cross Society, Assam Relief Committee, the State Branch of the Indian Medical Association and a large number of governmental staff (more than 100) from 20-11-56. The people though got somewhat panicky co-operated fully in the anti-plague immunization work and by 2-12-56 when the authors arrived at the town, more than 50,000 people had been vaccinated and more than 6,000 holdings and 65 godowns had been sprayed with D.D.T. and gammexene. No further human case was reported till that date. Both the Chief and Medical Ministers visited the area and took personal interest in the matter, and a local advisory committee was set up under the chairmanship of the Deputy Commissioner of Kamrup District to guide and control the day to day operations.

The fourth human case was reported in the evening of 2-12-56 in a young girl of 16 years belonging to the same community (Marwari) and locality. She had fever with typical axillary bubo, anxious countenance and extreme restlessnes. She was being treated with streptomycin and sulphadiazine; her blood culture, however, proved negative.

TABLE 1
Results of Examinationof of Rats (Dead or Alive) in Gauhati during the First Week of December, 1956.

TABLE 1

Results of Examination of Rats (Dead or Alive) in Gauhati during the First Week of December, 1956.

Sl. No.	Locality	Dead or Living	Species	Post mortem findings	Smear for *P. pestis* Spleen	Liver	Heart	Culture P. pestis	Agglutination against P. pestis	Remarks
1.	Police Station	D	G.V.	Subcut. haemorrhage on the right side of neck; Rt. inguinal gland enlarged; Hgic. spots in lungs and fluid at base of pleural cavity; Spleen congested; Kidney congested and swollen. Haemorrhage in peritoneal cavity, stomach and bladder full.	—	—	—	+	+	As stomach & bladder were full, it died shortly before
2.	Fanshi-bazar	D	G.V.	Blood vessels congested, Haemorrhagic spots in both lungs; Kidney congested and swollen; haemorrhage in the peritoneal cavity, also blood clot ...	—	—	—			
3.	Do.	D	R.r.	Subcut. haem. rt. side neck; lungs congested, liver mottled, spleen pale	?	?	—	+	+	Pooled material from liver & spleen
4.	Do.	D	R.r.	Lungs mottled, spleen slight congested ...	—	—	—			
5.	Do.	D	G.V.	Haemorrhage in the lungs and pleural cavity, liver congested and a few cysts present; spleen & Kidney congested & enlarged; extensive haemorrhage in the peritoneal cavity ...	++	++	++	+++	+	
6.	Do.	L	G.V.	Normal	Normal	Normal	Normal			Pooled material
7, 9, & 10, 11.	Do.	L	R.r.	Do.	Do.	Do.	Do.	++	+	
8.	Fanshi-bazar	L	R.r.	Lungs mottled ...	Do.	Do.	Do.	+	+	
12.		D	G.V.	Highly decomposed ...	Not done					
13.	Do.	D	G.V.	No abnormal finding ...	—	—	—	One colony only	+	Spleen-liver material for culture

G.V.—Guinea pig. R.r.—Rattus rattus. D—Dead. L—Living.

A rapid investigation was conducted by the authors through local survey, examination of certain number of dead and living rats collected in the area, by postmortem, cultural and animal inoculation and serological methods in addition to the examination of one surviving and one active case of human plague in the town. Certain quantity of stams, blood agar media, traps for collecting live rats, equipments for bacteriological culture and for postmortem examination of rats and the specific anti-plague serum were carried by the authors to the field. The incubator and the laboratory animals were obtained through the courtesy of the Director, Veterinary College, Gauhati and the work was carried out in the clinical laboratory attached to the Civil Hospital, Gauhati. On the fourth day the inoculated animals and other material were removed to the Pasteur Institute, Shillong, for further investigation.

FINDINGS:

The findings which have been given in a tabular form (see Table I) may be summarised as follows:—

(a) Of the 20 rats (7 dead and 13 alive) collected, all were examined for fleas and only 13 including 5 dead rats from the Fanshibazar area for plague infection. Four strains of *Pasteurella pestis* were isolated from the dead rats and two from the live ones.

Rats were still dying in fair numbers indicating that the epizootic was active among the rat population and was likely to cover wider areas if not quickly controlled.

(b) *Examination of human cases:* Only 4 human cases of typical bubonic plague infection were reported, three of which occurred in one house owned by Sri Keshabdeo in Fanshibazar and another case in a young girl of the same community and locality. Two cases died.

Plague infection in the first case was confirmed by serological tests, his serum agglutinating with the known as well as locally isolated *Pasteurella pestis* strains at fairly high dilution. *Pasteurella pestis* was isolated from the blood of the third case and was confirmed serologically and by animal inoculation test

(c) *Other findings:*

(1) Attempts to obtain the vector fleas responsible for transmission of plague infection was unsuccessful.

(2) Of the rats examined, 8 were *Rattus rattus* (house-rats) and 12 were *Gunomys varius* (field rats).

CONCLUDING REMARKS:

This short investigation was concluded in less than a week's time: From the above findings, it was confirmed that the plague infection had been prevailing in the town of Gauhati causing an epizootic among the local rat population and also a few human cases. But special enquiry could not be made to trace the source of infection and how it reached the town on the opposite bank of Brahmaputra.

Failure to find out vector fleas in the rats might be due to the small number examined as well as intensive D.D.T. and gammexene spray in the affected areas. The small number of human cases may be explained on the same basis.

It may, however, be mentioned that the potential danger will exist so long as the infection remains present among the rat population causing incipient, mild or severe epizootic among them with the possibility of transmission into the human beings.

In view of the above findings, it was urgently necessary to set up a complete independent organisation to deal with the epizootic as well as the possible human cases and to institute effective control measures in the whole of the town as well as in all the transport and communication centres of road, rail, river and air. After the complete stoppage of the epizootic and of human cases, the organisation could be suitably modified for the routine examination of rat population and to keep a vigilant watch over any further recurrence of the epidemic. Accordingly a scheme of control measures with a budget estimate of Rs. 3,65,000/- under the following heads was prepared and submitted to the Government of Assam for immediate implementation.

1. Area of operation.
2. Control measures and investigation work—(i) organisation and methods, (ii) isolation hospital or wards, (iii) central laboratory, (iv) immunization work, (v) central office.
3. Promulgation of temporary regulations for anti-plague measures.
4. Proper disposal of refuse and garbage and general improvement of sanitation of the town.
5. Publicity and propaganda.
6. Advisory Board for co-ordination of control work by the Government and the public.
7. Training of personnel.

(Contd. on page 118)

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ERADICATION OF MALARIA

With the discovery of DDT and the experience of the whole world in regard to its efficacy in the control of transmission of malaria, it has been possible to inaugurate large-scale malaria control programmes and to prove it a measure economically possible for adoption even by less developed countries. In India a large population has been brought under protection against malaria. In 1946 the Health Survey & Development Committee of the Government of India recommended undertaking of anti-malaria operations all over the country in close association with the central organisation under the Ministry of Health. The Planning Commission further stressed the need in 1951, assigned to the task a high priority and recommended that the programme should be carried out on all-India basis under the auspices of the Point Four Indo-American Aid programme. Some States like Bombay, West Bengal, Madras and Mysore had successfully carried out in their respective areas anti-malaria operations with DDT before the National Malaria Control Project came into existence. A comprehensive Malaria Control Scheme for the whole of India, however, was drawn up by the Malaria Institute of India and named it as National Malaria Control Programme. It was estimated that out of 386 million population, 200 million lived in malarious areas and for bringing the same under protection, 200 malaria control units—giving one per each million population—would be required to be established having each an operation period of at least 3 years followed by a maintenance programme. In 1955-56, 133 malaria control units were in operatoin for varying periods of time in different States giving protection to 112.5 million population. Although the object of the programme for the 1st Five Year Plan period was to afford complete coverage of 200 million population, in actual practice the achievement fell far short of the targets and was also not uniformly satisfactory in all States for various reasons. A standard staff pattern per Unit was formulated and was strictly adhered to without consideration of the physiographical conditions, the extent of area involved, communication and transport, which naturally varied from State to State. Again, the number of units allotted to each State was primarily determined not by the extent and magnitude of the problem but by the financial capacity of the State to support them. The selection of the localities to be brought under operation was very wisely left to the States authorities in the hope that the hyperendemic areas would receive priority of consideration with progressive extension to other areas. The result was that the population actually protected fell much below the desired level, the quality of protection too was below the

standard envisaged due, in several instances, to only one application of the insecticide, inadequate dosage or untimely or delayed spraying operations.

In spite of these handicaps and hurdles, a very definite impression has been made on the incidence of and deaths from malaria. In the 2nd Five Year Plan, it is expected that all the 200 units will be under operation giving protection to the entire population exposed to the risk. Encouraged by the results obtained hitherto and by the success of the experiments carried out in other countries—both large and small—the Government of India is actively considering the proposal made by the experts in the country of switching from a malaria 'control' programme on to one of malaria 'eradication'. The experience of large-scale control programme in malarious areas of different parts of the world over a period of years brought out two very important observations which have considerably influenced the approach to the problem. The first observation is that of the disappearance of malaria parasite in the human host in populations which have been effectively protected against new infections for at least 3 years and thus making any further control operations unnecessary. A similar observation was made years ago in the Sermonita area of the Roman campagna where Dr. Hackett of the Rockfeller Foundation worked, although the method of securing protection was not the same as adopted to-day. The second observation is the demonstration of the phenomenon of resistance which the malaria vectors in some areas have developed against the insecticides in use. While the first demonstrated the possibilities of eradicating the disease, the second stressed the urgency of action, the first step towards which would be the establishment of a complete, quick and adequate coverage of the whole country before the mosquito develops resistance to the insecticide.

There are, besides, other considerations which would prompt us to recommend the eradication programme, as the objective strategy of the two programmes of control and of eradication differed very essentially—the advantages weighing in favour of the latter. The control work covers mainly the hyperendemic areas or areas where malaria is a major problem. It leaves out smaller pockets ordinarily inaccessible or out of the way. It aims at reducing malaria condition to a minimum level and not at complete stoppage of transmission. It needs maintenance of operation for an indefinite period; in other words, commits the State to a continued heavy expenditure year after year. The eradication programme, on the other hand, aims at intensive and thorough control of all malarious areas irrespective of size, accessibility or intensity of malariousness. It requires effective and intensive measures over a limited period only and contemplates complete stoppage of all measures at the end of the period, after satisfying that there is no longer any hazard of re-introduction of infection, which means the maintenance of a fully active surveillance organisation only. Different countries have developed different systems of surveillance. In India it may not perhaps be difficult to merge it finally into the general health organisation of the State Health Services. The most important feature of the eradication programme is that it involves greater expenditure and more intensive efforts over a limited period only and hence is more economical in the long run.

The conditions which must be fulfilled prior to the launching of an eradication programme are (1) complete and adequate coverage, i.e. spraying every house in the area with adequate dose and in time, (2) achievement of the end point of

malaria transmission—namely, childhood spleen rate below 5%—parasite rate below 1% infant parasite rate nil for consecutive 2 years (3) surveillance during interruption of spray for the purpose of report, appraisal and adoption of steps immediately necessary if a case of infection is found. Let us examine the position of malaria control in India to determine if time has arrived to switch on to the programme of eradication. In regard to the criteria mentioned above and the conditions to be fulfilled, the most important among which are those of giving adequate and complete coverage and the achievements of the end points of malaria transmission, it is obvious that this will take time and all that is possible at this stage is to phase the eradication programme in the various States in a manner that would make its adoption for the whole country possible by the end of the 2nd Five Year Plan period. From 1957 onwards more and more units will come under the "interruption of spraying" programme and "surveillance"—according as the end points of transmission have been achieved so that by 1960 all the 200 units will be relieved of repeated spraying, and surveillance established instead.

This, according to the experts—national and international—appear to be the desideratum. While all efforts and energies are to be directed towards achieving the object, serious consideration of the authorities—Central & State alike—should be given to the following aspects of the matter:—

(1) Quickly cover up the areas in the various States that have yet not received control programme benefits.

(2) Eradication programme cost is initially high and will involve capital investment but not permanently recurring cost. If the States are not helped considerably by the Centre either with or without foreign aid, and programmes are left to be decided on the support each State can offer, it will take years to give the coverage both in quality and quantity—a pre-requite for the eradication programme.

(3) Eradication programme will require strengthening the existing control programme staff with men with higher technical training for case finding, treatment, parasitological investigations and verifications of suspected cases, surveillance of infected cases and finally epidemiological investigation and evaluation.

(4) Different States must agree to take up the programme with due seriousness and responsibility and secure the benefits of control operation throughout the State to the required end point level. This point is raised, as some States are thinking of integrating anti-malaria and anti-filaria campaigns without adequate augmentation of staff which would not be a wise policy if eradication, which has a specific, well-defined time-limited objective, is contemplated.

(5) From the epidemiological point of view it is necessary to find out if some of the vector species are tending to change their behaviour arising out of the repellant action of the insecticide and whether their disappearance from the houses is a temporary phase for the survival of the species. For this purpose, some study on the pattern of behaviour changes as well as of other aspects of the bionomics of the vectors should be simultaneously undertaken.

(6) In regard to the question of resistance, it appears that the quantum of dosage—initial as well as subsequent—deserves careful consideration.

Though suspected, the development of resistance in the vector species in India has yet not been established. But if the dosage is not properly adjusted to the special difficulties encountered in the various parts of States, particularly in regard to the absorbent nature of the wall surfaces, particular customs and traditions which obliterate the effect of DDT on the walls, to over-crowding which often causes the insecticide to be rubbed off the walls—and if deterioration of the residual DDT is allowed to occur, it will perhaps offer favourable conditions for the vectors to develop resistance, for it is the small dose and the deterioration of the insecticide that very often lead to the development of resistance among the surviving vector species. A single very large dose or two repeated large doses mean more expense on the insecticide, which must be provided for in the budget of the Centre specifically for aiding the States in this regard.

(7) Another important consideration is the problem of importation of cases harbouring malaria parasites from the neighbouring countries and from adjoining States within the country, particularly if these are not simultaneously put on eradication programme. In this connection, largeness of the inter-State human traffic has to be borne in mind and the problems arising in the border States of the neighbouring countries may present insuperable difficulties in surveillance. Those States that have international boundaries like the Punjab, West Bengal, Rajasthan and Assam, will have to face a very difficult situation regarding surveillance and to maintain the standard of eradication programme. International agencies might be helpful in ironing out such difficulties if necessary with launching of simultaneous programmes in border areas of the neighbouring countries.

The malaria control budget for 1953-55 (inclusive) shows that out of a total expenditure of 120 million rupees, Government of India's contribution was only 11 million, foreign aid brought 69 million and the States' share amounted to 40 million. If eradication is contemplated, Government of India should be prepared to bear the financial burden more liberally. If left to the States, their financial resources will never prove to be adequate. A more liberal budget, a wider outlook, greater circumspection and vigilance on the part of the international and foreign aid agencies, the Government of India and those of the States, will be necessary. Finally we have to guard against the tendency that naturally develops after certain amount of success has been achieved with malaria control programme. Interest lessens as fear of the incidence of the disease recedes. The public shows indiffernce and complacency, while the authorities fail to understand why requests for funds should be continued when the transmission of the disease has practically ceased and there remain only a few cases of malaria which it is hard to conceive as being possible sources of new epidemics. Malaria Eradication Programme begins with systematic spraying for a period which provides an adequate margin of safety and on its discontinuation a fully active surveillance is established through which detection of the still remaining cases is made and action in regard to them taken. It is an abslute essential for the eradication programe or in other words for the fight to the finish.

ANTIBIOTICS AND PUBLIC HEALTH

Since the marketting of penicillin for civilian use in 1944 efforts of the microbiologists and the manufacturers were directed towards discovering newer and newer antibiotics. The result is that inspite of the slow progress at the beginning the recently accelerated pace of discovery has produced a series of valuable antibiotics with fairly wide range of activity. At the same time it has become progressively more difficult for the clinicians to keep themselves abreast with the information about their properties, dosage and the spectrum of effectiveness. The question arises what are the additional advantages of these new products over the old ones, and whether their is really any need or scope for new antibiotics. The answer to the last question is obviously in the affirmative, as specific drugs for quite a large number of diseases are yet to be found. The species of microbs most affected by them are staphylococci, streptococcii pneumococci, neisseria, pasteurella, rickettsias, treponema, vibrio, haemophilus and other gram-negative genera including salmonella, and partially mycobacteria etc. But most of the virus infections like smallpox, measles, mumps, chickenpox, influenza, infective hepatitis, poliomyelitis, encephalitis etc. are not amenable to treatment with antibiotics.

Some of the new antibiotics are: rovamycin, oleandomyclin, romicil, sigmamcin, vancomycin and albamycin or novobiocin. The activities of rovamycin, originally called spiramycin[1] are rather inferior to erythromycin[2] but the advantages claimed over the latter is the cross resistance and actual antagonism between the two antibiotics.[3] Oleandomycin (Pfizer), is another antibiotic related to erythromycin and somewhat inferior to it in bactericidal activity, which exhibits cross resistance and antistaphylococal activity in vitro,[1, 4] the majority of initially erythromycin-resistant staphylococcus being affected by this antibiotic. The other advantages claimed for oleandomycin are (1) it shows cross resistance against carbomycin and (2) it is less toxic or nontoxic to man in therapeutic doses.[4] It has been found effective in bacterial pneumonia, acute streptococcal angina[5] and in osteomyelitis, influenza, Q fever, cholecystits, appendicitis, infective mononucleosis, leptospirosis and inoculation hepatitis.[6] But these claims should be confirmed by further trials. Romicil is another name of oleandomycin given by a Swiss firm.

