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EDITOR :

DR. B. C. DASGUPTA, B.SC., M.B., M.R.C.P., D.P.H., D.T.M. & H.

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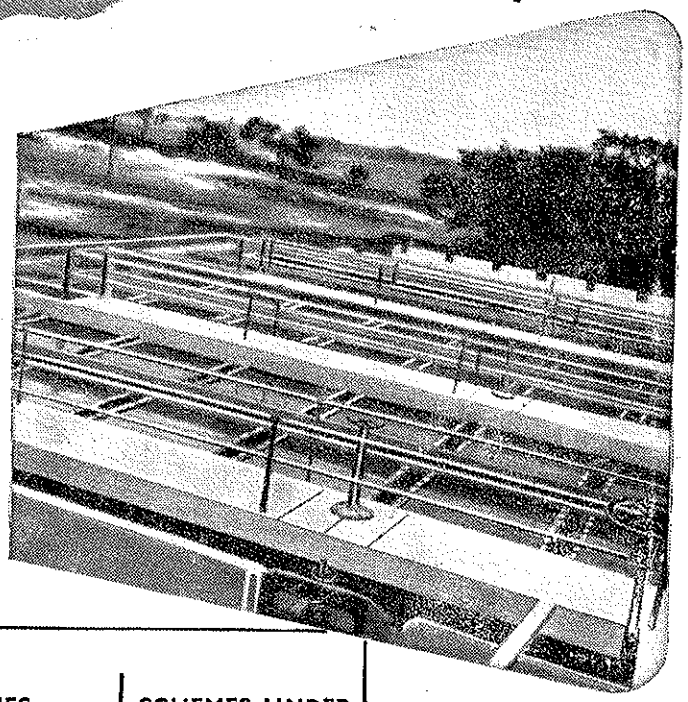

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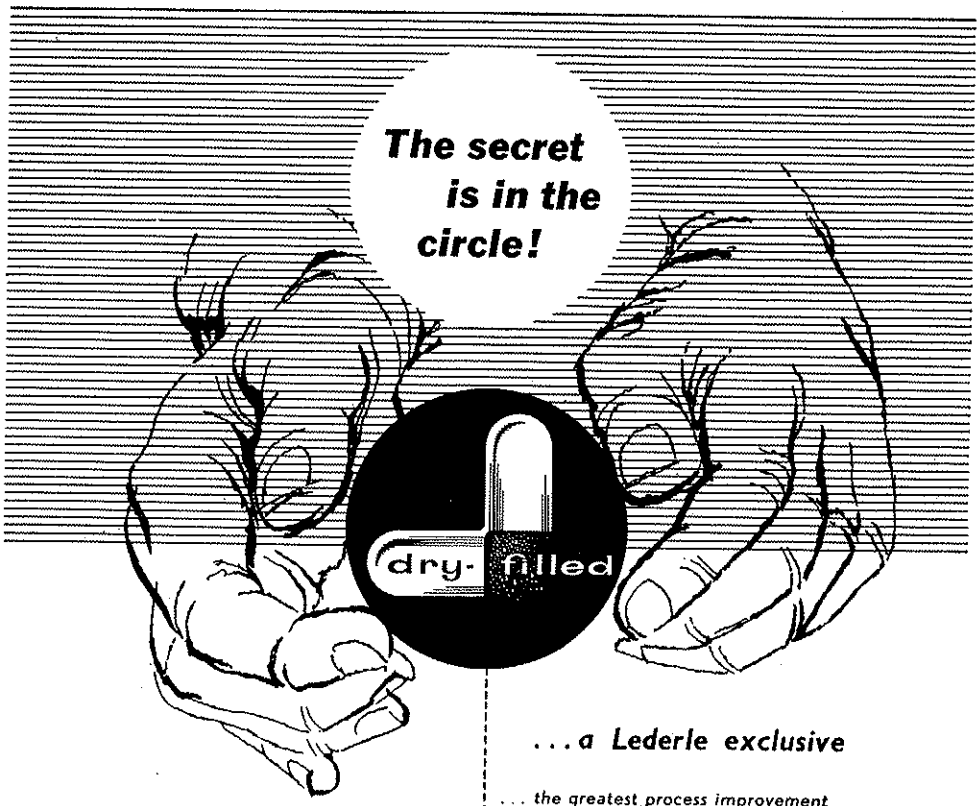

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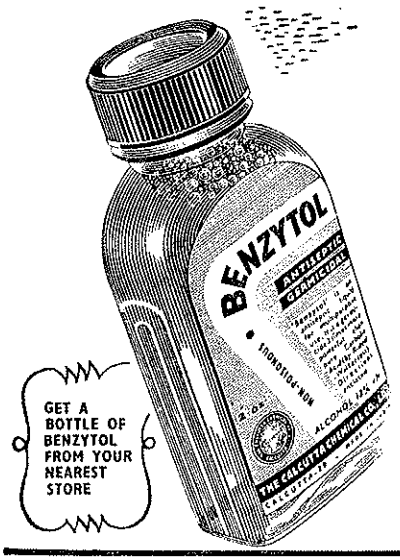