Sigmanycin (Pfizer) is a 1:2 mixture of oleandomycin and tetracycline. This combination has been based on the idea of two dimensional spectrum of staphylococei. It is supposed to obstruct the acquisition of resistance to either of the antibiotics and is synergic in action, the combination acting much better than either of the components separately[7]. Further trials with combination of antibiotics of different types are, however, indicated.

Vancomycin has the advantages that it is bactericidal and developes very little resistance in bacteria but it has to be administered through the intravenous route. Trials in Mayo Clinic[8] have proved its efficacy in acute endocarditis. Albamycin or novobiocin is another new antibiotic now available. Its advantage is that it attains higher concentration in blood than any other antibiotic but its efficacy has not been fully confirmed.

Apart from the therapeutic uses of these substances the public health and preventive aspects are no less important. On this issue there are both advantages

and disadvantages. Among the advantages the most important is its in vivo bactericidal effect cutting off the infection quickly and making the reservoir free from it early and often completely. Thus the reduction of quantum of infection in a community is a distinct advantage for the control of epidemics and prevention of further spread and in certain instances, prevention of carrier condition. Its use has also brought down the mortality in many severe infectious diseases including tuberculosis. It also cuts down the period of illness which is both a physical as well as an economic gain for the individuals and perhaps more so far the community.

Another advantage is its value as a preservative for foods for man and animal. It has also become very handy for virological culture and experimental work.

The disadvantages or drawbacks of the indiscriminate use of antibiotics are also not few.

Firstly, continued administration or ingestion often induces pronounced drug resistance in pathogenic. Organisms like Myco. tuberculosis, staphylococcus, streptococcus etc. Epidemiologically this is dangerous as the resistant organism might cause serious epidemics and create a major problem from the point of view of treatment and control.

Secondly, frequent use of antibiotics often lead to hypersensitivity and then the drug does more harm than good.

Thirdly, administered in repeated small quantities it leads to the suppression of the virulent pathogenic organism, the causative agent of disease, earlier than what is necessary for the development of specific immunity and hence the persons may be subjected to relapses and repeated attacks.

Fourthly, the suppression of virulent pathogenic organisms may result in the gaining of upper hand by the relatively less virulent organism which are non-susceptible to the antibiotics and may cause disease and death. For instance, patients undergoing treatment with antibiotics are rendered extremely susceptible to infection with pathogenic fungi like aspergilla and monilia.

Fifthly, antibiotics not only suppress the growth of the susceptible pathogenic organisms whose presence in small number is rather helpful for the development of immunity from subclinical infection but also affect the intestinal bacterial flora which are essential for nutrition of the body by manufacturing, Vitamin B complex which prevents pellagra and ariboflavinosis.

Lastly, the antibiotics used on food preservation and absorbed along with the food may increase coagulability of blood and aggravate the chance of thrombosis."

[1] British Medical Journal, 1956, 1, 621.
[2] Garrod, L. P., and Waterworth, P. M., *ibid.*, 1956, 2, 61.
[3] Chabbert, Y., Ann. Inst. Pasteur, 1956, 97, 57.
[4] Needham, G. M., and Geraci, J. E., Antibiot. Med., 1956, 3, 334.
[5] Bernstein, A., and Piller, M., *ibid.*, 1956, 86, 1247.
[6] Esselier, A. F., and Keith, J., ibid., 1956, 86, 1311.
[7] English, A. R., et al., Antibiot. and Chemother., 1956, 6, 511.
[8] Geraci, J.E., et al., Proc. Mayo Clin., 1956, 31, 564.
[9] Steyn, Douw, G—Ind. J. Pub. Hlth 1: ..... 1957.

NOTES & NEWS

I. ACCIDENTS IN CHILDHOOD

Accident Mortality Among Children—Swaroop, S., Albrecht, R. M. & Grab, B—Bull. World Hlth. Org., 15, 123-126, 1956.

The main features of the mortality from accidents in the age-group 1-19 years have been elucidated by an examination of the statistical information available to WHO for certain countries.

The mortality statistics for certain countries have been examined with particular attention to the sex and age of the population, in two ways: (a) by the proportional mortality from accidents (percentage of accidental deaths to total deaths) and (b) by the specific death-rates per 100,000 population.

The proportional mortality figures indicate that accidents have on the whole assumed the leading role as a cause of death in children between 1 and 19 years, but that this is not so among children under 1 year or among old persons. The specific death-rates, on the other hand, show that accidents take their highest toll of life in old age, and not inconsiderable toll in infancy. However, it is the predominance of other causes of death at the extremes of life which overshadows the role of accidents in these two groups. It has also been pointed out that such causes as heart disease and cancer, which account for more deaths at all ages than accidents do, may nevertheless be less important when judged in terms of the years of working life lost or the years of total life lost, because on the average an individual who is the victum of a fatal accident is younger than the patient who dies of heart disease or cancer.

An examination of the main causes of accidents reveals that they differ somewhat from country to country and more by age and sex, thus emphasizing the need for an epidemiological consideration of the accident problem. In general, however, the two most important causes, in the age-group 1-19 years, in the countries studied are motor-vehicle accidents and drowning. It should, however, be pointed out that the case-fatality rate varies considerably from one type of accident to another and that morbidity surveys have shown that other types of accidental injuries may also be frequent in this age-group. Apart from the question of frequency, there is also the question of the severity of the injury and the duration of disability (permanent or temporary), which can be answered only by morbidity statistics.

An examination of the trends in the death-rate from all causes, from accidents in general, and from motor-vehicle accidents and drowning in particular, in the age-group 1-19 years, shows that the death-rate from all causes has fallen greatly since 1931 in the countries studied, and that in most of them the death-rate from accidents has also decreased, although in some there is no appreciable change. In any case, the fall in the death-rate from causes other than accidents (most particularly in the death-rate from infectious diseases) has been so great that accidents are now responsible for a relatively higher percentage of deaths in this age-group. For example, in England and Wales, the average specific death-rate from infectious and parasitic diseases for the age-group 1-19 years was 127.3 per 100,000 population in the period 1931-32. The corresponding rate for the period 1951-53 is only 12.9, a decrease of 89.9%. During the same interval of about 20 years the accident death-rate in this age-group decreased by only 36.3%, so that in 1951-53 accidental deaths accounted for 25.2% of all deaths at these ages in contrast to 9.4% in the period 1931-32.

The trend in the accident death-rate in the age-group 1-19 years has been affected mainly by a decline in the death-rate from accidents other than those due to motor vehicles and by a rise, in most of the countries studied, in the death-rate from motor-vehicle accidents. In some countries the decline in the death-rate from accidents not caused by motor vehicles has been greater than the rise in those due to motor vehicles, so that the death-rate from all accidents has fallen. In Canada, Australia and Sweden, the decline and rise have been of approximately equal magnitude, so that the death-rate from all accidents has changed little. In England and Wales, and to a lesser extent in the U.S.A., the death-rates from motor-vehicle accidents have fallen, as well as the death-rate from other types of accident.

In general, therefore, accidents are becoming relatively an important cause of death among children primarily because of the conquest of other causes of death, but partly also because the rising tide of motor-vehicle accidents in most of the countries studied is nullifying to a greater or lesser extent the gains obtained by the control of other forms of accidental death.

Although the number of motor vehicles and road mileage have been increasing, the motor-accident death-rate for the age-group 1-19 years have fortunately not increasing in the same proportion. Still it is obvious that the trend of the specific death-rate from accidents in this age-group will continue to be affected by the trend of motor-vehicle accident mortality, which is related, more or less, to be increased in motor transport.

The over-all conclusion to be drawn from the available statistical evidence is that, although as a result of the speedier reduction in the death-rate from other causes, the relative importance of accidental deaths in the age-group 1-19 years has increased, there is no justification for taking an alarmist view. In absolute magnitude, accidental deaths are on the whole decreasing, but this decrease is not occurring as fast as it is in the case of many other causes of death. A complacent attitude is therefore also not justifiable. The motor-vehicle problem is clearly not under control. There is also need to determine effective and practicable means of accelerating the decrease in other forms of accidental death. It is hoped that the above analysis, although limited to the mortality aspect of the problem, will to some extent help to clarify the situation and be of use in the efficient planning of appropriate preventive measures in childhood.

2. FOREPOST OF HYGIENIC SCIENCE

By E. MAXIMOVA

Unhygienic conditions of work and certain industrial processes in factories, mines and plants result not only in ruining the health of workers but in such fatal and grave diseases like tuberculosis, silicosis etc. Industrial dust, heat, cold and noise take their own toll.

Few instances described here will give an idea how the research work is carried out and implemented in U.S.S.R. to solve many of the problems that arise.

Combatting Silicosis—a dreadful malady :

Silicosis is a dreadful malady, the constant companion of miners, foundrymen, and workers of porcelain factories. Silican particles, as the scientists say, are very aggressive. When they penetrate into the lungs, nodes, followed by coarser connective tissue, are formed. A healthy lung resembles a light, lacy sponge. In a person suffering from silicosis, lungs do not collapse, they stiffen, on account of the tissue becomig coarse and thick. It is difficult for the heart to send blood through such lungs and the organism begins to suffer from oxygen deficiency. This terrible, treacherous disease progresses slowly, it may go on for years and sometimes dozens of years.

Special masks, wet drilling (a water cloud which settles the dust is formed around the drill), ventilation, dry dust-catching, systematic preventive medical examination—all this has been established long ago by the U.S.S.R. legislation and has led to the almost complete elimination of pure forms of silicosis. However, there are other cases when lungs, weakened by silicon dust, suffer from an attack of tuberculosis. It is therefore very important to discern early symptoms of the disease when the danger of the organism's "collapsing" is not imminent, when all the processes may still be modified.

The workers of the pathoanatomy laboratory have established that the fine network on the lungs which radiologists considered the result of bronchitis is also an early form of silicosis, the so-called diffusive sclerotic form. On finding such symptoms the doctor's duty is to forbid the workers to continue work and to send him to rest and treatment.

Pathoanatomists are aided by the hygienists: the latter decide how the conditions of work are to be made sanitary.

Non-Fatigue conveyer system :

. . . The belt of the conveyer runs smoothly. It carries parts of ordinary, school-bags. At first it seems that the conveyer is moving evenly, however if we take a stop-watch we will find during the first two hours speed continues to increase, then it drops so markedly that the machine makes almost 5-minute intervals. After lunch-hour some of the working women change places in order to switch to other operations. Speed once again increases and then drops towards the end of the workday. This is a nonfatigue conveyer designed by the institute's team of researchers.

As is known, rhythm lightens work, and makes the movements more efficient and brisk. This had led to the creation of a new conveyer

—an indisputably advanced and humane form of organising labour. This conveyer has increased the productivity of labour by twenty per cent and markedly lowered the incidence of disease in the shop. Dr. Kasilov and his collaborators worked out a curve of the alternating rhythm of the conveyer which they studied and based upon physiological principles proceeding from the variations in the working capacity of the human organism during a day of work. To-day scientists are studying the conveyer that mounts precision instruments and watches and are designing apparatuses for new researches, for work on speed machines.

The physiology of mental creative labour is a difficult problem which also deeply concerns the experimental researchers of the laboratory. The significance of this type of labour continues to grow from year to year in industry and agriculture.

For the present physiologists are engaged in studying the work of certain professions of the control type: that of proof-readers, accountants and dispatchers in the subway.

Battle Against Heat and Cold:

The microclimate laboratory is waging a battle against heat and cold. Ordinary water cannot drown their thirst—the more the worker drinks the more he perspires, and with sweat the organism gives up the salt it needs. Loss of salt leads to foundryman's fever. On Soviet plants cold salt soda water is supplied in the hot shops. But the problem of the drinking regime is one of the most important subjects which research workers of the laboratory are still continuing to study.

The thing is that a salt solution possesses an unpleasant quality. It causes a bad appetite. That means that it is imperative to create the kind of drink that would not only quench thirst but also improve digestion.

But the point is how can be microclimate be created in the hot shop to lighten the work of metallurgists? In the laboratory of Professor V. G. Davidov there is a cabin designed by him which is fixed next to where the workman is placed. Four sheets connected with each other from three walls and roof through which ordinary faucet water passes. It is well known that, in premises where the temperature is high overheating depends not only upon the amount of heat a person receives, but also upon how much of it he dispenses. It occurred to scientists that the worker could be made to give out some part of his priciple, the radiation cooling cabin was built.

The industrial sanitation laboratory has built many new apparatuses whose task is to disclose the slightest admixture of harmful substances in the air and to signalize about it.

One of these apparatuses registers precisely, on a moving paper ribbon saturated with a special substance, changes that occur in the composition of the air. For instance, in the presence of Arsinius Hydrogen the ribbon turns yellow and the more gas there is in the building the brighter is the colour. If the amount of the harmful substance in the shop or laboratory is above the permissible level the apparatus with the help of a photoelectric cell emits a sound signalling the danger.

Sanitation Chemistry:

Sanitation chemistry organised in U.S.S.R. in 1918 is an independent branch of science with its own methods of research, capital works, connections and even traditions. And the industrial sanitation chemistry laboratory is one of the oldest in the institute. Quite recently a new laboratory of radiology grew out of it. This laboratory studies the action of radioactive substances on the human organism. Everything here is new, unknown, unfamiliar and extremely promising.

Radioactive Isotopes are beginning to be widely used to-day in all branches of industry —on hundreds of factories where tens of thousands of people come in contact with them. The task consists in obtaining that working with these substances, which exert such a terrible destructive power on living tissues, should become no more dangerous than working with, say, copper or tin.

The designs of the new shops are sent to the laboratory for consultation on questions of safety engineering. Here all the technical novelties connected with radioactive radiation are tested.

Radiologists have begun extremely important observations of the health of research workers who are engaged in work with the powerful ten billion electron volt Synchophasotron in the electro-physical laboratory of the Academy of Science of the U.S.S.R.

Thus the institute carries on its noble task of creating healthy conditions of work which will eliminate all possibilities of danger to a worker's health and his well-being.

3. RESOLUTIONS PASSED AT THE ALL INDIA MEDICAL CONFERENCE

Resolution No. 1—This Conference reiterates the Resolution passed at the 27th All-India Medical Conference held at Sholapur which was as follows:

"That in order to provide a Reserve of Medical Officers for National Emergencies, this Conference recommends to the Government to formulate a scheme for imparting compulsory military training in the medical wings to all qualified medical personnel of military age".

Resolution No. 2—This Conference of the Indian Medical Association cordially invites all specialist associations which are holding their (annual) conferences at different places and at different times, to hold their conferences at the same place and at about the same time—either simultaneously or just before or immediately after the Conference of the Indian Medical Association. If this is done, it will enable specialists of different branches of medicine and general practitioners to come together to their mutual advantage.

Resolution No. 3—This Conference recommends to State Governments that in order to function effectively, the departments of medical and public health be amalgamated and that the head of this unified department be, who should always be a medical man, the Secretary to the Ministry of Health in the respective to the Ministry of Health in the respective States.

Resolution No. 4—This Conference is of opinion that the creation of a "Medical Education Grants Commission" is very necessary at the present time when expansion of medical education is under consideration of Government of India and suggests that necessary enactments by Parliament be made to achieve this object.

Resolution No. 5—In view of the fact that separate Councils of Registration for Ayurvedic and Unani systems are being started all over the country, with the object of encouraging the study, growth and practice of those system and of maintaining proper standards, be it resolved to urge on the Central and State Governments, in the interests of public health, to prohibit the practitioners of these systems from using modern scientific drugs and particularly dangerous drugs including new powerful antibiotics and chemotherapeutic drugs and the practice of modern Surgery. Obstetrics and Gynaecology. Unless such a step is immediately taken, the very objective of having separate Councils will be defeated.

Be it resolved further to warn the general public about the danger of accepting from the practitioners of indigenous systems and unqualified people prescriptions and supplies of such modern drugs.

Resolution No. 6—The Indian Medical Association is concerned over the loss of employment by a large number of doctors as a result of nationalisation of Insurance. In view of the hardships caused to a number of doctors who were specially trained in insurance work and also because of the loss to the Corporation and Government of the experience gained by such doctors, the Indian Medical Association recommends to Government:

(i) to retain or re-entertain all active and regular Insurance medical examiners having registrable qualifications under the Indian Medical Degrees Act, 1916, irrespective of the nature of such qualifications and provided there are no adverse remarks against their names;

(ii) to re-distribute the work in such a manner that all doctors employed get a fairly equal number of cases to examine. The Association thinks that a suitable ceiling be fixed to the number of cases that a doctor would be allowed to examine in a particular period. This number be determined in consultation with the Indian Medical Association.

(iii) To fix the scale of fees for medical examination at a uniform rate of Rs. 15/- per case irrespective of the amount of insurance, as in the opinion of the Association the work involved is the same in all cases. This will ensure a better quality of working being turned out.