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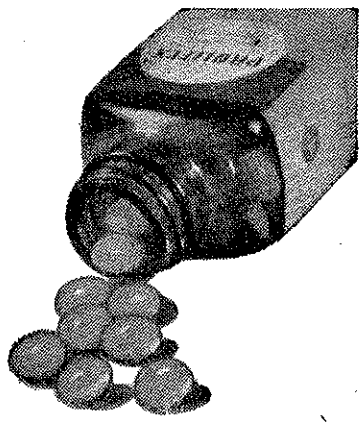

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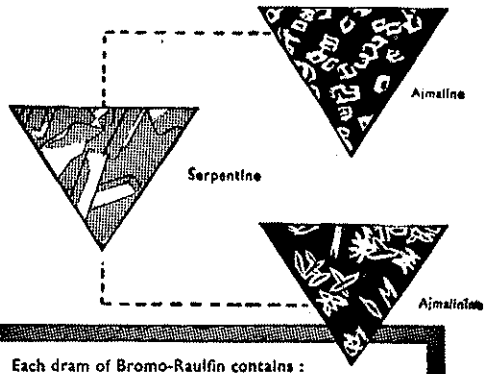

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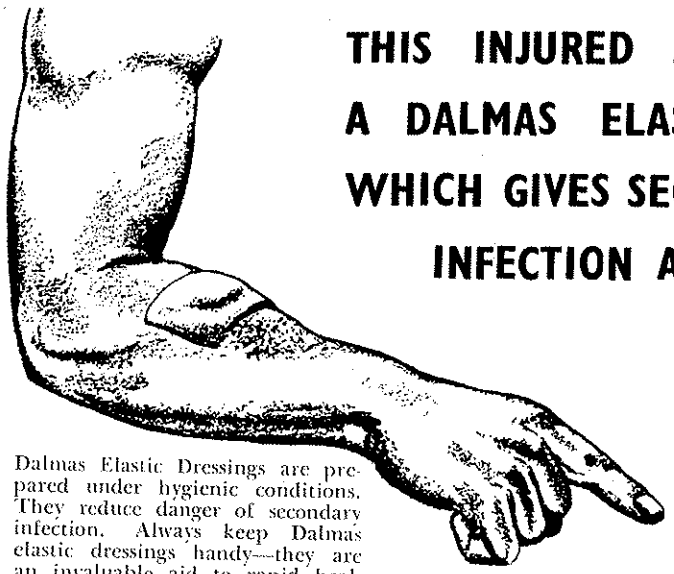

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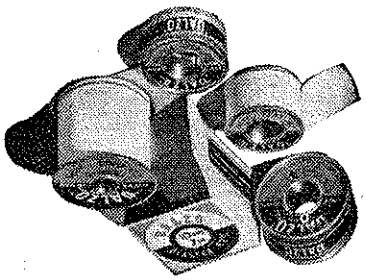

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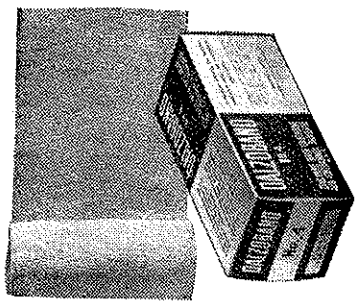

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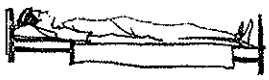

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VOLUME I JULY 1957 NUMBER 3

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INDIAN JOURNAL OF PUBLIC HEALTH

Official Quarterly Publication of the Indian Public Health Association

VOLUME I JULY 1957 NUMBER 3

BEHAVIOUR OF SLUDGE IN A SEPTIC TANK

By

DR. GAURCHANDRA GHOSH, B.E., A.M.I.C.E., D.I.C., F.R.S.H., PH.D. (LONDON).
Executive Engineer, Public Health Engineering, Govt. of West Bengal.

General Principles :

In a septic tank, as its name implies, the sewage undergoes septic decomposition. This action is anaerobic and is brought about by a complex flora of micro-organisms. The proteins, carbohydrates, and fatty matters in the sewage are all attacked by anaerobic bacteria and broken down to simpler compounds. Spore-forming anaerobic bacteria of the genus clostridium particularly cl. *sporogenes* are very active in breaking down proteins. Amino-acids which are the final products of break-down of protein, are suitable for bacterial nutrition. After this stage, development depends on the type of bacteria present. Some types build them into bacterial cell proteins, but prefer to break down carbohydrates for their energy requirements. Other types use amino-acids as both building and energy sources. The nitrogen is turned out as ammonia which accumulates to make the reaction of the mixture alkaline. This process of ammonification is the first stage of nitrogen cycle. In a septic tank the process hardly proceeds beyond this first stage. A wide variety of fungi like aspergillus may break down cellulose but amongst bacteria this property is restricted. Of the aerobic types, *Bacillus fosiicularium* and *Bac. methanigenes* are the two important groups which break down cellulose, whereby methane and hydrogen are produced. Proteus group, the sewage bacteria proper also plays an important part in breaking down the organic matter.