(iv) to enable the medical men to do their work in an independent manner, the Association suggests that cases may be sent to the doctors directly by the Corporation.

II. The Indian Medical Association offers to Government and to the Insurance Corporation its whole hearted support to enable nationalised insurance to be a success. To enable the Government to get the opinion of the Indian Medical Association, which is the largest and the representative body of medical men, this Association requests the Government:

(i) to take a representative of the Association on the Central Board of the Insurance Corporation. This medical representative will be helpful in forming a medical sub-committee of the

Corporation that could guide the Corporation in the medical aspects of insurance.

(ii) to take representatives of the Association in all zonal boards, whenever such boards are formed.

III. In order to enable the Association to bring to the notice of the Government and the Corporation the various implications of their recommendations, this Association requests the Government and the Corporation to receive a deputation of the Indian Medical Association at a suitable date and time.

Resolution No. 7—Whereas smallpox still continues to take a heavy toll of human life in the country and whereas it can be completely brought under control and eradicated, be it resolved that mass vaccinations and re-vaccinations of the whole population be compulsorily carried out through either paid officers or trained volunteers. The control of smallpox should form a major campaign in the Second Five Year Plan.

Resolution No. 8—This Conference of the Indian Medical Association recommends to State Governments to constitute expert advisory Committees, including therein representatives of the Indian Medical Association, to advise them on the formulation and implementation of Five Year Plans in relation to health services so that balanced planning, continuity of policy and the most economic utilization of public funds can be ensured.

4. THE FIFTH CENTRAL COUNCIL OF HEALTH

Some of the important resolutions passed at the fifth Central Council of Health Conference held at Ranchi from 14-16 Dec. 1956 are as follows:—

Malaria Eradication

Resolution 1.—'The Central Council of Health notes with satisfaction the progress achieved in the implementation of the various health programmes and welcomes the proposal to intensify the Malaria Control Programme with a view to its conversion into an eradication programme as early as possible. The Council records its deep sense of appreciation of the assistance and cooperation given by the International and Bilateral Agencies in the development of those programmes'.

Strengthening State Health Directorates

'The council notes with regret that a considerable amount of funds allocated for health programmes in the First Five Year Plan has had to be surrendered. Recognising the paramount importance of timely planning and the need for proper supervision of health programmes, the council recommends to all state Governments to suitably strengthen their Health Directorates so as to ensure that all the funds made available under the Second Five Year Plan are fully and effectively utilised'.

Grants to the States

'The Council having considered the position regarding the implementation of certain health schemes requests the Planning Commission to issue necessary clarification to the effect that the grants received from the Health Ministry by the States in respect of certain schemes included in the Central Government Plan will be considered as an addition to the State Health Plan as well as to the total State Plan for the Second Plan period'.

Service Conditions of Nurses

'The Council is deeply concerned about the limited progress achieved in the implementation of the recommendations made by the Nursing Committee and in view of the very important role Nurses in the development of the country's health programmes the council again urges the State Governments to improve the emoluments and working conditions of nurses'.

State Family Planning Boards and Officers

'The Council realising the importance of Family Planning in minimising the pressure of population of the country's limited natural resources and welcoming the provision made for this purpose in the Second Five Year Plan recommends that State Governments should consider the appointment of Family Planning Boards similar to the one recently established by the Union Government. To effectively organise and supervise the Family Planning programmes the Council further recommends the appointment in each State of a whole time Family Planning Officer in its Health Directorate'.

Public Health Engineering in the State Health Directorates

'The Council reiterates its earlier recommendation regarding the setting up of public Health Engineering organisations in the states

under the Directorates of Health Services. Further the Council recommends that all the town and village planning schemes in the States should be drawn up in consultation with the Public Health Engineering Departments of the States'.

Establishment of Primary Health Centres

Resolution 2.—'The Central Council of Health recognising the very important role of primary Health Centres as the focal points for all rural health services, both curative and preventive, welcomes the proposals of the Union Ministers of Community Development and Health to establish more such centres in the extension service blocks and other rural areas under the Second Five Year Plan'.

'The Council however feels that for such centres to function efficiently and effectively it is essential that their activities should be very closely integrated with the other health services already available in the same area'.

'The Council would also like to emphasise the useful role that the village level worker can play in the successful operation of all rural health programmes. The council therefore recommends that such workers should be associated to the fullest possible extent with Health programmes'.

Intensification of Anti-leprosy Work

Resolution 4.—'The Central Council of Health taking note of the views of the State Governments on the report on the Committee for the control of Leprosy, recognising that anti-leprosy measures in operation at present are grossly inadequate and in view of the control programme already initiated in the First Five Year Plan and proposed to be developed further in the Second Five Year Plan recommends (1) that high priority be given to programmes for the setting up of control and subsidiary centres for the detection and treatment of leprosy cases on a mass scale in all areas where the incidence of the disease is high, (2) that adequate attention be paid to the rehabilitation of cases of leprosy, (3) that Goverment agencies continue to expand anti-leprosy work in collaboration with the voluntary and non-official agencies working in this field and (4) that legislation on all India basis be promoted as may be necessary to facilitate an early control of the disease as a public health problem and to control the spread of infection from area to area by uncontrolled inter-state migration'.

Model Public Health Act

Resolution 5. 'The Central Council of Health taking note of the views expressed with regard to the promotion of central legislation on the basis of the model public health act, recommends to the Union Health Ministry to proceed with the early preparation of a draft bill which may be circulated to the State Governments. The matter must be ready to be placed in a concrete form before the next meeting of the Council.'

Compulsory Re-vaccination

'The Council also recommends to the State Governments the suggestion of the Government of West Bengal to consider the feasibility of introducing compulsory re-vaccination in selected groups of 5 to 7 years or at the time of admission to schools. Suitable action may also be taken by the State Governments on the suggestion of the West Bengal Government for the more efficient registration of Births!

'The Council considers further that suitable provision be made in the Public Health Bill or if necessary by separate legislation for the prevention of pollution of sources of water.'

Swasth Hind

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5. RURAL AND URBAN FERTILITY RATES

The National Sample Survey carried out an investigation into "couple fertility" both in the rural and urban areas. The information was collected between April and June 1951, from 19876 sample couples in 1,106 sample villages and between April and September 1952, from 14,119 sample couples in 930 sample villages and 6175 sample town and city blocks.

The results show that couples married after 1930 had on an average a large number of children than the corresponding groups of couples married before 1930 and contrary to the normal experience, the village records are lower than the towns.

The N.S.S., in a report says that two, seven and twelve years after marriage respectively a rural couple married after 1930 reported 0.16, 1.34, and 2.64 children born on an average as against 0.08, 0.96 and 2.16 children born to a couple married before 1930. Similarly, 2, 7 and 12 years after marriage respectively each urban couple

married after 1930 reported on an average 0.26, 1.81 and 3.22 children born as against 0.14, 1.45 and 2.84 children born for couples married before 1930.

6. PAUCITY OF NURSES IN INDIA

The Alwaya factory will be managed by the development of the country's health programmes was re-emphasised at the fifth meeting of the Central Council of Health, held at Ranchi recently. The Council expressed deep concern over the limited progress made in the implementation of the recommendations of the Nursing Committee. It, therefore, again urged upon the State Governments to improve the emolumets and working conditions of nurses.

It is estimated that there are about 17,000 nurses and 21,000 midwives actually practising in India at present. This number falls far short of the countyr's actual requirements.

The Health Survey and Development Committee had recommeded that there should be ratio of one nurse to every 500 of the population and one midwife for every 100 births. On this basis, the total requirements of nurses and midwives would be 7,00,000 and 87,500 respectively for the present population. Even on the basis of one nurse and one midwife to every 5,000 persons, the requirements would be about 70,000 nurses and a similar number of midwives.

In order to meet the increasing demand for Health Personnel in connection with the expansion of Health Programmes under Community Development Projects, a scheme for the training of about 6,600 additional Auxiliary Nurse midwives has been included in the Second Five-Year Plan at an estimated cost of Rs. 89 lakhs to be shared by the Central and State Governments concerned.

7. AMENDMENT OF DRUG RULES

The Association of Indian Pharmaceutical Manufacturers, Calcutta, criticising the Central Government for their proposing drastic changes in the Drug Rules in exercise of Section 33 of the Drugs Act, in a meeting held in Calcutta on November 24 adopted the following resolutions—(1) That the existing rates of licence fees should not be increased, (2) Import of foreign patent preparations which are manufactured in India should be banned, (3) Import duty on plants and equipment, specially on the testing equipments, should be waived. After due survey of the capital structures and other performances individually, the Pharmaceutical concerns should be given help both in the form of subsidies and financial assistance. Government should set up immediately regional test houses in different zones all over India who will be issuing certificates to show the genuineness of the products. A uniform central excise policy should be followed, Railways should arrange for refrigerated cars and cold storage godowns and lower their freight rates for pharmaceutical products to half parcel rates.

8. A NEW EMBLEM TO PROTECT CIVILIAN DOCTORS

The World Medical Association has adopted a medical emblem and a Code of Medical Ethics in time of war. These were recommended by a joint Committee made up of representatives of the International Committee of the Red Cross; the International Committee on Military Medicine and Pharmacy and the World Medical Association with the World Health Organization providing an Observer. Adoption by the member associations and legislative enactments in each country and recognition at the international level to insure complete protection under the emblem is now being implemented.

The new medical emblem destined to protect civilian doctors, their ancillaries and civilian defence units is a red staff and serpent upon a white field. The staff is represented by a vertical line, the serpent by a sinuous line over the vertical line with two (2) undulations on the left side and one (1) undulation on the right side.

9. MEDICAL CERTIFICATES

A new clause (d) in the Rule 2 of the Code of Medical Ethics, Part III has been added by the West Bengal Medical Council. As a result the complete rule 2 reads as follows:

(2) (a) Certificates issued by a medical practitioner over his signature should correspond strictly with facts within his personal knowledge, and should should not be untrue, misleading or improper.

(b) They should not cover more than the actual period during which the patient had been under his personal observation.

(c) They should not be given for inadequate or extraneous reasons.

(d) They must always contain either the signature or the thumb impression of the person to whom they are issued.

Certificates granted in contravention of the above will make the practitioner liable to have his name erased from the Medical Register.

10. MORE MEDICAL COLLEGES IN INDIA

The Government of India have proposed to open during the Second Five Year Plan six more Medical Colleges one of which has already been established in Pondicherry. The other five colleges are proposed to be located at Kanpur, Jamnagar, Ranchi, Bhopal and in the Kerala State.

11. THE SECOND DDT PLAN TO BE SET UP

For setting up a second D.D.T. factory at Alwaya (Kerala) a further progress has been made in its stage of execution by the selection of U.S. firm for a "turnkey" job of supply, installation and commissioning of the plant.

The factory, which is expected to cost about Rs. 80 lakhs, will have a capacity of 1,400 tons of D.D.T. per year. The factory is expected to go into production by the middle of 1958.

The total value of the contract awared to the U.S. firm is $737,100 of which the rupee expenditure may be of the equivalent of $150,000. The firm has guaranteed to put up the complete plant and bring it to full production within a period of 18 to 23 months. There is provision for bonus for every day that the firm shows full production before 18 months and penalty for each day that the production is delayed after 23 months.

The Alwaya factory will be managed by the Hindustan Insecticides (Private) Ltd., a Government-owned company under the Ministry of Production, which is entrusted with the management of the Delhi D.D.T. factory. Work on the project has already begun. When in full production, the factory is expected to employ 250 persons.

With the completion of the Alwaya project, India will be self-sufficient in the requirements of anti-malaria insecticides. The capacity of the Delhi D.D.T. factory is to be doubled and insecticides other than D.D.T. are being produced at the rate of 2,000 tons per year by private manufacturers. The total requirements are estimated at 5,000 tons per year.

12. ANDHRA GOVERNMENT SANCTIONS DEPARTMENT OF HISTORY OF MEDICINE

The department of History of Medicine which was sanctioned by the Andhra Government and located in the Andhra Medical College Buildings, Visakhapatnam, was opened by Srimati M. Chandrasekhar, Union Dy. Minister of Health on 20.9.56. It is the first of its kind in India. This department will try to answer any enuqiries relating to the History of Medicine, i.e., lists of books, source materials, individuals, institutions interested in particular branch or subject or epoch or author.

13. PLEA FOR SPECIAL DIPLOMA IN SKIN DISEASES

The need for providing all facilities to specialise in the treatment and prevention of skin diseases and also for instituting a special diploma for the purpose, was stressed by Dr. P. V. Cherian, Chairman of the Madras Legisllative Council, inaugurating the third All-India Conference of Dermatologists and Venereologists at Madras on 29-12-56:

Dr. Cherian, in the course of his inaugural address said that in our country there were a large number of physicians and surgeons and specialists, and he was convinced that there was no need for our boys and girls to go to foreign countries for higher examinations.

He referred to the plight of people suffering from leprosy and expressed the hope that with the better therapeutic discoveries they were now making, a time would soon come when leprosy would be a disease of the past. There were a large number of skin diseases in our country, some of which were very peculiar to the tropics. He urged that every opportunity should be taken to develop this speciality and suggested that it would be of great use if a special diploma was instituted for the purpose.

14. HOSPITALS AND ISOLATION BEDS FOR T.B.

(1) *T.B. Hospitals at Indore:*

Dr. Pattabhi Sitaramayya, Governor of Madhya Pradesh, declared open the newly-built 70-bedded Manorama Raje T.B. Hospital at Indore on 3rd December 1956. It was constructed and equipped at a cost of Rs. 9 lakhs for which the Maharaja Yeshwant Rao Holkar had donated a sum of Rs. 4,31,000/- to name

the hospital after his late sister Manorama Raje Holkar. The Hospital has been provided with modern equipments, a full ledged laboratory and a radiology section. The recurring annual expenditure of this hospital will be Rs. 1,25,000/-.

(2) T. B. Isolation Beds in State Hospitals :

The Government of India have sanctioned Rs. 3,98,125/- to various States for the establishment of T.B. isolation beds in hospitals and institutions during 1956-57. This amount represents 50 per cent of the Central Government's grant towards meeting the non-recurring expenditure on the establishment of the beds. The total number of beds to be established through these grants is 637. The recipients are the Governments of Andhra, Bihar, Bombay, Himachal Pradesh, Kerala, Madhya Pradesh, Mysore and .U.P. The number of beds they are expected to establish in their institutions are 150, 200, 25, 10, 72, 80, 50 and 50 respectively.

15. POST-GRADUATE COLLEGE OF OBSTETRICS, GYNAECOLOGY AND CHILD HEALTH FOR CALCUTTA

The Chittaranjan Seva Sadan Post-Graduate College of Obstetrics, Gynaecology, and Child Health was inaugurated at the institution's premises at Calcutta, on 23-1-57, by Dr. Radhakrishnan. Earlier, the Vice-President laid the foundation stone of the Chittaranjan Sishu Sadan Polyclinic at the same place.

In his inaugural address, Dr. Radhakrishnan said that it was wrong to believe that Indians had been interested in celestial bliss alone and not in mundane things. It had always been recognised in India that physical fitness was necessary for intellectual and spiritual development.

Indian books on philosophy and religion had stressed this need for physical fitness and in ancient times hospitals were not unknown in India.

During the past 50 years, he continued, there had been many advances in medicine—the discovery of wonder drugs and new therapeutical advances. India had benefited from them but had made no contribution towards them. This was not, he believed, because Indians were less able but because research required equipment and co-ordinated work.

He expressed the hope that the new post-graduate colleges that were being inaugurated would provide the necessary opportunities and become nurseries of research scholars in medicine and surgery.

16. RESEARCH-CUM-ACTION (RCA) PROJECT

Environmental Sanitation Workers meet in New Delhi

Workers of the Research-cum-Action project of the Government of India started with the support of the Ford Foundation met on the 18th and 19th March, 1957 at New Delhi. They exchanged information and experience they had gained so far in their areas and discussed important problems of administration, health education, sanitation and sociology as related to the programmes of the project centres. These projects have been located at Najafgarh (near Delhi), Singur (near Calcutta), and Poonamalle (near Madras) and integrated with the Orientation Training Centres for the health personnel working in the commuity development projects. The RcA Scheme attempts to find out the best methods of bringing environmental sanitation—with emphasis on latrines—to the villages, in order to cut down the incidence of death and ill health from those diseases that are caused more or less directly, with or without the intervening action of flies, by contact with human faces. The following six point research programme is being carried on in these centres :—

1. Clear definition of the problem, and agreement on objectives and priorities.
2. Biological principles upon which the attack is to be made.
3. Engineering application of the biological principles.
4. Knowledge of the people's values, beliefs, attitudes, and motivation as they relate to environmental sanitation.
5. Health education based on knowledge of the people.
6. Administrative problems in environmental sanitation.

—Swasth Hind

17. CULTIVATION OF MEDICINAL—PLANTS

Central Organisation to be set up :

A Central Indian Medicinal Plants Organisation is proposed to be set up by the Government of India in collaboration with ICMR, CSIR and ICAR.

This organisation will be the co-ordinating body for the work done in connection with the cultivation of medicinal plants, standardisation and certification of drugs, correct identification and prevention of adulteration in drugs etc.