The colloidal matter in the sewage are first of all flocculated, then liquified, and finally, partly digested. Organic matter already in solution is also digested. All these processes lead to a remarkable change in the character of the sewage resulting in an appreciable reduction in the volume of sludge. This process is however not carried out as far as in properly supervised sludge-digestion tanks in municipal sewage works. The Royal Commission on Sewage Disposal (1) in their fifth report (1908) noted as follows:—

"All the organic solids present in a sewage are not digested by septic tanks, the actual amount of digestion varying with the character of the sewage, the size of the tanks relative to the volume treated, and the frequency of cleansing. With a domestic sewage and tanks worked at a 24 hours rate the digestion is about 25 per cent."

In a digestion chamber the decomposition of sludge results in evolution of gas bubbles which constantly rise to the surface, carrying with them minute quantities of decomposed sludge. These help to thoroughly infect with putrefying bacteria, the undissolved components of the incoming sewage, and keep the contents of the tank in continuous motion. In this way, the decomposition process begins to operate almost immediately and with full force, and a well designed septic tank can thus have a purifying strength which far exceeds that achieved by simple sedimentation lasting 24-hours or even a number of days.

It is obvious that, if the biological processes are to operate effectively in a septic tank, not only turbulence is an important factor but also the presence of a quantity of ripe sludge. Ripe sludge may be defined as sludge in an advanced state of decomposi-

tion, containing bacteria amongst which the methane producing types predominate. Only through contact with this type of sludge can the digestion of the organic matter be carried out with the completeness desired. Another type of decomposition known as acid fermentation may at times occur in a septic tank. With this form of fermentation digestion does not go beyond the initial phase, owing to the predominance of facultative anaerobic bacteria. Large quantities of organic acids as well as hydrogen sulfide are formed, and acid reactions predominate. The effects in practice are an intense, nauseating stench and very little diminution in the volume of sludge. In certain circumstances both types of decomposition may occur simultaneously in the septic tank i.e. acid fermentation in the floating cover, and normal digestion in the remaining contents of the tank.

Sludge for Seeding :

When a septic tank is first started, it is the common practice to seed the tank with some ripened sludge from elsewhere to speed up the process of bacterial reproduction and accelerate the process of decomposition. Under unfavourable conditions and without the addition of ripe sludge it may take a long time for the process of decomposition to start, specially during cold weather. For the same reason, when a septic tank is desludged, a certain quantity of old sludge is retained inside the tank to help in speeding up the process. Once the process has started there is no necessity for any seeding. In England the Ministry of Housing & Local Govt. recommend (2) to retain about 20% of settled sludge inside the tank (during desludging) to seed fresh deposits. The reaction in a new septic tank is generally acid to start with, which changes to alkaline when malodour ceases. It is not till this state is reached that digestion is said to have started, and according to Macdonald (3), it is only after 12 months that it is in full action; but the delay in starting can be greatly curtailed by inoculating new tanks with several gallons of ripened sludge, Ghosh (1945) recommends about 100 gallons of sludge and effluent (4). The Dept. of Health, Victoria (1946) recommend (5) that in the case of a new domestic type septic tank up to 10 users, it is desirable to add 10 gallons or so ripe sludge from an established tank to seed the new tank with bacteria and to render its contents slightly alkaline. In case such sludge is not readily obtained, it is recommended that the smelly ripening period may be shortened or done away with by flushing in a handful of slaked lime through the W.C. twice weekly for the first few weeks of use.

Weibel, Straub, and Thoman (1949) at Cincinnati carried out laboratory experiments (6) to determine how much digested sludge should be added to a digestion (septic) tank for seed purposes

Graduated amounts of sludge ranging from 0 to 20 per cent by volume, were added to a series of bottles and filled to the mark with fresh raw sewage, and digestion allowed to progress at room temperature. From their experiments it appeared that 1 to 4.38 sewage sludge volatile solids ratio might serve for seeding purposes.

The experiments are by no means conclusive and more work is needed to fortify the basis. As digestion proceeds slowly at lower temperatures, it appeared advantageous to the authors to seed tanks placed in northern climates and further: to avoid risking a period of malodorous operation until alkaline digestion was established, seeding appeared advantageous.

O.E.E.C., report (1953) states that as per American practice some of the deposited sludge should be left in the septic tank to seed the incoming fresh sludge material.

A new prduct '*Bionetic*' has been suggested for the purpose of seeding and accelerating biological process. The product is prepared by suspending a culture of the required organisms in sterile water, spraying the suspension on top of a dry nutrient medium, incubating for 24-30 hours, and drying the culture at a maximum temperature of 110°F. The prduct is stable and would remain viable for some years. It is claimed that the use of the product would enable the load which a plant can treat to be increased without requiring plant extensions.

Against the above discussions in favour of seeding, there is another school of thought which considers that seeding is not at all necessary. Connecticut State Dept. of Health (8) suggest that it is not necessary to leave solids in the tank for seeding purposes or promoting solids digestion. South Carolina State Board of Health (9) recommend as follows: —

"When a septic tank is placed into service, it is not necessary to add anything to start decomposition or digestion. If normal domestic sewage flows into the tank it contains sufficient number of bacteria to start the digestion process within itself.