The Central and State Governments are also considering the establishment of Herbaria in various localities for the purpose of cultivating genuine Indian drugs which can be used for treatment in the indigenous systems of medicine.

18. ROCKEFELLER GRANT

The Rockefeller Foundation announced the grant of 2,500 dollars for the Madras Medical College toward the development of its department of pediatrics.

The Rockefeller Foundation also announced the grant of 88,000 dollars to the Indian Council of Medical Research in Delhi for neurological research. The foundation feels that the prevalence in India of a number of diseases which involve the nervous system such as lathyrism, nutritional deficiencies and leprosy provide excellent opportunity for neurological investigation. Leprosy particularly which commonly produces selective damage to nerves, difficult or impossible to duplicate experimentally, offers, according to the foundation, unique opportunities for study of the pathology and physiology of nerves and specially their sensory distribution.

19. SCHOLARSHIP FOR STUDY IN TUBERCULOSIS IN U.K.

The National Association for the Prevention of Tuberculosis, London, has offered a scholarship of the value of £350 to a medical graduate from India for study in tuberculosis in the United Kingdom during 1957.

The candidate will be selected by the Tuberculosis Association of India and will have to give an undertaking of return to tuberculosis work in India after the training.

The comprehensive programme of study will include two months' study at a sanatorium, of different forms of collapse therapy, pathology, administration, records and sanatorium routine; one month specialist experience according to the interest of the candidate, such as orthopaedic or genito-urinary or pneumoconiosis; one month's study in the treatment of tuberculous children, diseases of bones and joints and tuberculous meningitis; six weeks' at chest clinics for a study of domicillary treatment, follow-up of contacts, tuberculin testing, B.C.G. vaccination, after-care and rehabilitation; and two weeks' at a mass radiography unit to study reading of miniature and large films, dark room technique, records, organisation and equipment.

20. MALARIA CONTROL OF INDIA

The Government of India and the U.S.A. signed a supplementary project agreement under which India will get $6\frac{1}{2}$ million for her malaria control programme.

This is the first agreement under the U.S. Development Assistance Programme for the fiscal year ending June 30, 1957.

The money will be used to obtain from outside India 9,200 long tons of 75 per cent water wetable D.D.T. powder and 200 long tons of 50 per cent water wettable Dieldrin powder.

Under the agreement, the Government of India will provide the rupee equivalent of $2.3 million to meet the costs of local operations and inland transportation.

India's nationwide Malaria Control Programme, now in its fifth year of operation, envisages the extension during the current year of the operations so as to give some measure of protection to about 200 million people living in malarious areas.

21. NATIONAL MALARIA CONTROL PROGRAMME

During 1955-56, 133 malaria control units were functioning in the various States and afforded protection to about 112.46 million people. The objective of the Programme during the 2nd Five Year Plan is to form 200 units and afford protection to 200 million people.

During the First Five Year Plan the expenditure of this programme was about Rs. 11.5 crores. During the 2nd Five Year Plan a sum of rupees 27 crores has been earmarked by the Planning Commission for malaria control.

In order to co-ordinate the anti-malaria activities on either side of Indo-Burma border, an inter-country meeting was held recently in which the representatives of the Government of India, the Government of the Union of Burma and the World Health Organisation participated. Indian delegation was headed by Lieut-Colonel Jaswant Singh, Director, Malaria Institute of India, Delhi; Additional Deputy Director General of Health Services, Government of India, New Delhi.

22. FILARIA INFECTION RESEARCH

The Scientific Advisory Board of the Indian Council of Medical Research approved a budget of Rs. 78 lakhs for financing 296 research schemes to be taken up in 1957.

The sum included provision for a new building for housing the Nutrition Research Laboratory in Hyderabad and for the expansion of the Virus Research Centre at Poona.

The Board also recommended two research units one at Calcutta and the other either at Trivandrum or Ernakulam for combating filarial infection. It decided to undertake pilot studies for the control of guinea worms disease and recommended the starting of a cholera advisory centre at Calcutta.

23. WORLD CONFERENCE ON MEDICAL EDUCATION

The Second World Conference on Medical Education is scheduled to be held between August 30 and September 4, 1959, at Chicago, U.S.A. to consider the theme "medicine is a life long study". This Conference which will be sponsored by The World Medical Association will have the following collaborating organizations: (1) The World Health Organization; (2) International Association of Universities; (3) Council or International Organizations of Medical Sciences.

The Programme Committee under the Chairmanship of Dr. Victor Johnson, Director of The Mayo Foundation for Medical Education and Research, University of Minnesota Graduate School, invites members of medical schools aid faculties; member national medical associations and their medical education committees; and organizations and individuals interested and qualified in medical education to submit to it topics and problems that should be considered within the frame of reference of a conference devoted to exploring the continuing education of the doctor after graduation from medical school.

The four general section subjects which are currently being considered are: I. Basic Clinical Training for all Doctors, II. Advanced Clinical Training for General and Speciality Practice, III. Education for Research and Teaching, IV. Methods of Continuing Medical Education Throughout Life.

Dr. Raymond B. Allen, Chancellor, University of California in Los Angeles has been named President of the Second World Conference the late Sir Lionel Whitby of the United Kingdom was President.

The Conference objective is an exchange of information for the purpose of assisting in raising the standards of medical education of the world. This follows the pattern set by the First World Conference on Medical Education held in London, England in 1953 which devoted its deliberations to undergraduate medical education.

The Programme Committee wishes to provide the Conference with competent representative speakers and participants for panel and group discussion from every area of the world speaking to stimulating thought provoking topics and considering problems universal to the doctor who has completed his basic medical education, regardless of his age, mode of medical practice or specialized interests or education. To accomplish this, the Committee needs suggestions and guidance in the selection of conference topics and eminent doctors qualified to speak on these subjects. Each country of the world recognizes doctors of this calibre within its nation. Every medical organization of the world is cordially invited to submit the names of these experts, the area of each expert's proficiency as well as topics and subjects, the discussion of which at such a world forum, would prove useful in elevating the standards of medical education the world over. Suggestions should be addressed to: The World Medical Association, 10 Columbus Circle, New York 19, New York.

24. INTERNATIONAL CANCER CONGRESS

The Seventh International Cancer Congress sponsored by the International Union Against Cancer will be held in London, England, July 6-12, 1958 under the Presidency of Sir Stanford Cade. Congress headquarters will be The Royal Festival Hall. There will be two main sessions of the Congress: A. Experimental, B. Clinical and Cancer Control. Special emphasis will be placed on Hormones and Cancer, Chemotherapy, Carcinogenesis and Cancer of the Lung.

Preferred papers will only be considered if submitted with an accompanying abstract (not over 200 words) before October 1957 and if dealing with new and unpublished work. The registration fee for the Congress will be £10 (ten pounds) or $30 (thirty dollars) and the latest date for registration without late fee will be January 1, 1958.

Registration forms and a preliminary programme will be available early in 1957 on

application to The Secretary General, Seventh International Cancer Congress, 45 Lincoln's Inn Fields, London, W.C. 2, England.

25. INTERNATIONAL CONGRESS ON OCCUPATIONAL HEALTH

The 12th International Congress on Occupational Health will be held at Helsinki from July 1—6, 1957. The preliminary programme of the Congress includes the discussion of the following subjects: Industrial Noise, Evaluation of Invalidity, Industrial Hygiene Norms, Cardiacs and Work. There will be an opportunity before and after the Congress for members to visit and acquaint themselves with the organization and operation of occupational medicine and hygiene in other Scandinavian countries. There will be an excursion on July 7 to industrial establishments and hospitals in various parts of Finland. The official languages of the Congress are English, French, German and Spanish.

The Congress fee for members is U.S. $10,00. Further information relating to the Congress may be had on application to the Organising Committee, c/o. Tyoterveyslaitos, Haartmaninkatu 1, Helsinki-Toolo. Chairman Dr. Lee Noro and Secretary-General Dr. Pentti Sumari.

26. INTERNATIONAL CONGRESS OF DERMATOLOGY

The 11th international Congress of Dermatology will be held at Stockholm on 31 July—6 August, 1957. The Congress has decided to limit the programme of the Congress to the following main themes: (1) Biology of Skin Surface, (2) Systemic Reticulosis, (3) Vascular Allergy, (4) Occupational Dermatoses, (5) Newer Developments in Dermatological X-ray Therapy, (6) Cosmetic Dermatology. Symposia will also be held.

27. EIGHTH ALL INDIA CONFERENCE OF THE SOCIETY FOR THE STUDY OF INDUSTRIAL MEDICINE

The 8th All India Conference of the Society for the study of Industrial Medicine will be held on the 12th, 13th and 14th April, 1957 at the All India Institute of Hygiene & Public Health, Calcutta. In the two symposia viz. (1) Importance of Industrial Health Service in the Second Five Year Plan and (2) Industrial Health Service *vis-a-vis* E.S.I. Scheme have been organised. During the session Sir Ardeshir Dalal Memorial lecture will also be delivered.

REPORTS & REVIEWS

VITAL STATISTICAL RATES-INDIA
(January, 1957)

Out of 3,018 towns in the country 318 towns have a population of more than 30,000 each. Reports received from 226 such towns showed that during the first week of January, 1957 the birth rate was 31.3 per 1,000 population and death rate was 12.8 per 1,000 population. Birth and Death Reports were available from 223, 236 and 244 towns during the 2nd, 3rd and 4th week of January, 1957 and the corresponding birth rates were 29.6, 29.1 and 26.4 and the death rates were 12.8, 12.9 and 12.7 during the respective weeks. It is estimated that the birth and death rates in large towns and cities of the country in the month of January, 1957 were 29.2 and 12.6 as against revised figures 32.3 and 13.5 respectively in the month of Dec. 1956. During January, 1956 the birth and death rates were 29.7 and 12.4 respectively. Thus during this month the birth rate was slightly lower than that during January, 1956 and lower than the five yearly average rate (30.6) for the month. The death rate was slightly higher than that in January, 1956, but it was considerably lower than the five yearly average rate (14.5) for the month.

Swasth Hind

A NOTE ON "SALIENT FEATURES OF PUBLIC HEALTH IN ANDHRA STATE"

By Dr. C. C. Sundarsanam Naidu,
Director of Public Health, Andhra State.

1. VITAL STATISTICS

The Andhra State inaugurated on 1/10/53, has according to 1951 census a population of 20507801, extending over 63608 Square miles. Registration of Vital events is compulsory almost all over the State *i.e.* 98% of the population excepting those in the hilltracts and backward agencies. The estimated mid-year population for 1955 on the basis of arithmetical progression method is worked out as 21,264,7221.

The following figures summarise the important Vital Statistics recorded.

	No. of events		Rates	
	1954	1955	1954	1955
Births	5,47,001	6,38,009	26	30
Deaths (total	2,93,692	3,15,029	13.96	14.81
Deaths by causes				
Cholera	977	532	.946	.025
Small-pox	1,471	1,278	.07	.06
Plague	33	19	.0016	.00089
Fevers	94,949	1,08,065	4.51	5.08
Malaria	3,610	3,811	.17	.18
Dysentery and Diarrhoea	20,958	18,318	.996	.86
Respiratory Diseases	20,190	22,745	.96	1.07
Deaths from Child birth	3,144	3,677	*5.69	5.71

* Rates of deaths from child births are worked out for 1,000 live and still births.

The Birth Rate for the State as increased considerably, while there is at the same time a slight increase in Death Rate. This is partly accounted for by the greater completeness of Birth and Death returns for year 1955. However, this appears to be an interesting phenonmenon common to various neighbouring states also the peculiarity about it consisting in the fact that whereas for over a decade the general trend in birth rates in several states in India has been one of decline, though it did not lend itself to any simple interpetation the general increase noticed in 1955, forms a clear departure from the previously observed trend. I would suggest in this connection that the Indian Public Health Association may do well to form a sub-committee comprising members among the Vital Statisticians of the States to go into the matter in detail and that there should be regular sample surveys conducted in every State not only to improve the state, on a uniform basis, of registration but also to help the precise assessment of Health in various directions.

2. NUTRITION

Under-Nutrition and mal-nutrition are common in the low income groups and even among middle income groups of Andhra Population. Deficiencies in certain nutrients like vitamin A, Thiamin and calcium and in protein consumption are widely prevalent among even higher income groups. Consumption of productive Foods like milk, fruits,, green leafy vegetables has to be popularised and the necessity for balanced diets as also improved diets for special vulnerable groups such as pregnant and nursing mothers will have to be brought home to the Public through a wide-spread programme of Health Education and Publicity. A campaign for reduction of the Public mind in the correct methods of cooking has also to be carried out so as to prevent losses of nutrients in existing traditional modes of preparation and cooking of foods.

In fact the above conditions would appear to be common throughout all the States in the Indian Union and, therefore, it has been suggested that a National Public Health Nutrition Programme should be taken up under the Second Five Year Plan. just like the National Malaria Control Programme and the National Filaria Control Programme.

At present, there is one Regional Nutrition Health Unit with a Health Officer specially trained in Nutrition and ancillary staff and equipment including a Health Education Van, functioning in Andhra State. This Unit had been concentrating effects since formation of Andhra State in 1953, on Nutrition work in Community Projects area in East Godavari District, and recently shifted to work at Visakhapatnam in the Beri Beri Research Scheme based on A.M.C. Visakhapatnam, in Visakhapatnam Municipality and environs. This unit is going to work hereafter at Guntur Medical College as Thiamine deficiency is observed to be severely prevalent in Guntur District.

The establishment of a Central Nutrition Bureau in the State under the charge of an Assistant Director of Public Health with a well equipped museum and laboratory for carrying out analysis of locally grown foods and analysis of customary preparations sold in local restaurants etc. and for carrying out research on specifice nutrition problems is under contemplation and the plan provision for the scheme in Second Five-Year Plan is Rs. 1.61 lakhs. The Nutrition Laboratory is proposed to be established in 1957-58 only.

Besides there should be one more regional unit for the State with one Health Officer trained in Nutrition and ancillary Health Inspector staff with a Jeep Station Wagon with a 4 wheeled drive equipped for carrying out nutrition surveys and for nutrition publicity and education in villages by provision of a 16 m.m. projector and films and also equipped for carrying out cooking demonstrations and for treatment of nutritional deficiencies and minor nutritional ailments and for free distribution to special vulnerable groups, of food and vitamin supplement supplied by bodies such as UNICEF. As may be observed from a perusal of the reports of the Indian Council of Medical Research on work done in Nutrition in various States, there is need for arranging to effect an interchange of views and methods between Nutrition experts and Statistical personnel actually working with biometric data in various States. Although the Indain Council of Medical Research constitutes at present an eminent form of the kind suggested, the Indian Public Health Association may have an important role to play in this direction by way of giving studied suggestions with regard to the detailed working of nutrition units in the various states.

3. MATERNITY AND CHILD WELFARE SERVICES

There are at present 445 Maternity and Child Welfare Centres functioning in Andhra State, out of which 113 are under District Boards, 65 in Municipalities, 10 in Panchayats Boards, 100 under Government in selected areas such as Primary Health Centres in Community Project areas, Community Development Block and National Extension Services Blocks, 25 under the Women's Welfare Department in rural parts, 96 under Central Social Welfare Board and 21 centres conducted by voluntary social services organisations such as Indian Red Cross Society.

Necessary steps are being taken to extend Maternity and Child Welfare operations to the rural areas by developing Primary Health Centres including Maternity Child Health, strengthening the existing Maternity Centres and by improving the training facilities.

One post of Assistant Director of Public Health Andhra, (Maternity & Child Welfare) has been sanctioned and necessary steps are being taknen to fill up the post by a suitably qualified and experienced senior officer.

As regards subordinate personnel, 5 pupil Health Visitors are under-going training and 52 more Health Visitors have been given orders of admission to the Health Visitors Training School, Visakhapatnam in July 1956.

The State Government have sanctioned starting a training to 360 Dais and necessary steps are being taken to implement the scheme and the training course will commence from 1-10-57. The UNICEF's aid for the Public Health and Nursing Training Project has been vouchsafed, and towards the total target of 1800 Dais to be trained in all at the rate of 360 Dais each year in the Second Five-Year Plan period, it is expected that the UNICEF will be supplying 1800 Daiskits, 10 sets of teaching equipment etc.

Establishment of Primary Health Centres :

The scheme for expansion of Health Services envisages the establishment of 100 Primary Health Centres, and provision of mobile dispensary and health vans, one at each of the 12 health centres in Guntur and Kurnool Districts.

Simhachalam Health Centre and Sanitary Inspectors.

Training :

One Health unit, with a Maternity Home attached at Simhachalam was started during 1953-54 to afford Training facilities to the student Sanitary Inspectors at the Andhra Medical College, Visakhapatnam. Subsequently the Health Unit which was covering only a population of about 22,000 has been upgraded into a Rural Health Centre covering a population of about 63,000 in conjunction with the Department of Social and Preventive Medicine in the Andhra Medical College, Visakhapatnam. The Centre is in charge of a Health Officer Class I with necessary technical and non-technical staff. Transport facilities viz. one ambulance van and one Station Wagon have been supplied to the centre on March 56 to afford integrated curative and preventive services to the masses.

The Health Centre is in need of much all round development and a housing survey is being conducted at present in the villages within its jurisdiction.

4. FAMILY PLANNING.

To adopt positive measures for the Propagation of Family Planning Technique as a measure to reduce the high pressure of population and the rate of growth the establishment of 5 Family Planning Clinics has been sanctioned by the State Government and of these one has been functioning in Kurnool Municipality under control of Public Health Directorate and the other 4 clinics are under the control of Director of Medical Services (Andhra). The Government of India have sanctioned the opening of 2 Family Planning Clinics, one in Visakhapatnam and another in Eluru run by the respective Municipalities with Central assistance. Intensive Health Education and Publicity campaign is a prerequisite for successful working of Family Planning Propaganda.

5. B.C.G. VACCINATION:

B.C.G. Vaccination campaign was inaugurated in Andhra State in October 1954 at Visakhapatnam. Nearly 3 districts have been covered by the unit with 3 teams working in the region of coastal districts. In September 55, a parallel B.C.G. Unit was started in Chittoor District so as to carry out B.C.G. Vaccination simultaneously in the Central Districts. This unit has been making rapid progress and is

functioning now in Cuddapah District after covering Chittoor fully.

The Campaign has so far tested 22,62,049 persons read 15,91,185 and vaccinated 7,68,497 up to the end of July 56. The progress and popularity of the campaign deserve special notice.

With the ensuing formation of Andra Pradesh, the health problems of the New State are bound to increase, in as much as the area to be added from the present Hyderabad State happens to have no complete registration of vital statistics and no District Boards organisations and stands in need of much improvement in every direction of developmental activity.

However, the experience gained in the past in the Madras Composite State of old and the rapid improvement marked in the Andhra State in the short period of 3 years after formation fill one with confidence that the health status of Andhra Pradesh as whole is bound to improve tremendously before the completion of the Second Five-Year Plan.

ANNUAL REPORT FOR 1955 OF THE HIND KUSHT NIVARAN SANGH, (INDIAN LEPROSY ASSOCIATION), NEW DELHI.

Report of the Chairman :

The Chairman, Rajkumari Amrit Kaur, Health Minister of the Government of India. states that the National Leprosy Control Scheme is the outcome of collaboration between the Govtrnment of India and the State Governments. Under this scheme it is proposed to establish a large number of leprosy treatment centres in various states where leprosy is highly endemic to control the spread of leprosy by intensive mass treatment with modern drugs.

National Lepresy Control Scheme:

During 1955-56 only about 20 centres started working, out of 40 sanctioned under the National Leprosy Control Scheme. The centres which have been established cover a population of about 7 lakhs population out of which about 1½ lakhs have been examined. At these centres about 10,000 patients are receiving treatment and over 6,000 contacts have been registered for observation and follow-up. In the Second Five-Year Plan 100 new centres are to be added.

The Committee for the Control of Leprosy:

Although the estimated extent of leprosy in the country is about 15 lakhs there are only 152 institutions with accommodation for 19,600 and the total number out patients clinic was 1,203 at which about 1,20,000 patients are treated.

As the activities existing are grossly inadequate, the Committee recommends gradual expansion of anti-leprosy work in all directions vis. In-patients institutions village isolation centres, Out-patient clinics (including mobile clinics) control units, rehabilitation colonies social services for patients and dependents and measures for the protection of children, etc.

Regarding the training of personnel for anti-leprosy work, the Committee recommend (1) an adequate number of lectures and demonstrations in the under-graduate course. (ii) adequate training in the post-graduate course and facilities for refresher course. (iii) an increased emoluments to attract a sufficient number of medical men. (iv) training of sufficient number of non-medical assistants to help medical man in their anti-leprosy work.

In the matter of inter-state migration of beggers suffering from leprosy the Committee recommends: —

(*a*) establishment of adequate number of homes for beggers with infective leprosy by the state governments with the Central aid if necessary.

(*b*) Central Government should meet the expenses incurred due to the stay and treatment of migrated beggers either from their own funds or by recovering these expenses from the states where from these beggers have migrated.

(*c*) Organisation of Regional Homes to be maintained or subsidized by Central Government.

The Committee also prefers promulgation of a Central Act of Parliament applicable to all the states.

In the opinion of the Committee the State Governments should also be responsible for co-ordinating all anti-leprosy activities in the state sponsored both by the government and voluntary organisations but the research activities and the research institutions in the state should be the responsibility of the Central Government with co-ordination at both the Central and the State levels.

Plan for Leprosy control in the Second Five Year Plan :

The Health Panel of the Planning Commission has recommended that the National Leprosy Control scheme should be continued and expanded but the expenditure on each centre should be reduced by curtailing some of the staff and other expenses and utilising the savings towards setting up more centres to obtain a wider coverages. These centres should ultimately be integrated with the health centres of NES blocks. They also made other recommendations including the establishment of a Central Leprosy organisation attached to the Directorate General of Health Services for co-ordinating all works. The scheme of Leprosy control programme will be as follows: —

(1) *Personnel*—500 doctors and 2,000 paramedical personnel (including 200 technician) will be trained during the next five years at a cost of Rs. 3.81 lakhs.

(2) *Health Education*—The programme should cover the general Public, the medical profession, leprosy workers and patients.

(3) *Case finding*—It should bt integrated with the machinery for treatment but survey unit may be employed in special cases.

(4) *Treatment of cases on an extensie scale through :*
- (*a*) Leprosy clinics.
- (*b*) General hospitals and dispensaries.
- (*e*) NES Blocks—In all blocks where leprosy is endemic the existing health units should offer treatment to suffers through trained medical officer and some additional staff. Twenty such centres should be started every year during the next five years.

(5) *Upgrading of the existing in-patitnt institutions :* through the provision of the following facilities:

(*a*) a full-fledged medical officer or a doctor trained in leprosy.
(*b*) one or more para-medical personnel for keeping link with the patients' home and village and for making arrangements for treatment and rehabilitation of those discharged and follow up work.
(*c*) prevention and treatment of deformities, training on suitable crafts, etc.

(6) *Rehabilitation of patients :*

(7) *Co-ordination :*—of work voluntary, state and central Leprosy Organisation through :
(*a*) Central Leprosy Organisation under the Director General of Health Services.
(*b*) Central Leprosy Advisory Board
(*c*) State Leprosy Advisory Boards.

(8) *Finance :*
The states have provided 5.29 crores and the Central Ministry of Health Rs. 28 lakhs for the Control of Leprosy. The following additional schemes have also been recommended.

(9) *Aid to voluntary Leprosy institutions :*
A sum of Rs. 4,27,500 has been distributed among 22 Leprosy institutions during the First Five Years Plan.

Research Activities of the Hind Kusth Nivaran Sangh :

General—The main activities included routine clinical and therapeutick work, research, teaching and publication of the quarterly journal, "Leprosy in India."

I. *Research activities :*—

These are bacteriological, histological, immunological, therapeutic studies.

(a) Bacteriological—Myco, Leprae has been studied by electron microscope and phase microscops and five former have been described.

(b) *Histological*—(i) Study of biopsy specimens from cases of leprosy of different types for intracellular lipid which is almost pathognomonic of the lepromatous nature of the lesion. (ii) study of cutaneous nerves in sections from skin lesions stained by silver-impregnation method and acid-phosphatase method is being continued.

(c) *Immunological*—From a study of lepromin test in contacts of leprosy cases they have come to the conclusion "the negative reactors are not only more likely to get the disease, but also more likely to get the serious (lepromatous) form of the disease."

(d) *Therapeutic studies*—(i) Studies with "Hydnosulphone" has shown that it has "definite value in the treatment of leprosy, especially in cases which cannot tolerate and/or do not make satisfactory progress with other drugs." (ii) Dihydroxy derivative of DDS has no advantage over plain DDS.

II. *Teaching :*

Lectures demonstration on leprosy were given to the DTM & H and L.T.M. classes of the School of Tropical Medicine, Calcutta. Two leprosy courses were conducted durin the year. Sangh also conducted the All India Leprosy Workers Conference at Jamshedpur.

Report of State Branches :

West Bengal :

The work of the branch consisted of leprosy survey, teaching, publicity and inspection of clinics. During the year 20,525 students and 896 staff of the remaining 126 Primary Schools of the Calcutta Corporation were examined. 80 cases of leprosy (N-79 L-1) were detected among the former, and 3 (N-28, L-19) were detected, mostly among the scheduled castes. 3696 persons residing in some 20 villages in Raiganj (West Dinajpur) were examined and 60 cases (N-53, L-7) of leprosy were detected.

Uttar pradesh :

Besides giving grant in aid to a few clinics and voluntary organisations and free distribution of sulphone tablet to various institutions, educational campaign was carried out and three district branches of the association were formed.

Hyderabad Pradesh :

5 special leprosy centres were maintained, the treatment work being done by Government medical officer. Grant-in-aid was given to two voluntary organisations and two colonies, in addition to provision of one survey and propaganda officer to one of the above voluntary organisations.

Orissa :

51 rural leprosy clinics and 8 colonies were maintained, and grant-in-aid was given to one voluntary organisation, 450 leprosy patients were maintained by the branch, 420 at the Cuttak Home & Hospital and 30 at Hatibari colony. A start has been made for the isolation of vagrant leprosy cases and establishment of domicilliary treatment centres in former state areas. 70 bacteriologically positive vagrant cases were removed and isolated at Cuttack and 4 treatment centres have been established in these respects.

Madras :

The main work was publicity and welfare of patients, personal contact with official, non-officials and patients forming an important item in this respect. The branch is also conducting social assistance programme for the patients in various ways. The usual publicity and membership-raising campaign was successfully held.

Bombay :

The branch continued to maintain the clinic at Ambewadi in South Satara District. The number of patients registered for treatment rose to 690. Besides treatment, survey and propaganda are carried out in the neighbouring villages. 1028 school children and 5297 person were examined, and the number of leprosy cases detected were 15 and 84 respectively. Grant in-aid to the Ackworth leprosy Home and Sholapur District Branch was continued.

Punjab :

The leprosy relief worker maintained by the Sang at Chotta Bhangal visited 40 villages and traced out 6 new cases and treated 31 cases of leprosy. It continued to maintain the dispenser at Palampur.

Mysore :

The branch meets the expenditure incurred on annual toke remuneration to part-time leprosy workers, and on welfare work amongst the inmates of the central leprosarium at Bangalore.

Bihar :

A few leprosy clinics are run by this branch and sulphone drugs were supplied free of cost to all institutions and clinics in the state, both Government and non-Government.

Andhra :

In 9 out of the 11 districts in the state, District branches have been formed.

SWASTH HIND (Health of India)

The Central Health Education Bureau of the Directorate of the D.G.H.S., Government of India has brought out a monthly bulletin.

We have received with great interest the monthly bulletin SWASTH HIND (Health of India) published by the Central Health Education Bureau of the Directorate General of Health Services, Government of India. It has received the blessing of Rajkumari Amrit Kaur, the Union Health Minister. The main objectives of the bulletin are: (a) promotion of health of the people in India; (b) reporting and interpreting the policies, programmes, plans and projects of the Central Ministry of Health; (c) exchanging of information considered useful to health workers throughout the land; (d) reporting on national vital statistics and quarantine.

Health Education is undoubtedly essential necessity for the propagation and practices of health knowledge all throughout the Country. It is actually the foundation upon which the acceptance the programme and the cooperation of the public depends. It is hoped that the bulletin will play an important role in the advancement of public health policies in India. We welcome the publication and wish it all success.

OBITUARY

CHARLES-EDWARD AMORY WINSLOW B.S., A.M., DR. P.H.

Dr. Winslow, professor emeritus of public health at Yalt University, died on Jan. 8, at the age of 79. With his death the world has lost a stalwart in Public Health and a great educationist and a learned man. Though a commanding figure, he never seemed remote, in his noble and somewhat aristocratic appearance. He perused his subject—the health of the people, with a devotion that was passionate in its intensity, and yet most of his public-health ideals were severely practical. His powerful mind was directed mainly to environmental hygiene, which he almost considered as a chief task. In many respects he followed the lead in public health and introduced the best of his work to the United States, as well as to the world at large. His gracious personality will be remembered in the annals of preventive medicine. He belonged not only to the United States but to the whole world. "Every noble life leaves the fibre of itself interwoven for ever in the work of the world". We all mourn for this great loss.

He was born at Boston and he took the degree of Bachelor of Science at the Massachusetts Institute of Technology in 1898. For some years he was assistant health officer at Montelair, New Jersey, and he worked during the summers in the engineer's office of the Massachusetts Board of Health. In 1902 he was appointed instructor in Sanitary Bacteriology at the Massachusetts Institute of Technology and in 1905 he was promoted to Assistant Professor. In 1910 he became Associate Professor of Biology at the College of City of New York and Curator of Public Health in the American Museum of Natural History. In 1915 he was appointed to the Chair at Yale which he held until he retired in 1945. He was editor-in-Chief of the American Journal of Bacteriology from 1916 to 1944. In 1942 he received the Sedgwick Medal of the American Public Health Association. After the late war he continued his earlier work for the Health Section of the League of Nations in the counsels of the World Health Organisation, and his monograph on W.H.O.'s immense task. The Cost of Sickness and the Price of Health (1951), was one of the last of his widely ranging publications on Public Health. In 1953 he received the Laskar Award.

(Contd. from page 149)

(highly unsaturated). The aortic cholesterol was unaffected rather increased in case of *cocoanut oil and the hepatic cholestrol level* decreased only in case of sardine oil. Thus the reduction was effective in proportion to the degree of structure of the oil.

CURRENT PUBLIC HEALTH LITERATURE

TUBERCULOSIS AND LEPROSY

LOWE JOHN (LATE) AND MC. FADZEAN, JAMES A.—Further Immunological Studies—Leprosy Review—27:147, 1956.

The idea that infection with *Myco-Tuberculosis* may produce cross sensititivity to *Myco. Leprae* has been the subject of numerous papers during the last 15 years. But the evidence on the possibility of the reverse phenomenon i.e. infection with *M.Leprae* inducing sensitivity to tuberculin has been lacking. Some workers have suggested that in certain areas, like India and Egypt, a low grade sensitivity to tuberculin is due to some nonspecific response, and a hypothesis has been offered that it is due to infection with an organism antigenically related to *M.tuberculosis* such as *M.Leprae*. The authors therefore carried out an investigation (1) to obtain more data on cross sensitivity between tuberculosis infection and leprous infection; (2) to obtain evidence when a non-specific factor influenced the results of tuberculin test and, if so, (3) to get evidence whether, this non-specific factor could be infection with leprosy bacillus.

The tuberculin positive rate in Nigeria increased from 44.3 per cent when tested with 5 TU to 68.3 per cent when the same patients were tested with 100 TU. This figure did not correspond with the prevailing Tuberculosis condition in the area. In another study 80.2 per cent of adults were found to be definitely positive to 50 TU. Similar results were also obtained in India, Egypt but not in Mexico and Denmark. The authors therefore concluded that non-specific factor might be operating in those areas. But it could not be ascertained whether or not the leprosy bacillus was a factor in producing this positive tuberculin test. However, a statistically significant corelation was demonstrated between the lepromin and tuberculin reaction. According to the authors this could have resulted from the simultaneous expossure of the population to tuberculosis and Leprosy.

TUBERCULIN INSENSITIVITY

SCADDING, J. G.—Insensitivity to Tuberculin in Pulmonary Tuberculosis,—Tubercle, Lond. (1956), 37, 371.

The range of tuberculin sensitivity found in patients with pulmonary tuberculosis is wide. Case histories of 4 patients with an idolent type of pulmonary tuberculosis, who failed to react to skin tests with 100 T.U., are presented. In a series of 142 cases of sarcoidosis, 14 at some time produced tubercle bacilli, 12 without any change in clinical picture. Two cases from this group are quoted to illustrate the range of clinical pictures which they presented. At one end of the range, the distinction from indolent pulmonary tuberculosis with low tuberculin sensitivity is indefinite. These observations suggest that at least some of the cases which may properly be labelled 'carcoidosis' are a manifestation of infection with the tubercle bacillus. Some of the logical difficulties which complicate discussions of this subject are briefly discussed.

CHEMOTHERAPY AND BACTERIA IN PULMONARY LESIONS

STEWART, M. S., TURNBULL, F. W. A. AND MACGREGOR, A. R.—The Influence of Chemotherapy on the Bacterial content of Tuberculous Pulmonary lesions—Tubercle, Lond. (1956), 37, 388.

Bacteriological and histological examinations were made on 71 specimens of lung tissue from 68 patients with pulmonary tuberculosis. In 11 the sputum was positive at the time of examination and the organisms were resistant to the drugs in use. In 55 the sputum was negative and the organisms had been sensitive to the drugs in use when last tested. In 2 the sputum was positive and the organisms drug-sensitive.

Drug-sensitivity seems to play a major part in the sterilization of tuberculous lesions.

Provided that the organisms are sensitive to the drugs in use, the longer chemotherapy is given the less is the likelihood of viable bacilli being isolated.

There was close correlation between the healing of cavity walls, both on naked-eye appearance and histologically, and the results of bacteriological examination of the lesion.

Some comments are made on the relationship between positivity and the size, consistency and histological activity of the lesions.