The following theoretical considerations may be advanced against the necessity for seeding:—

1. All the bacteria necessary for the digestion are present in the raw solids.

2. These bacteria are normally few in number in the raw solids, but they multiply and establish themselves under favourable environmental conditions. Raw sewage usually contains between 1,000,000 to 10,000,000 bacteria per ml. If the dilution with water is as great as 1 in 100, even then the liquid entering the septic tank would contain 10,000 to 100,000 bacteria per ml. Under favourable conditions these bacteria would multiply very rapidly. Bacterial reproduction is governed by the formula $-b = ax2^n$ where a = Initial number of bacteria.

b = Number after any interval of time 't'

g = generation time.

n = Number of generation in time 't' $= \frac{t}{g}$.

As an example, if the sewage contains say 10,000 bacteria per ml., and the generation time is $\frac{1}{2}$ hour, then in 5 hours there would be 10 generations of bacteria and the number of bacteria would increase to $10{,}000 \times 2^{10} = 10{,}000{,}000$ per ml. It is thus easily seen how, under optimum conditions, the bacteria would multiply very rapidly and start digestion.

3. Even during the initial period prior to the establishment of flora responsible for digestion, the addition of cultures of bacteria or seeding material does not result in shortening the period of maturation and adjustment unless proper environmental conditions are established, and if these conditions are at an optimum the rapid rate of multiplication of the bacteria normally present in the raw sewage could establish the necessary flora without the aid of artificial additions of cultures. In other words, one can add a great number of bacteria artificially, but unless the conditions are conducive for their multiplication the benefit derived will be negligible, and if the environmental conditions are at an optimum the organisms present in the raw sewage multiply and establish the necessary flora. The important consideration is the multiplication of the bacteria, with the resultant biological activity, rather than the existence of a large number of bacteria.

4. Digestion of sewage solids is the result of biological activities of bacteria. These activities comprise the hydrolysis and liquifaction of complex organic materials by enzymes secreted by bacteria, the enzymes converting these materials into simpler, intermediate, soluble or more readily available forms. The intermediate soluble products diffuse through the cell membranes and are ultimately assimilated and converted into final end products such as methane, carbon-dioxide, and possibly hydrogen, leaving and undigestible humus-like residue. Development of the bacteria necessary to bring about these various complex bio-chemical changes takes place naturally in fresh solids kept under proper environmental conditions for a time. The digested sludge, which harbours a great number of the organisms necessary for the various phases of digestion, serves as seed for the digestion of additional raw sludge, and the process is perpetuated as long as the environmental conditions are maintained.

Henkelekian and Berger of the Dept. of Sanitation, Rutgers University, New Brunswick (10), carried out a series of experiments by the addition of pure enzymes, enzyme and bacterial culture preparations, and yeast to determine their effect on the liquefaction of sterile and non-sterile fresh solids by using the increase in B.O.D. of the supernatant liquid as the yard stick. An additional experiment was run to check the claim that the addition of enzymes improves the quality of effluent from septic tanks. The results obtained led to the following conclusions:—

"1. The addition of pure enzymes, enzyme and bacterial preparations, and yeast, does not increase the liquefaction of nonsterile fresh solids as measured by the B.O.D. of the supernatant liquor.

2. The addition of pure enzymes to sterile fresh solids increases the B.O.D. of the supernatant liquid.

3. The addition of enzymes and bacterial preparations to non-sterile fresh solids does not result in an increased liquefaction as measured by the B.O.D. of the supernatant liquid.

4. The addition of an enzyme preparation to settled sewage did not result in an increased stabilisation and did not indicate an increase or decrease of B.O.D. after storage up to 6 days".

In order to observe what effect, if any, yeast has on the anaerobic digestion of fresh sewage along , Weibel et-al set up bottle experiments in the laboratory. Varying con-

centrations of yeast were added to raw sewage and the progress of digestion, as measured by gas production, was compared with what of a control unit containing sewage and digested sludge; the latter serving as a seed material. After 18 days, the control flask, containing the sewage sludge mixture had produced a total volume of 2,850 milliliters whereas none of the flask containing the sewage yeast mixtures had produced any gas. Reading made on the 25th day showed gas volumes from 2 to 40 milliliters for the yeast sewage mixtures.

From the above the conclusion was reached that yeast added to raw sewage alone will not stimulate digestion for at least 25 days after addition; and this conclusion is in agreement with that of Henkelekian.

Sludge as Starter—(West Bengal Experience) :

In West Bengal since 1948 to 1953 the author experimented on early 200 septic tank installlations in factories around Calcutta where after complete annual desludging of septic tanks, no sludge has been left over or added as a starter. The experience of five years of working has been that the plants have worked quite satisfactorily as evidenced by frequent inspections for smell or bad odour and also by tests for B.O.D. and suspended solids of the resultant effluent. The temperatures obtained in this part of the country are higher than in colder climates, and it is therefore not possible to conclude what the effects would be in colder climates. Even in colder regions the temperature inside a septic tank constructed below ground level may not be very low specially where waste hot water is admitted to the septic tanks. Controlled experiments to determine the exact requirements are necessary and there is a good field for extensive research in this direction, both in the laboratory and in the field.