INFECTIOUS AGENCY IN SEWAGE

KELLY S. M., CLARK, M. E. AND COLEMAN, M.B.—Demonstration of Infectious Agents in Sewage—A.J.P.H. 45, p. 1438-1446, 1955.

The authors demonstrated the effectiveness of the swab as a device for finding infectious agents that may appear intermittently in sewage. They have shown that the 'acceptable' sewage treatment facilities do not always destroy pathogenic agents. The methods utilised for the examination of the samples to locate sources of paratyphoid infection, typhoid carrier, and centers of poliomyelitis virus spread, consists of exposing pads of gauze (swabs) to sewage and using the liquid expressed from the swab as the sewage sample. This differs from the traditional type of sewage sample, the catch sample, which is dipped from the source in an instant and is representative of the sewage at that instant. The expressed liquid from the swab, on the other hand, is a composite of the sewage which flows through the swab during the exposure period.

Three investigations were carried out in this connection. The results illustrated the suitability of the swab as a sampling device, and in combination with appropriate isolation technics, demonstrate the practicability of isolating infectious agents which may occur intermittently in sewage. The additional advantage is the safety of the technicians and collectors. Similarly these methods facilitated the easier isolation of pathogenic germs like Coxscackie Virus, Tubercule bacillus and Salmonella including typhoid, paratyphoid bacillus. This work also shows that the sewage treatment while complying the existing standards may not control pathogenic agents to the extent that receiving streams can be ignored as potential sources of infection.

SALMONELLA ORGANISMS IN FISH

GULASEKHARAM, J., VELAUDAPILLAI T. AND NILES G. R.—The Isolation of Salmonalla Organisms from Fresh Fish sold in a Colombo Fish Market.—J. Hyg. 54, 581-84, 1956.

The present investigation was undertaken to study the posibility of Salmonella organisms being present in fresh fish intended for human consumption in Ceylon. Six hundred and twenty-nine fresh fish consisting of 65 species were studied. The 39 fish belonging to the 24 species were found to be harbouring salmonella organisms of 15 types. Of the 42 samples of fish-washings obtained from a fresh market of Colombo 5 samples of washings were found to the harbour at Colombo. The Organisms isolated were of types, except *Salm. chittagang and Salm. oranienberg* which had been previously isolated from human and animal sources in Ceylon. The presence of the salmonella organisms in fresh fish intestines suggests that the organisms have entered the live fish whilst the isolation from the gills and fish-washing might be due to post-mortem contaminations. The significance of these findings in relation to health has been discussed as hazard.

TYPHOID VACCINE IN OIL

DAVID, C. Y. CHU., ROBERT, E., HOYT AND M. J. PICKETT.—Immunization to Vi and O Antigens of Salmonella Typhi Using a stable antigen in Oil.—J. Hyh 54, 592-596, 1956.

Since the saline suspensions of Salmonella typhi lose their Vi activity rapidly, while dried organisms retain the abilitty to stimulate antibody production and to react with Vi antibody. The authors prepared a vaccine by harvesting Vi positive organisms in alcohol, which were then dried and resuspended in peanut oil. This vaccine was found to produce high antibody titres against both O and Vi antigens when a single injection was given to rabbits. The sera of such immunized rabbits also gave protection against death due to injection of live Vi type organisms. The oil vaccine has certain other advantages also. The administration of a single injection produces an antibody response which reaches a higher titre persists much longer than that following the administration of a saline vaccine. This is perhaps due to the gradual release of bacteria from the oil reservoir in the tissues providing a prolonged antigenic stumuous. The vegetable oil used for the suspension does not provoke any abscess or inflammation.

SOLUBLE ANTIGENS OF PLAGUE BACILLUS

RAGHAVAN, N. V., NIMAKAR, Y. S. AND RAO, S. S.—Fractionation of the soluble antigen of *P.pestis*—I.J.M.R., Vol. 45, p. 8, 1957.

The authors in their attempt to isolate purer soluble antigenic fractions of *P. pestis* from the supernetant of the plague vaccine by using gell diffusion precipitin test came across three antigens in large amount and four antigens in

small amounts. But the expected purification over the fraction isolated by Seal (1953) and Baker et al (1947) could not be fully effected. For the isolation of the fractions the crude powder of total antigen of *P. pestis* precipitated by saturation with ammonium sulphate was first extracted by ethylene glycol (Fraction A) and then with diethylene glycol (Fraction B) and residue with saline (Fraction C). These fractions represented the three major water soluble fractions. A and B being highly antigenic and protective for mice and C being inactive. Fraction A did not precipitate with anti-Pseudo tuberculosis serum while B and C reacted strongly. The virulence factor was not detected in any of the fraction.

(Detection of a second antigen reading with anti P. pseudotuberculosis serum has probably come out of the testing of the fraction which was rejected by Seal or Baker et al and not related to *P. pestis*).

GLUCOSE TOLERANCE TEST IN CHOLERA

BANERJEE, S., BHADURI, J. N. AND SARKAR, A. K.—Studies on glucose tolerancex test in Cholera—Ind. J. Med. Res., 45:9-14, 1957.

The contradictory reports on the blood sugar values of patients suffering from cholera by Pasricha and Mallik (1940), Chatterjee and Sarkar (1941), Ghanial and Mikhail (1949) prompted the author to re-investigate the matter.

The authors, however, confirmed the findings of Pasricha and mallik as 15 out of 22 cases investigated showed high fasting blood sugar level and the remaining cases showing normal values. The intravenous glucose tolerance test was performed in 22 cases suffering from cholera and in 8 cases suffering from gastroenteritis, as soon the patients were admitted into the hospital and before any specific treatment was given. Inorganic phosphorus values of blood were also determined before and after administration of glucose.

Most of the patients had initial hyperglycaemia while a few cases had normal blood sugar level. After the intravenous injection of glucose the blood sugar values rose but two hours after the injection of glucose they came down below the initial level in most of the cases.

Inorganic phosphorus level of blood was high in all the cases and there was no correlation between the blood sugar and inorganic phosphorus levels of blood after the injection of glucose. Intravenous administration of glucose is recommended in cholera.

According to the authors this hyperplycaemia is not due to dehydration alone but also to glycogenolysis in the liver from execessive secretion of adrenalin as a result of acute stress in cholera.

SEROLOGICAL DIAGNOSIS OF INFLUENZA

ROSEN BAUM MAX J. AND WOOLRIDGE, R. L.—The use of soluble antigen for the serological diagnosis of Influenza in vaccinate populations—J. Inf. Dis. 99:275-281, 1956.

In the course of Influenza vaccine evaluation studies undertaken at the U. S. Naval Training Centre at great Lakes, Illionois it was necessary to determine whether significant antibody titre changes were due to response of individuals to the vaccine or to recent Influenza infection. The differintiation could not however be made by using infected chick embryo allantoio fluids as antigen in either the complement-fixation or Haemoglutiation inhibition tests. The author has however claimed success by using soluble antigen component of the fluids prepared by simple technique. While the soluble antigen gave positive complement fixation test with sera of persons naturally infected with Influenza, it gave negative with those of persons immunised by Influenza vaccine.

The readers are referred to the original publication for the method of preparation of soluble antigen. When soluble antigen was used in place of infected allantoic fluid in the complement fixation test it permitted the detection of antibody titre arising from influenza infection in immunised persons, the antibody rises to soluble antigen being correlated with clinical symptoms. The small amount of soluble antigen present in commercial vaccine appeared to have little immunising effect.

VIRAL HEPATITIS

HOYT, R. E., MORRISON, L.M.—Reaction of viral Hepatitis Sera with *M. Rhesus* Erythorcytes—Proc. Soc. Exp. Biol and Med., 1956, Vol. 93, Dec. 547-49.

To find a serological test for detection of viral hepatitis, sera of persons diagnosed as having viral hepatitis were tested for their ability to agglutinate red cells of different animals. As erythrocytes of rhesus monkey showed a greater degree of agglutination than other types, these were subjected to intensive study.

Red cells of *Macacus rhesus* were collected in A. C. D. solution and stored in the refrigerator. A working suspension was prepared by washing the cells 3 times in 0.9% Nacl solution, then resuspending to make up a 2% suspension by volume. As the cells stored in A.C.D. solution lose their sensitivity it should be used within 10 days.

Sera to be tested were inactivated at 56° C for 30 minutes; 0.2 ml of serum was added to 0.2 ml. of 0.9% Nacl solution and mixed; 0.2 ml. of this dilution was transferred serially through 6 tubes, each containing 0.2 ml of diluent, giving a series of dilutions ranging from 1:2 to 1:64; 0.2 ml of cell suspension was added to each tube and the set was incubated for 1 hour at 37° C. Cells were sedimented by slow centrifugation (1000 r.p.m. for 2 min) and degree of agglutination was estimated after gentle resuspension.

Four groups of blood were examined by (i) Blood donors (ii) Jaundiced patients exclusive of viral hepatities (iii) infections mononucleosis, and (iv) patients diagnosed as having viral hepatitis.

Sera of groups I and II were found to have comparatively low titers, being less than 1:8. On the other hand, sera of the viral hepatitis group showed higher titers, 1:8 or greater.

According to the authors this finding might be valuable in differential diagnosis of the Jaundiced patient. Though this test is not specific, it can be used for screning the donors for collection of whole blood or blood plasma, and also for viral hepatitis. Investigation was continued.

DIETARY OILS AND GALLOGENS IN AV AN ATHEROSCLEROSIS

KING JR., J. S., CLARKSON, T. B.; AND WORNOCK, N. H.—Effect on Experimental Arian Atheroselerosis of Dietary Oils and Gallogen—Proc. Soc. Exp. Biel. and Med. 1956, Vol. 93, Dec. 443-44.

In this paper the effect of feeding of fats of various degrees of unsaturation, singly and with Gallogen (diethylamine salt of mone (+) camphoric acid ester of a , 4-dimethylbenzol alcohol) on atherogenesis in the cholesterol-fed cockerel, was studied. The twenty-one-day-old cockerels were placed on a diet of Purina Growing Mash and 1% Cholestrol and divided into 6 groups, which received additional materials as follows:—Group I, 8% Peanut oil; Group II, 8% coconut oil; Group III, 8% sardine oil.; Group IV, 8% Pennut oil and 0.1% Gallogen; Group V, 8% coconut oil and 0.1% Gallogen; Group VI, Sardine oil and 0.1% Gallogen. An edible antoxidant, butylated hydroxyanisole (Eastman), 0.01%, was added to the sardine oil and as a control, to the coconut oil. The diets were mixed every 2 weeks, except for the sardine oil, which was refrigerated and mixed weekly. Food consumption was equal for all the groups. During the experimental period there were 2 deaths, one occurred in the Group IV and another in the Group I from unknown cause. The mean serum cholesterol, aortic cholestrol and lepetic cholestrol levels at the beginning and at the end of the 16th week were as follow:

Groups	Serum cholesterol mg/100 ml 0 wk	Serum cholesterol mg/100 ml 16th wk	Aortic cholesterol 16th wk. mg/dry wt.	Hepatic cholesterol 16th week mg/dry wt.	Average body wt. (gm)
I	151	1642	19.7 ± 4.8	81.9 ± 8.4	1833
II	151	1339	20.0 ± 7.6	74.1 ± 17.8	1561
III	155	1372	20.9 ± 5.9	76.5 ± 17.0	1703
IV	161	1143	14.6 ± 3.6	78.2 ± 16.5	1727
V	149	1054	23.9 ± 8.3	74.7 ± 25.9	1637
VI	147	623	10.7 ± 3.6	49.7 ± 12.1	1686
Normal 12th wk.	—	—	7.6 ± 1.2	20.5 ± 3.0	—

Three fats under investigation. were not different from each other with respect to their effect on aortic or hepatic chlesterol levels of cholesteral-fed cockerels and only slightly with respect to serum levels. Aortic and hepatic cholesterl levels were almost same for the 3 fat-alone groups, but the addition of Gallogen to the rations resulted in a decrease in the serum cholesterol in each case. This decrease was small in case of coconut oil (saturated) larger in case of peanut oil (moderately unsaturated) and quite distinct for sardine oil

(Contd. on page 145)

ASSOCIATION NEWS

The General Secretary wishes to announce with great pleasure that the Memorandum and Rules and Regulations of the Association as passed in the last Annual General Meeting and subsequently scrutinised by the Sub-committee and the legal adviser, have been duly registered and are being published below for the attention of the members.

MEMORANDUM AND RULES AND REGULATIONS OF THE INDIAN PUBLIC HEALTH ASSOCIATION

(Registered under the Societies Registration Act XXI of 1860)

1. The name of the Association shall be INDIAN PUBLIC HEALTH ASSOCIATION.

2. The Registered Office of the Association shall be situated in the State of West Bengal and until otherwise decided by the members in a General Meeting, the registered office of the Association shall be at 110, Chittaranjan Avenue, Calcutta-12.

3. The objects of the Association are as follows:—

Promotion and advancement of public health and allied sciences in their different branches in India, protection and promotion of public and personal health of the people of the country, and promotion of co-operation and fellowship among the members of the Association.

(a) Hold an Annual Convention and periodical meetings or conferences of the Members of the Association and of the Public Health Profession in general.

(b) Initiate, hold, direct, manage, take part in and contribute to conferences, congress, meetings, lectures and demonstrations on any aspect of public health and social welfare for the purpose of advancing any of the objects of the Association.

(c) Publish and circulate a Scientific Journal which shall be the official organ of the Association, specially adapted to the needs of the Administrators and research workers in Public Health in India.

(d) Disseminate health knowledge and conduct educational campaigns among Schools, Colleges, Cultural bodies, Village organisations and other people in co-operation with different public bodies working with the same objects by holding health exhibitions, running or sponsoring popular health journals, preparing and distributing literature, posters and information about health and social welfare.

(e) Encourage research in public health and social work with grants-in-aid or with grants out of the funds of the Association, by establishment of scholarships, prizes or rewards and in such other manner as may from time to time be determined by the Association.

(f) Publish from time to time transactions and other papers embodying researches conducted by the members or under the auspices of the Association.

II. RULES OF THE INDIAN PUBLIC HEALTH ASSOCIATION

(Registered under the Societies Registration Act XXI of 1860)

1. *Constitution:*

The Association shall consist of members whose names are on the Register of Members of the Association at the time of the inauguration of the Association and later duly elected in such manner and upon such conditions as prescribed from time to time. The Association may also have Patrons.

2. *Register of Members:*

There shall be a register in which the names of all the members of the Association shall be entered with their qualifications and addresses

3. *Administration :*

(a) The affairs of the Association shall be conducted by the Council of the Association, herein-after called the Central Council. The day to day affairs shall be conducted according to the rules and bye-laws as framed for the purpose from time to time.

(b) The income and property of the Association shall be applied solely towards its objects and no portion shall be paid or divided amongst any of the members by way of profits, provided nothing hereinafter contained shall prevent any payment in good faith of interest not exceeding 6% on any loan advanced by members of the Association to promote the objects thereof, or of remuneration to a servant of the Association in return of any services actually rendered to the Association or undertaken by the authority of the Central Council to promote the objects of the Association.

(c) In case of dissolution of the Association, any property whatsoever left over after satisfying all debts and liabilities, shall not be paid to or distributed among the members of the Association but shall be given or transferred to some other society or societies with the same or similar objectives as determined by the votes of not less than two-third members in person at the time of dissolution.

4. *Eligibility of members :*

Any person possessing registrable medical or recognized public health qualifications including that of nursing or persons actually employed in public health work are eligible for membership of the Association of the categories mentioned hereunder.

5. *Classification of membership :*

A. HONORARY MEMBERS :

Persons of high scientific or literary attainment or persons who have rendered conspicuous service in the field of public Health and Social Welfare or to the Association or persons whose connection with the Association may be deemed valuable, if willing to be made Honorary Members, may be so elected according to rules hereinafter laid down.

B. ORDINARY MEMBERS :

Any person actively engaged in or interested in Health Work and possessing qalifications of Graduate standard of education in Medicine and/or Public Health, Public Health Engineering or allied specialities or possessing recognized equivalent qualifications to be decided by the "Committee of Eligibility" appointed by the Council, are eligible for Ordinary Membership of the Association.

C. ASSOCIATE MEMBERS :

Any person actively engaged in health work but not possessing qualifications required of Ordinary Members, may become an Associate Member enjoying all the privileges of the Ordinary Members except that of voting which will be guided by the Rules hereinafter laid down.

D. LIFE MEMBERS :

Persons possessing qualifications required of Ordinary Members may become Life Members by paying a lump sum in lieu of yearly subscription according to rules hereinafter laid down.

6. *Subscription :*

A. RATE OF SUBSCRIPTION :

(a) Honorary Members shall not have to pay any subscription.

(*b*) Ordinary Members shall pay a subscription of Rs. 12/- per year in one instalment. New members joining the Association in the 2nd half of the Association year shall pay Rs. 6/- for the half-year.

(c) Associate Members shall pay a subscription of Rs. 6/- per year or Rs. 3/- for new members joining the Association in the Second-half of the Association year.

(d) Life Members shall pay a lump subscription of Rs. 150/-, unless otherwise decided by the Central Council from time to time.

B. GENERAL RULES ABOUT SUBSCRIPTIONS AND CONTRIBUTIONS :

(a) All subscriptions and contributions are payable in advance at the beginning of the year. If the subscription of any

member remains in arrear action may be taken according to rules as laid down under "Termination of Membership".

(b) In case both husband and wife are enrolled as members of the Indian Public Health Association they may pay only one full and one half annual subscription provided they agree to have only a single copy of the journal.

7. *Election of Members:*

A. HONORARY MEMBERS:

Shall be proposed by a member of the Central Council in writing wherein a statement of the distinguished service or of the conspicuous contribution of the person in the cause of Public Health and/or Social Welfare meriting such an honour shall be set forth. He shall secure the support in writing of at least 9 other members of the Council or 24 other ordinary members. The election shall take place by a postal ballot among the members of the Central Council. The person shall be considered elected if two-thirds of the balloted votes are in his favour.

B. ORDINARY MEMBERS:

(a) Ordinary Members shall fill in and sign the prescribed form of application for membership being duly proposed and seconded by two respective Ordinary Members of the Association whose signatures shall also appear in the application form and send it to the General Secretary of the Indian Public Health Association direct or through the State Branch as the case may be. It should also be accompanied by Rs. 12/- as one year's subscription or Rs. 6/- if the application is made in the second-half of the Association Year. This will be considered first by the Eligibility Committee who shall place it at the first available meeting of the Central Council with their recommendation. The resolution of the Council for or against admission of the applicant as a Member shall be communicated to him or her directly.

C. ASSOCIATE MEMBERS:

The same procedure will also be followed in case of Associate Members except that the proposer or the seconder may be an Associate Member.

D. LIFE MEMBERS:

A person who is an Ordinary Member or is eligible to be an Ordinary Member seeking enlistment as a Life Member shall pay a sum of Rs. 150/- with his or her application. The procedure of election shall be the same as in the case of Ordinary Member as under B above.

8. *Eligibility Committee:*

The Committee of Eligibility for membership shall consist of one of the Vice-Presidents and the Gentral Secretary of the Central Council for the purpose. All applications for membership except for the Honorary Member shall be passed on to this Committee for scrutiny as to the qualifications and suitability of the candidate for the type of membership for which the application has been made. The application with the Committee's remarks should be forwarded to the Central Council for its final consideration and onward transmission of the decision in the matter to the respective parties.

9. *Privilege of Members:*

A. GENERAL PRIVILEGES:

(a) Honorary, Life and Ordinary Members shall be supplied free with all the publications of the Association. The Associate Members will receive the Association journal on payment of Rs. 6/- per year in addition to his annual subscription.

(b) All members shall be entitled to the use of the Library and the Association rooms, if any.

(c) All members shall have the right to attend and take part in discussions at all meetings, lectures and demonstrations organised by the Association.

(d) All members shall have the right to attend conference organized by the Association on such terms as hereinafter laid down by the Association.

(e) The rights of every member shall be personal and shall not be transferable, transmissible or changeable by his own act, by operation of law or otherwise. No member shall be permitted to attend general meetings by proxy.

B. VOTING RIGHTS:

(i) The Honorary, Life and Ordinary Members shall have the right to vote in the election of the office-bearers of the Association to which they are registered and on all resolutions put forward at any of the meetings of the Association. The voting for election of the Central Council and in the Annual Gentral Meeting will be guided by the rules hereinafter laid down.

(ii) Tht voting rights of the Associate members shall be exercised in the following manner:

They shall elect one voting member for every 20 Associate Members. Such members shall be elected by ballot votes of the Associate Members according to the Rule 10 hereinafter laid down and announctd in the Annual General Meetings of the Central Council.

Such member shall be designated as voting Associate Member and shall have the same privileges as those of the Honorary, Life and Ordinary member for the year for which he is elected, and shall pay an annual subscription equivalent to that of ordinary membership.

C. ELIGIBILITY OF SERVING AS OFFICE-BEARERS:

The Honorary, Life, Ordinary and the voting Associate Members, elected as above, shall be eligible for serving as members of the Central Council.

10. *Election of the voting Associate Members:*

The General Secretary of the Central Office shall invite the Associate members of good standing on the 1st week of October each year to nominate from amongst them requisite number of voting members, within a specified date. On the receipt of the nominations they shall carry out an election by ballot votes to be completed within 15th November of every year. Such elected members shall function as voting members after the announcement according to Rule 9B (ii).

11. *Termination of Membership:*

A. BY RESIGNATION:

A member may at any time resign his membership by giving notice of not less than 30 days but preferably six months' notice, in writing to the General Secretary.

The resigning member shall pay up all the dues against him and return all papers, properties or documents of the Association and the Secretary will put up a statement of dues against the member or a clearance certificate if all dues are paid along with his resignation to the Central Council for information and necessary action.

B. BY REMOVAL OF NAME FOR NON-PAYMENT OF SUBSCRIPTION AFTER DUE NOTICE AS FOLLOWS:

If the subscription remains unpaid for the first three months of the Associate year the defaulter shall be informed in writing by the General Secretary. If after two months of this notification the annual subscription remains unpaid a registered notice shall be given stating clearly that if within 30 days of the notice the dues art not paid the privileges of membership shall be suspended. If the dues still remain unpaid necessary action will be taken by the Central Council.

C. BY REMOVAL OF NAME ON THE GROUND OF UNDESIRABLE CONDUCT:

If the conduct of any Member as reported to the Central Council is found prejudicial to the interest of the Association or is calculated to bring the public health profession into discredit, the Council may ask the member concerned to submit a written explanation of his conduct. In the event of the explanation being found unsatisfactory the Council shall take such action as considered necessary.

In the event of the said member refusing either to explain or to resign when asked to do so, a general meeting of the members of the Association shall be called to consider the case and at least 7 days notice of the meeting shall be given to the Member concerned with opportunities to explain, if the member wishes to do so. If three-fourths of the members present at the meeting vote for removal of the name of that Member, his name shall be removed from the Register.

12. *Readmission :*

Persons who have ceased to be members on account of non-payment of subscription can be readmitted on fresh application being made by them and on payment of any dues outstanding against them on the date when they had ceased to be members. The Central Council shall, however, have the power to remit a part or whole of any outstanding dues against such members on the recommendation of the members.

Members whose names have been removed on the ground of undesirable conduct may be readmitted on the expiry of not less than 2 years, provided their application for re-enrolment is supported by ten Standing Members of the Association testifying to the conduct during the intervening period. But the members who have resigned under this clause can be readmitted on sumitting a written statement regretting his conduct acceptable to the Central Council.

13. *Membership in abeyance :*

In case of any member going abroad for a year or more or for any other reason he, if he so wishes, may apply to the General Secretary for keeping his membership in abeyance till his return which should also be mentioned. His membership will be resumed as soon as the Secretary receives the intimation of his return and on payment of subscription of the current year.

14. *State Branch :*

A minimum of 50 members of good standing residing within the jurisdiction of a State wishing to form a State Branch may apply to the Central Council for recognition. The formation and function of such State branch shall be guided by the rules and regulations framed by the Council from time to time.

15. *The Association Year :*

The year of the Association for financial and other purposes will ordinarily be the calendar year, January to December, unless otherwise decided by the Annual General Meeting of the Association.

16. *The Annual General Meeing :*

The Annual General Meeting of the Association shall be called at least once a year within three months of the completion of the Association year.

17. *Management of the Association :*

The management of the Association shall be vested in a Central Council.

A. THE CENTRAL COUNCIL :

The Central Council shall be composed of the following personnel by election from amongst the Honorary, ordinary, Life and voting Associate members of good Standing.

(a) Ex-officio members of the Central Office Elected under Rule 20C—
(i) The President.
(ii) The President-elect.
(iii) The Past-Presidents.
(iv) The two Vice-Presidents.
(v) The General Secretary.
(vi) The two Joint-Secretaries.
(vii) The Treasurer.
(viii) The Editor of the Journal (Indian Journal of Public Health).
(ix) The Managing Editor of the Journal.
(b) The Presidents of the State Branches, if any.
(c) The ten members elected at the Annual General Meeting.
(d) The elected representatives of the State branches, if any, according to rules framed by the Central Council from time to time.
e) The Chairman of Functional Sub-committees: When the different sections are organised on functional basis, the Chairman of each section shall be member.

B. CASUAL VACANCIES :

Casual vacancies occurring in the Central Council amongst the office-bearers of the Association shall be filled in by the nomination of the Central Council during its term of office and such members shall hold office only for the remaining period of the term.

C. FUNCTIONS AND POWERS :

The funds and properties, movable and immovable, belonging to the Association shall be vested in the Central Council of the Association. The Central Council shall direct and regulate the general offices of the Association and shall have power to :

(*a*) Organise branches in different parts of the country and to consider applications to open State Branches and other branches.

(b) Form suitable committees and sub-committees to suggest (i) modifications of various Public Health Laws, rules and regulations and standards bearing on various health services according to the needs of different State Governments to suit the local conditions and to make them more effective and workable, (ii) planning of various health services and welfare work for the whole country (both rural and urban) on the basis of integration of curative, preventive and social medicine.

(c) Establish, support and aid any establishment of all or any other Associations or Societies founded for all or any of the objects of the Association.

(d) Affiliate with any company, institution, society, association or any other public body having objects altogether or in part similar to those of the Association.

(e) Borrow or raise money for all or any of the objects herein contained on such terms and in such manner and on such securities as may from time to time be determined by the Association.

(f) Take such steps or make personal or written appeals or hold meetings or shows or otherwise as may from time to time be deemed expedient for the purpose of procuring contribution to the funds of the Association in the shape of donations, annual subscriptions or otherwise.

(g) Take on lease or hire or acquired by purchase or exchange or otherwise either separately or jointly with any other company, association or individual movable or immovable properties of all descriptions, conveyance and accommodation, rights and privileges and convenience, and erect buildings or structures on any land for the time being belonging to or in the occupation of the Association and to repair, improve, alter and extend or rebuild any or all buildings and erections belonging to the Association or in its occupation.

(h) Sell, lease, mortgage, surrender, exchange, dispose or otherwise deal with all or any part of the movable or immovable property belonging to the Association or in its occupation.

(i) Invest any money of the Association not immediately required for any of its objects in such manner as may from time to time be determined by the Association.

(j) Frame, alter or repeal rules and bye-laws for the conduct of business at meetings of the Association and for the maintenance and administration of the Association room, library and properties and for the organisation and direction of publication.

(k) Frame and/or recommend alteration or repealing rules and bye-laws of the Association for consideration of the General body.

(*l*) represent any matter in which they consider that the interests of the Association or of the public health profession are affected, before the Government, public bodies or any properly constituted authority.

(m) Consider and decide applications for membership, the resignation of Members and the question of taking disciplinary action against any Member.

(n) Write off the whole or part of the arrears against any individual Member or other dues if considered desirable.

(o) Appoint or remove salaried personnel of the Association.

(p) Exercise in addition to the powers by these Rules expressedly conferred on it, all such powers and do all such acts and things as may be required to be done by the Association and which are not hereby or by legislative enactment expressedly directed or required to be exercised or done by the Association in a General Meeting.

Note : The decision of the Central Council in all matters not covered by these Rules shall be final and binding on the members of the Association.

D. TERMS OF OFFICE OF THE CENTRAL COUNCIL :

The new Central Council shall enter upon its duties after the Annual Meeting of the Central Council and shall hold office till the end of the next Annual Meeting of the Central Council.

I. MEETINGS OF THE CENTRAL COUNCIL :

(a) Meetings of the Central Council shall be of three kinds to be held as follows :

(i) Ordinary Meetings :
The Ordinary Meeting shall be held at the Central Office, the exact date, time

and place being fixed by the General Secretary in consultation with the President. At least two meetings in a year shall he held.

(ii) The Annual Meetings:
The Annual Meeting shall ordinarily be held at the place of the Annual General Meeting of the Association and prior to it.

(iii) Special Requisition Meeting:
A special Requisition Meeting of the Central Council shall be called within six weeks on receipt of a requisition signed by at least one-third of the Members of the Central Council stating the business for which the Special Meeting is required. The time, date and place of such meeting shall be fixed by the General Secretary in consultation with the President.

(b) *Notice:* Generally 3 week's notice of the Meeting shall be given to all the Members giving the place, the date and the hour of the meeting. The agenda of business to be transacted at the meeting shall accompany the notice of the Meeting.

In emergencies a shorter notice shall be allowed at the discretion of the President but in no case it shall be less than 7 days.

(c) *Quorum:*

1. Quorum for Ordinary Meeting shall be 6 till otherwise decided in a General Meeting.
2. Quorum for Annual Meeting shall be 12 till otherwise decided in a General Meeting.
3. Quorum for special Requisition Meeting shall be two-thirds of the total members, unless otherwise decided in a General Meeting.

(d) *Co-option of members:* The President may co-opt up to three members from amongst the voting members to attend a particular Ordinary Meeting of the Central Council (Vide Rule 17Ea(i).

18. *The Annual Meeting of the Central Council:*

I. PROCEDURE AND ORDER OF BUSINESS:

The business to be transacted at the Annual Meeting of the Central Council shall be taken in the following order:—

(*i*) The election, if necessary (in the absence of the President and the Vice-President), of the Chairman.

(ii) Adoption of the Annual Report for the previous year.

(iii) Adoption of the audited Accounts.

(iv) Consideration of the budget for the coming year.

(v) Taking of necessary action for the election of the Office-bearers and announcing the names of the Members so elected at the Annual Meeting.

(vi) Taking necessary action for the election of the Journal Committee and announcing the names of Members so elected at the Annual General Meeting of the Association.

(vii) Appointment of an Auditor.

(viii) Amendment of rules, if any.

(iv) Resolution brought forward by the Individual Members of the Association.

(x) Any other business with the permission of the President.

II. GENERAL RULES ABOUT THE ANNUAL MEETING OF THE CENTRAL COUNCIL:

(i) Except with the special permission of the President (or the Member presiding over the Meeting) no resolution shall be placed before the Central Council that has not been previously given notice and duly circulated with the agenda of the Meeting.

(ii) Resolutions sponsored by individual Members shall reach the General Secretary.

(iii) Notice of resoultions to be moved at the Annual Meeting of the Central Council shall reach the General Secretary not later than the 15th November, or the date hereinafter fixed.

III. GENERAL RULES OF PROCEDURE AT MEETINGS:

(a) Minutes of all meetings shall be correctly kept and shall be confirmed by the Chairman of the Meeting in case of Annual Meeting of the Central Council and by the Chairman of the next Ordinary Meeting in case of the Ordinary Meeting of the Central Council.

(b) No resolution adopted or negatived at a meeting shall be reconsidered unless either 6 months have elapsed or 1/3rd of the Members of the Central Council

or 1/5th of the members of the Association sign a requisition for its reconsideration.

(c) The Chairman of a Meeting may adjourn a meeting and shall do so if more than half the Members present are for adjournment. At the adjourned meeting only the unfinished business of the Meeting shall be transacted.

(d) Question submitted to a Meeting shall be decided by a Majority of votes except in case where a particular majority is provided for. Voting shall be by show of hands ordinarily but it may be done by ballot if the Chairman so decides or at least two-thirds of the Members present demand it.

(e) The Chairman shall in case of equality of votes have a casting vote.

(f) No business shall be transacted at a Special Meeting other than that for which the meeting is called.

(g) The proceedings of any meeting shall not be invalid by reason of there being any vacancy or any invalid appointment or election of any Member or accidental omission to give notice of such a meeting to any Member.

(h) A notice may be served on any Member either personally through a servant of the Association or by post.

IV. PROCEDURE OF A SPECIAL REQUISITION MEETING:

(i) Nothing except the business for which it is called shall be discussed at a special Requisition Meeting.

(ii) If within half an hour from the appointed time a quorum is not present, the meeting, if convened on the requisition of Members, shall be dissolved; but in any other case it shall stand adjourned to be called again by the General Secretary in consultation with the President later and at the meeting the members present, whatever their number, shall form the quorum and shall carry on the business.

General Rules:

(a) Proposals for change of rules shall ordinarily be considered only in an Annual Meeting of the Central Council. The proposed alterations must reach the Central Office at least 4 months before the date of the Annual Meeting and due notice of it must be given in the Agenda of the Annual Meeting of the Central Council.

(b) Any additions to, modification or repeal of the Rules passed by the Central Council should be confirmed in a subsequent meeting of the Council for presenting before the General Body for consideration.

(c) All suits and legal proceedings by or against the Association shall be in the name of General Secretary.

19. *Funds of the Association:*

A. INCOME:

(a) The funds of the Association shall be derived from the subscriptions of members, contributions or donations, income from publications, conferences and exhibitions, bequeaths and such other sources as may be authorized by the Central Council from time to time.

(b) There shall be a reserve fund of the Association, the amount of contribution to which shall be decided by the Central Council in the Annual Meeting.

(c) Any fund of the Association remaining excess over expenditure shall be deposited in an account in the name of the Association in a Scheduled Bank or Postal Savings Bank.

B. EXPENDITURE:

(i) All expenses in connection with the management of the office, publications, conferences, scientific investigations, prizes, scholarships and such other purposes considered advisable for the furtherance of the cause of the Association shall be met from the funds of the Association as sanctioned in by the annual budget passed by the Central Council.