Sludge accumulation in septic tanks :

In course of time sludge begins to accumulate inside a septic tank. The amount of sludge space provided varies in different countries, and depends to a large extent on the frequency of desludging. In the United Kingdom where six-monthly desludging is the usual practice, it is customary to allow depositing and desludging space of 2 cu.ft. or 12.5 gallons per head. Where digestion is good, space required is 20% less, and for poor digestion it is 25% more. To the figure of 12.5 gallons an allowance of 20% is made for sludge left for seeding providing a total of 15 gallons per head of sludge space. In the U.S.A. the usual frequency of desludging is 12 months, Sludge space of 3.4 cu.ft. per head is usual, and allowing 20% for seeding a total sludge space of 25.5 gallons per head is provided. If garbage is ground or chopped up and discharged to the foul sewers capacities are increased in extent to the relation that this practice is followed in the houses served, with a maximum increase of 50% where all houses are so equipped. Synthetic detergents slow up digestion, and where such detergents are in common use sludge storage capacities are increased by 20%.

Weibel, Straub, & Thoman (1949) at Cincinnati carried out field observations on 300 single house-hold type septic tanks in normal operation in nine areas over the country. Of the 300 installations, 205 were screened out for detailed examination as being able to satisfy all of the following criteria:

1. A single house-hold is served.
2. A reasonably accurate history was obtained.
3. The tank was not full of scum and sludge.
4. The outlet device was intact.

An examination of the 205 tanks was first made on the basis of sludge and scum found in the tanks, as related to the number of contributing resident persons and years of service during which the accumulation took place. The device for measuring scum thickness consisted of a hinged plate, on a tub handle, which was slipped through the scum layer in vertical position, rotated to a horizontal position, and pulled up against the bottom of the scum for measurement. The sludge level indicating device was a jointed copper tube with a water tight window at the bottom, below which was fixed a flash-light bulb. The inspector observed the light bulb through the tube as the tube was lowered into the tank. The light blanked out at the sludge level recorded as the top of sludge. The results were reproducible by different operators in the neighbourhood of one-eighth inch. This device worked excellently and was better than the methods of lowering and withdrawing a sample bottle at various depths, until solids content indicated the sludge level depth had been reached, at risk of disturbance of tank contents.

The accumulations of scum and sludge were reduced to a hypothetical annual rate of accumulation per person by dividing the

total accumulation by the years of service, and, again, by the average number of persons connected, obtaining the expression average cubic feet per capita per year. This figure, when multiplied by the number of persons, and number of years of operation, equals the total observed accumulation. From these the following conclusions are made:—

1. For 205 tanks considered, the average sludge and scum accumulation for the group tended to be upwards of 3.4 cu.ft. per capita per year during the first year, dropping down, presumably because of digestion and compaction, to 1.34 cubic feet per capita per year at the 6 or 7 year mark and continuing on at that rate. On this basis, twice the effective scum and sludge storage capacity would appear to extend the interval between cleanings to 4½ years; three times in 7 years.
2. Measurements of scum layers for 150 tanks indicated that for scum layers up to 28 inches thick, about 27 per cent of the total thickness will be exposed above the water line, and 73 per cent below it.

Effect of type of waste on scum & sludge :

Of the 205 tanks, data for 62 installations which received only bathroom wastes (bath tub, lavatory and water closet) and for 80 installlations wherein all wastes (bathroom plus kitchen and laundry) were discharged to the septic tanks were utilised for a comparison. From the trend curves it was seen that the average annual per capita accumulation for the tanks receiving all wastes is about 1.46 cu.ft. beyond the 6 year point as against 1.31 cu.ft. for bath room wastes only. It is thus likely that kitchen and laundry solids including fats and soaps add but 11 per cent to the total amount of solids accumulating from bath-room wastes alone.

Effect of capacity :

The 205 tanks were classified according to years of service and per capita liquid capacity in one or another of a series of 6 capacity ranges. The trend curves for the average accumulations of scum and sludge in the different capacity groups indicated that tanks with capacities of less than 125—175 gallons per capita retain less solids than the average of the group, while tanks of greater capacity than these in the 125 to 175 gallons per capita group retain more solids per capita than the average, and are therefore more efficient so far as solids removals are concerned.

In Bengal, septic tanks are designed on a total per capita capacity of 2½ cu.ft. It has been our experience that they work satisfactorily for a maximum period of 12 months when they need desludging. The accumulation of sludge at this period is approximately 25% of the total space i.e. about 0.63 cu.ft. per capita. If it is then not desludged, the quality of the effluent deteriorates. This is generally due to two reasons:—(1) Mechanical disturbance of accumulated sludge which is carried away with the effluent. (2) Reduction in the retention period and hence reduced digestion. The quality of the effluent improves almost immediately after desludging.

Effect of retention period :

Septic tanks are usually designed for a retention period of 24 hours. Practice however varies widely from place to place (8, 9, 14, 15, 16). Kansas State College experiments showed that suspended solids in the effluent decreased as detention period increased.