(ii) Any additional expense not covered by the annual budget shall have the prior sanction of the Central Council.

20. *Office-bearers of the Association:**

The following office-bearers shall be elected for the proper management of the activities of the Association:

(a) The President.
(b) The President-elect.
(c) The two Vice-Presidents.
(d) The General Secretary.
(e) The two Joint Secretaries.
(f) The Treasurer.
(g) The Editor, the Associate Editor, the Managing Editor, the Assistant Editor, and five other Members of the Scientific Journals of the Indian Public Health Association.
(h) The Editor of the Public Health Journal.

(i) Members of the first Central Council elected in the first General Meeting held on 30th September 1956, during the Inaugural Session of the Association.

President—Lt. Col. C. K. Lakshmanan,
Director General of Health Services,
Government of India,
17, Roberts Lane, New Delhi.

President elect—Dr. B. C. Das Gupta,
Ex-Director of Health Services,
Government of West Bengal,
55/6, Monoharpukur Road, Calcutta-29.

Vice Presidents—
(1) Shri P. C. Bose,
Chief Engineer, Public Health Engineering, Government of West Bengal,
21, Mandevilla Garden, Calcutta-19.
(2) Col. Barkat Narain,
Adviser, Health Ministry of Community Development Project,
Rastra Bhawan, New Delhi.

Honorary General Secretary—Dr. S. C. Seal,
Professor of Epidemiology,
All India Institute of Hygiene & Public Health,
70A & B, Jatindas Road, Calcutta-29.

Honorary Joint Secretaries—
(1) Dr. K. C. Patnaik,
Associate Professor of Social Medicine,
Nazafgarh, Delhi.
(2) Dr. T. R. Bhaskaran,
Associate Professor of Sanitary Engineering, All India Institute of Hygiene & Public Health,
24A, Monoharpukur Road, Calcutta-29.

Treasurer—Dr. S. E. D. Masilamani,
Deputy Director, All India Institute of Hygiene & Public Health,
33/1, Amherst Street, Flat No. 6,
Calcutta-9.

Editor of the Journal—Dr. B. C. Das Gupta,
Ex-Director of Health Services, Government of West Bengal,
55/6, Monoharpukur Road, Calcutta-29.

Managing Editor of the Journal—
Dr. S. C. Seal,
Professor of Epidemiology, All India Institute of Hygiene & Public Health,
70A & B, Jatindas Road, Calcutta-29.

10 Elected Members—
Dr. T. B. Patel,
Director of Public Health, Government of Bombay, Connaught House, Poona.
Dr. K. N. Rao,
Director of Health Services, Andhra State, Visakapatnam, Andhra.
Dr. Sheshagiri Rao,
Director of Public Health, Mysore State, Mysore.
Dr. Mrs. Muktha Sen,
Professor of Maternity and Child Welfare, All India Institute of Hygiene & Public Health,
35B, Elgin Road, Calcutta-25.
Dr. B. V. Bhovta,
Sanitary Engineer, Public Health,
16, Queens Road, Bombay.
Dr. R. V. Rajam,
Director of Institute of Veneriology, Govt. General Hospital, Madras-3.
Dr. S. K. Sinha,
Dist. Health Officer,
Chaibasa, Singhbhum.
Dr. N. K. Tampi,
Professor of Preventive & Social Medicine, Medical College, Trivandrum.
Mrs. U. Gupta,
Nursing Superintendent, Govt. of West Bengal,
4, Deodar Street, Calcutta.
Col. N. D. P. Karani,
Armed Forces Medical College, Poona.

B. DUTIES AND POWERS OF THE OFFICE-BEARERS:

(a) *The President:***

(i) shall be the Chairman of all meetings of the Central Council and the Working Committee if and when appointed, and any other committee of which he may be a member.

(ii) shall preside at the Annual Conference and all meetings of the Association.
(iii) shall guide and control the activities of the Association.
(iv) shall regulate the proceedings of the meetings and conferences, interpret the rules and regulations, and decide doubtful points.
(v) shall, in addition to his ordinary vote, have a casting vote in case of equality of votes.

(b) *The Vice-President :*

(i) The Vice-President receiving the larger number of votes will preside at the Annual Conference in case the President is unavoidably absent.
(ii) shall act as Chairman of meetings of the Central Council in the absence of the President.
(iii) shall be the Chairman of all sub-committees and Committees of which he is a member, in case the President is not a member.

(c) *The General Secretary :*

With the help of two Joint Secretaries:
(i) shall be in charge of the Central Office.
(ii) shall conduct all correspondence.
(iii) shall have general supervision of accounts, pass all bills for payment and sign cheques.
(iv) shall get prepared by the Treasurer quarterly and annual statements of accounts duly audited by the auditor for adoption by the Central Council.
(v) shall prepare a budget and get it passed at the Annual meeting of the Central Council.
(vi) shall organise, arrange and convene meetings, conferences, lectures and demonstrations.
(vii) shall attend meetings of the Central Council and Working Committee if one exists, and keep proceedings thereof.
(viii) shall be Ex-officio Member of all committees, and shall have powers to depute one of the joint Secretaries if he is unable to attend.
(ix) shall maintain a correct and up-to-date register of all members of the Association.
(x) shall organise the I.P.H.A. with the help of the Joint Secretaries by encouraging the establishment of Branches and by creating a general interest in the I.P.H.A.
(xi) shall bring any matter which he considers necessary in the interests of the Association to the notice of the Central Council for guidance and decision.

(d) The Joint Secretaries shall help the General Secretary in all his work in looking after the office in conducting correspondence, in preparation of Agenda of Meetings, in preparing statement of accounts etc. They shall also act for the General Secretary in his absence.

(e) *The Treasurer :*

(i) shall receive all money of the Association and deposit them in a bank approved by the Central Council to the credit of the Association and operate jointly with the General Secretary.
(ii) shall be responsible for collection of subscription of Members.
(iii) shall dispose of the bills for payment as sanctioned by the General Secretary and only on his written order.
(iv) shall point out any error or discrepancy in the order of payment of the General Secretary and refer the order back to him with his remarks.
(v) shall be responsible for keeping up-to-date accounts of the Association with all the account books posted up-to-date.
(vi) shall get all the accounts audited by the Auditor of the Association.
(vii) shall prepare a monthly statement of accounts to be put before the Working Committee (if any) and a quarterly statement to be put before the Central Council.
(viii) shall prepare annual statement of accounts and a balance sheet showing the financial position of the Associa-

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* No one in receipt of a salary from the funds of the Association can be elected an office-bearer.

** In the event of any emergency arising by reason of any cause such as death, detention, resignation or absence for a considerable period out of India of the President, the duties of the President shall devolve upon the Vice-President who has obtained the higher number of votes at the election, or, in his absence, the other Vice-President. In case of resignation by the President it will become effective when it is accepted by the Central Council. Pending the acceptance of the resignation the Vice-President shall act as indicated above in case the President is unwilling to function as such.

tion, get it audited by the Auditor appointed at the Annual Meeting of the Central Council and submit it for adoption by the Central Council.

N.B.—The account of the publications shall be maintained separately.

C. ELECTION OF OFFICE-BEARERS:

(a) The president-elect and the Vice-Presidents.

The General Secretary shall on or before the 1st of October each year invite the members to nominate one Member of the Association for the Office of the President-elect and the two Vice-Presidents. Any of these Members desiring to withdraw their names must inform the General Secretary on or before the 1st of December. Non-receipt of any reply in this respect by this date will be interpreted as consent of the candidates concerned.

The General Secretary shall on or before the 10th of December send to all the members printed ballot paper containing the names of the candidates requesting them to select one name for President-elect and two names for Vice-President from among the list of candidates and send their decision on the printed ballot paper and envelope supplied by the Office to reach him not later than the 25th of December after which they will not be considered. On receipt of the ballot papers the General Secretary shall place them unopened before a meeting of the Central Council for scrutiny of votes and declaration of result.

The President, President-elect and the Vice-Presidents shall assume their offices from the 1st day of the Annual Conference.

(*b*) The General Secretary, the Joint Secretaries, the Treasurer shall be elected annually by the Central Council at its Annual Meeting. They shall assume office after the Conference. The Editor, the Associate Editor, the Managing Editor, the Assistant Editor and five other members of the Journal Committee shall be elected every three years in the Annual General Meeting of the Association.

21. *Appointment of an Auditor:*

A. An Auditor shall be appointed at the Annual Meeting of the Central Council every year for auditing the accounts of the Association. He shall be a Chartered Accountant.

B. DUTIES OF THE AUDITOR:

(a) shall audit the accounts at the end of the year or oftener if so decided by the Central Council and shall certify to their correctness.
(b) shall give suggestions for the proper keeping of accounts as required.

22. *The Journal of the Association:*

A. PUBLICATION OF THE JOURNAL:

(1) The Editor shall be responsible for due publication of the Journal with the help of the Editorial Board.
(2) Composition of the Editorial Board:
  (a) Editor.
  (b) Associate Editor.
  (c) Managing Editor.
  (d) General Secretary of the Association.
  (e) Advisers, Referees and the Collaborators nominated by the Editor.

B. MANAGEMENT OF THE JOURNAL:

(1) All business in relation to the management of the Journal, that of office, securing of advertisements etc. shall be conducted by the Managing Editor with the help of the Journal Committee.

(2) *Composition of Journal Committee:*

(1) The Editor.
(2) The Associate Editor.
(3) The Managing Editor.
(4) The Assistant Editor.

Five Members to be elected by the Central Council in the Annual Meeting.

The Journal Committee shall function for 3 years.

23. *The Annual Health Conference:*

A. AUSPICES:

(a) There shall be organised an All India Health Conference every year or as the Central Council may decide, under the auspices of the Indian Public Health Association at a suitable place and time to be decided by the Central Council of the Association. Such a Conference will usually be held towards the end of December, or early in January. The Branches of the Indian Public Health

Association when formed shall have the privilege of inviting the Conference.

(b) The Annual Meeting of the Central Council and the Annual General Meeting of this Association shall be held ordinarily during the annual health conference.

(c) *Membership of the Conference :*

All Public Health Workers possessing qualifications as laid down in the Rules and registered medical practitioners shall be entitled to join the Conference on terms hereinafter laid down and shall be called Members of the Conference.

B. BUSINESS AT THE ANNUAL HEALTH CONFERENCE :

(a) The Conference will have :

(i) An Inaugural Session : For addresses of the Chairman of the Reception Committee and of the President and formation of the Subjects Committee. This session will be open to members and visitors of the conference.

(ii) Scientific Session and Exhibitions open to members and visitors as above.

(iii) Open Session : (The Annual General Meeting of the Association).

(b) Announcement of the office-bearers of the Association and election of other members and adoption of resolutions etc.

NOTICE TO CONTRIBUTORS

The Indian Journal of Public Health is issued quarterly, one volume appearing in a year. The journal is meant to publish mainly original contributions and results of original investigations relating to the problems of public health, which broadly includes, personal hygiene, public health service, vital statistics and population studies, social and preventive medicine, microbiology and public health laboratory service, mental health, public health engineering, housing and sanitation, tropical medicine and hygiene, epidemiology and communicable disease control, industrial and physiological hygiene, occupational health, maternal and child health, health education, nursing, midwifery, health visiting, food and nutrition, school health, dentistry, veterinary hygiene, medical education and history of Medicine etc.

Manuscripts for publications, books for reviews, field news, reports of associations or societies and correspondence relating to the editorial management, published papers, questionnaires and business matters concerning subscriptions, advertising, reprints, order for copies, change of address, exchange, etc., should be sent to the Managing Editor, Indian Journal of Public Health, All-India Institute of Hygiene and Public Health, 110, Chittaranjan Avenue, Calcutta-12.

All scientific papers, reviews, letters to the Editor and other original contributions should be sent exclusively for the Indian Journal of Public Health, and no articles published elsewhere or submitted simultaneously to other periodicals can be accepted. The editor's or referee's comments on the article or any part thereof which needs clarification or modification and acceptance or non-acceptance of the article for publication in the Journal will be duly communicated to the authors concerned.

All manuscripts should be sent in *duplicate* type-written, double spaced with good margin on one side of the paper only. Authors are requested to enclose line drawings of all the diagrams in their paper drawn in Indian ink on smooth white Bristol Board. The drawing should be twice the size they will occupy in the journal. Good prints of Photographs and Microphotographs should be sent to obtain clear impression in the final print. Authors are particularly requested to reduce the number of diagrams to an absolute minimum.

References to literature should be arranged thus: The author's name, initials, year, abbreviation of Journal, volume and page. In the case of books or reports, the author's name as above, the Title in full, with the place and year of publictaion and page.

Contributors receive 25 reprints free of charge. Additional copies may be obtained at cost. The requirement of such copies should be indicated at the time of submission of the manuscript. Remittnces should be made by draft or cheque or by postal order payable to the Managing Editor. For cheques on banks outside Calcutta collection charges be added. Every paper submitted to the Journal will be subjected to the Editorial scrutiny and such modifications as are deemed necessary for clear expression and maintenance of standard.

INDIAN PUBLIC HEALTH ASSOCIATION

110, CHITTARANJAN AVENUE, CALCUTTA-12 *Date*.....

Application for Membership

Name

Mailing Address

Present Position

Experience

Place and date of birth

Education (Degree if any)

Professional Society Membership

Section affiliation desired (choose only one by a Cross Mark)

Health Officer	Maternal & Child Health	Dental Health
Laboratory	Public Health Education	Medical Care
Statistics	Public Health Nursing	Mental Health
Industrial Health	Epidemiology	Public Health Administration
Food & Nutrition	School Health	Unaffiliated

Proposed by Seconded by

Address Address

Branch affiliation—Local/State (if already set up).

Proposer and seconder of this application must be an ordinary (including Life) Member of the Indian Public Health Association.

Annual dues—Ordinary membership—Rs .12/-; foreign Rs. 18/- or $4.00 (£1-7s.).

Membership year—January-December. Members enlisting in July and afterwards may pay for the half year but he must pay for the whole year if he wants all the issues of the journal in the year. Money to be sent by M.O. or Postal Order. If crossed cheque is issued, extra charges of Re. 1/- for collection should be included.

Signature.....

INDIAN JOURNAL OF PUBLIC HEALTH

OFFICIAL JOURNAL OF THE INDIAN PUBLIC HEALTH ASSOCIATION,
110, CHITTARANJAN AVENUE, CALCUTTA - 12

Telephone: 34-28939

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Breadth of column	...	...	$2\frac{3}{4}$″

Printed in S/c. White Printing.

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APPEAL

The Indian Public Health Association now in its second year of existence is marching ahead day by day on the path of progress and recognition from all corners of the world. But the Association needs more patronage, more co-operation and more active help from its members and also from those who are interested in the betterment of public health services of our country.

I take this opportunity to request all to enlist as many members as possible during the current year. It is gratifying to note here that the Associate members have since been vested with voting rights subject to some rules and conditions, besides being entitled to copies of the journal by paying annual subscription at concessional rate of Rs. 6/-only. Lastly I would specially request to dear members of the association to send their annual subscription forthwith if not already paid for the year 1957 as it is over due. The normal function of the association is sure to hamper if the membership fee is not paid in time.

I am fully confident that my appeal will not go in vain and ere long our Association shall be in a very sound financial position with the active co-operation of you all.

S. C. SEAL,
Honorary General Secretary.

THE ASSOCIATION CREST

In the seal are depicted a palm tree with its stem entwined by serpents, the Sun emanating rays over the objects of the earth below and a strong healthy man holding the globe.

The palm as a tree is the symbol of life and youth. Serpents may be taken to interpret Death and are connected with the idea of teaching pupils how to preserve life and to prevent or combat Death. On the other hand, the serpent is a symbol Hygeia, the Goddess of Health in Greek Mythology and thus a connection with Hygeia is implied by the snake even though it stands for Death. Trees of plants are also the original source of food and of herbs for healing.

Two other interpretations of the symbols of tree and snake may also be offered:

(1) According to the Jewish mythology, as mentioned in the Old Testament, the tree represented the "Tree of Knowledge with the forbidden fruit." The serpent induced man to pluck and eat, and this brought to him both Knowledge and Death.

(2) A mystic sense can be attached to the symbols of tree and serpent from the point of view of more than one religion and culture. Thus it may be recalled that the cult of worshipping tree and the serpent has been existent in India from very ancient times representing symbolisations of Life and Death, that is of *Shakti* or *Prakriti*—Nature or Goddess of Life or the Great Mother, and of *Shiva* (who carries snakes in his person (or Purusha), that is Death or Dissolution—the force of Destruction and Regeneration.

The Sun, the prime source of all lives and energies and the giver of health is shown here bestowing its vivifying rays over all objects of the earth below and the light that emanates from it and pervades upon the Universe dispels the darkness in the physical plane as well as enlightens (symbolically) the mind in the mental plane.

The holding of the globe by the man indicates health and strength. It is also a symbolical representation of the view that public health is global and the activities of the Association should extend beyond the geographical boundary of India.

In addition to the above the seal also enjoins two important self-explanatory mottos, namely (1) Health is the Foundation of all Happiness (given in Sanskrit) and (2) Service to Humanity (given in English).

S. C. SEAL.