Macdonald (3) considers that too large a capacity causes over-septicisation which is characterised by rapid disappearance of scum, formation of a black and bubbling liquid, offensive odour and increased deposition of sludge. Against this opinion, we can quote Hepburn (1938) who after investigating a large number of domestic septic tanks wrote (14)—"When the tank effluent was disposed of by sub soil absorption, no case was found in which trouble of any kind had been caused by a tank being too large, though tanks with capacities up to 300 gallons (48 cu.ft.) per head were examined". The Royal Commission on Sewage Disposal (1), in their 5th report (1908) states that the rate of flow through a septic tank is a matter in which the needs of each place require special consideration, but at few places should the sewage be allowed to take longer than 24 or less than 12 hours to flow through the tank. They also suggested that in no case should less than two tanks be provided, and they should be arranged so that, if necessary, one tank can be used alone.

The following table gives the present day standards in force in some of the countries in Europe, and U.S.A. (1952).

SEPTIC TANK STANDARDS FOR SINGLE OR ISOLATED HOUSES (17)

Country	Gallons* (Minimum)	Compartments	Detention *1 gallon (days)=4.54 litres
Belgium	330	2	2
Finland	270	1 to 2	1-2
France	450-600	1 to 3	5-10
Germany	650	3	5-10
Gt. Britain	650	1 or 2	2-4
Greece	330	2	—
Italy	—	3	3
Switzerland	880	3	3-4
U.S.A.	500	2	2-3

The question of retention period was discussed in the third European Seminar (17) for Sanitary Engineers held at London in 1952. The following is a summary of the discussions on this point. "Retention time was mentioned as another factor which enters into the question of capacity. The present recommended volume for a three chamber tank in Switzerland is 1 m^3 (880 gallons). For ten-day retention, the tank would have to be more than one and a half times larger, which is another reason for limiting the use of such tanks to not more than fifty persons. In Belgium, the retention time is considered rather secondary to the tank volume (which is determined by the assumed needs of the population); and, apparently, a retention period of as much as ten or more days is not regarded as necessary. In Great Britain, retention time is less than ten days; but one of the British participants was in favour of extending this period for as long as possible in order to render the liquid components more septic".

According to Prof. Dr. Meinck (Berlin) (17) the purifying effect of septic treatment improves with the duration of detention of sewage. Septic treatment plants designed to provide for a 10-day detention period accomplish B.O.D. reduction approaching that of a biological plant, although the external characteristics, especially the odour would not suggest such complete treatment. This, in his opinion, seems to indicate a possibility of improving the process in its present form. Experiments in this direction appear to be very promising. Special weight should be attached to the elimination of the hydrogen sulfide odour if the septic tank method is to be adopted as an independent purifying method rather than a blological process. In this respect, mention should be made of experiments in which rain-water is introduced into the final compartment of a multi-chamber septic tank.

Increased retention period would increase the period of digestion and is likely to result in a better effluent so far as B.O.D. and suspended solids are concerned.

There is a great field for research in this direction. The odour of the effluent might perhaps be adsorbed by activated carbon. If this could be achieved, and there are many other possible ways which can be found out only after experiments, it would open up great fields for septic tanks as independent means of sewage disposal, and would be of great use in rural and semi-rural areas.

Desludging of septic tanks:

The frequency of desludging varies widely from place to place. It varies from 6 months in England, to one year in India, and 2 to 3 years in America. The Royal Commission on Sewage Disposal (1908) reported as follows:—

"No definite rules can be laid down as to how long a septic tank should be run without cleaning. In the case of small sewage works (serving population of say 100 to 10,000 persons) the tanks should generally be allowed to run without cleaning, so long as the suspended matter in the tank liquor shows no signs of affecting the filters injuriously. For larger works it would generally be advisable to run off small quantities of sludge at short intervals of time".

S. Carolina state Board of Health (9) recommend desludging when sludge reaches a depth of 2 ft. and at intervals not exceeding 1-2 years. U.S.P.H. Service:—Desludging at regular intervals, depending largely on usage (2-3 years). When the scum plus sludge deposit reached a combined depth of 18 to 20 inches the tank should be cleaned. Pettet and Jones (17) of the water Pollution Research Laboratory (England), on the basis of their experiments, noted as follows:—

"Removal of sludge once every six months appeared to be not often enough for the rectangular single compartment tank (retention period 30 years), barely adequate for the circular two-storey tanks (9 hours and 11.5 hours of retention), and probably adequate for the two compartment tank (64 hours retention), and the square two-storey tank (13.5 hours retention). An interval of one year between desludging operations ap-

peared to be too long for any of the tanks. No attempt was made to seed the tanks with digested sludge; and with this method of operation, digestion could not be relied upon to take place".

The writer's own experience with septic tanks in West Bengal has been that too much of sludge inside a tank hinders rather than helps in the working of a tank. Whenever there has been trouble of smell or poor quality of effluent due perhaps to over-loading, desludging has been a very handy remedy. If sludge is not regularly removed it gets compacted, and the writer has actually seen that in tanks not desludged for 15 to 20 years, the sludge has solidified to stone-like mass requiring the use of pick-axes for their removal. Such sludge can not possibly help in digestion of sewage, but only blocks up space inside a tank. Frequent desludging is always beneficial.

Conclusions :

Design and operation of septic tanks have in the past been guided more or less by rule of thumb, and it is only in recent years that the subject is being studied scientifically. Many people, quite contrary to facts, have the queer idea that it takes a long time, as much as one year, for a septic tank to attain an optimum level of satisfactory working, and that too frequent (meaning less than 5 years) desludging would upset the working. Septic tank method of sewage disposal is considered by some to be rather old fashioned, but as a matter of fact, for the rural areas, there is no better substitute. It is estimated that even in an advanced country like the United States of America 17 million persons are served by 4,400,000 residential septic tank-soil absorption system. In the tropical and less advanced countries, the need for septic tanks for the rural and semi-rural areas is infinitely greater. Hence there is the necessity for developing the system on a scientific basis. The field as a whole appears to be suffering from an abundance of concepts which have gained credence through repetition of opinion. References to factual study are few, and of limited scope. There is thus ample scope for extensive research work on all the aspects dealt with in in this paper.

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SANITARY LATRINES IN THE RURAL AREAS WITH SPECIAL REFERENCE TO SINGUR

By

N. Majumder & J. N. Sengupta

Section of Sanitary Engineering,

All-India Institute of Hygiene and Public Health, Calcutta.

Introduction :

Sanitation is the keynote to all health measures. High incidence of gastro-intestinal and worm diseases in India signifies lack of sanitation in the country. These diseases are preventable. The human excreta containing disease germs are left exposed to flies which carry the germs to the food we consume. Excreta, at times, get flushed to the nearest water collection and the same water is being used by the people for drinking and cooking purposes. Thus, these diseases get spread from person to person in the community. Proper sanitation programme can certainly bring down the incidences of these diseases considerably.

Most of our people live in the villages where sanitation is either nil or at its infancy. Any sanitation programme for the rural areas has to be cheap and acceptable to the villagers. Government has since taken a very serious note of the environmental sanitation conditions prevailing in the rural areas of India and has allocated a large portion of the health budget for the improvement of rural sanitation. National Water Supply and Sanitation Programme which was launched during the first plan period did not get underway fully during that period, but a modest begining was made. During the second plan period the scheme has received an impetus and a successful implementation of the programme is expected during this plan period. The Health Centre at Singur has been working within a small area for over 12 years. Implementation of environmental sanitation has been one of the major activities of the Centre. The Environmental Sanitation Programme of this Centre with respect to excreta disposal as it has developed here during the last 10 years has been presented to this paper.

Area :

The Health Centre consists of four contiguous Unions situated in Chandannagar Sub-division in West Bengal, India. The area covered is about 33 sq. miles and includes 68 villages with a population of about 72,000 (1951 census). Singur, the headquarters of the Centre is located about 21 miles from Calcutta and is connected to the city by road and railways. Climate is hot and humid for most part of the year. The annual rainfall is about 60". It is a part of the flat Gangetic delta. Drainage is poor. Tanks and ponds are common. The soil is alluvial: mostly a mixture of sand and clay or sand and clay in alternate layers. The sub-soil water level varies from 3' to 6' below ground level depending on the season.

Organization :

Prior to 1944 a Health Unit was functioning in the area. In 1914 the Centre was reorganised to cover 4 unions and it has been functioning ever since. In addition to the normal health activities, the Centre provides a practice field to the students undergoing training at the All India Institute of Hygiene and Public Health. The Officer-in-Charge of Administration is a medical graduate with post graduate qualification in public health. The sanitation programme in the area is carried out through two Rural Medical Officers of Health. Each union has a sanitary Inspector. A Chief Sanitary Inspector is available to supervise and coordinate the work of the sanitary inspectors. A Public Health Inspector stationed at the headquarters has been in general charge of execution of sanitation work in the area. The Public Health Inspector is assisted by

a mechanic, a fitter mistry and two tube well mistries. Technical guidance on sanitation problems is available from the staff of the Sanitary Engineering Section of the All India Institute of Hygiene and Public Health, Calcutta.

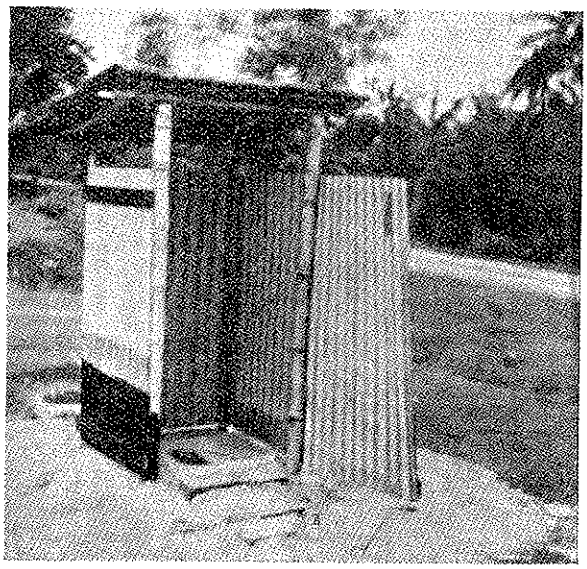
Programme of Work :

Latrines were very few in the area when the Centre started functioning. Soil pollution prevailed and no water collection could be considered free from contamination. Efforts were made to introduce sanitary latrines to suit the rural environment and economics. Borehole latrine was tried. Doubts were expressed as to the feasibility of its use in this area, on account of the soil condition and high water table in this region. Subsequently, it was proved beyond doubt that such latrines could successfully be used in the area.

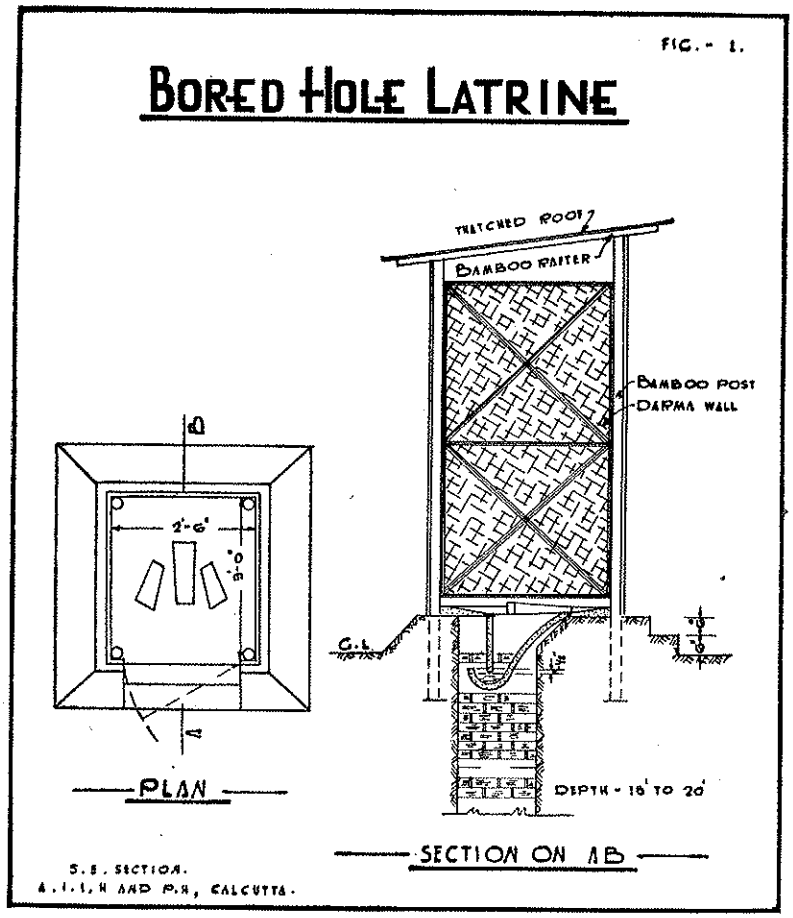
The borehole latrine consists of a hole made in soil of 16″ dia. and of 15′—20′ depth. (Vide Fig. 1). A concrete squatting plate is placed over the bore. Superstructure is next built, type of which, depends primarily on the resources of the party and the availability of the materials. Primarily due to lack of funds it was not possible to make a free gift of the latrine to the villager. However, a large number of schools in the area were provided with latrines from the Centre and one or two latrines were installed in each village as demonstration latrines. Though cheap, the villagers were reluctant to spend on this account. In order to stimulate the programme at the early stage the Centre gave away the squotting plates free to the villagers who wanted them. They had the option of either supplying the labour for digging the hole or paying the services of trained men. The superstructure was built of any material they liked. The sanitary inspector however supervised the work. The use of augers was made free to the villagers.

Gradually the people became latrine-minded and the demand for these latrines increased steadily. After about 3 years from the time when the latrine programme was initiated in the area there was a noticeable increase in their popularity and the villagers would install them even if they had to pay for the squatting plates, which were given free until then. The squatting plates were cast in large numbers at the Centre. About this time the staff engaged in the work realised that there were some inherent defects in borehole latrines. As the soil did not permit boring to great depths—15′ being the average depth, the life of these latrines was very limited. Within two to three years, each borehole required reboring. Augers available were few and it was difficult to attend to large number of borings required for new installations as well as for reboring of old ones. The transportation of the auger from one village to other also presented problems resulting in unnecessary delays. Boring required some amount of skill in operating the auger which meant that even if the villagers wanted to bore themselves, they could not do so and quite often they had to depend on trained gang for which they had to pay.

At this stage Dug-well latrines were introduced. Dug well latrine is an improvement on the bore-hole latrine. A hole of 30″ diameter is dug into the soil to a depth of 10′ to 15′ (Vide Fig. 2). A pottery or concrete ring is next fitted to the top of the bore and a squatting plate is placed over the same. In loose soil it may be necessary to line the hole with more rings. The superstructure is next built to afford privacy and protection from sun and rain. The equipments necessary for digging the hole and for putting up a cheap superstructure are normally available in the village. The villagers can build such a latrine on their own if they are properly guided. The life of a dug well latrine of



DUG WELL LATRINE

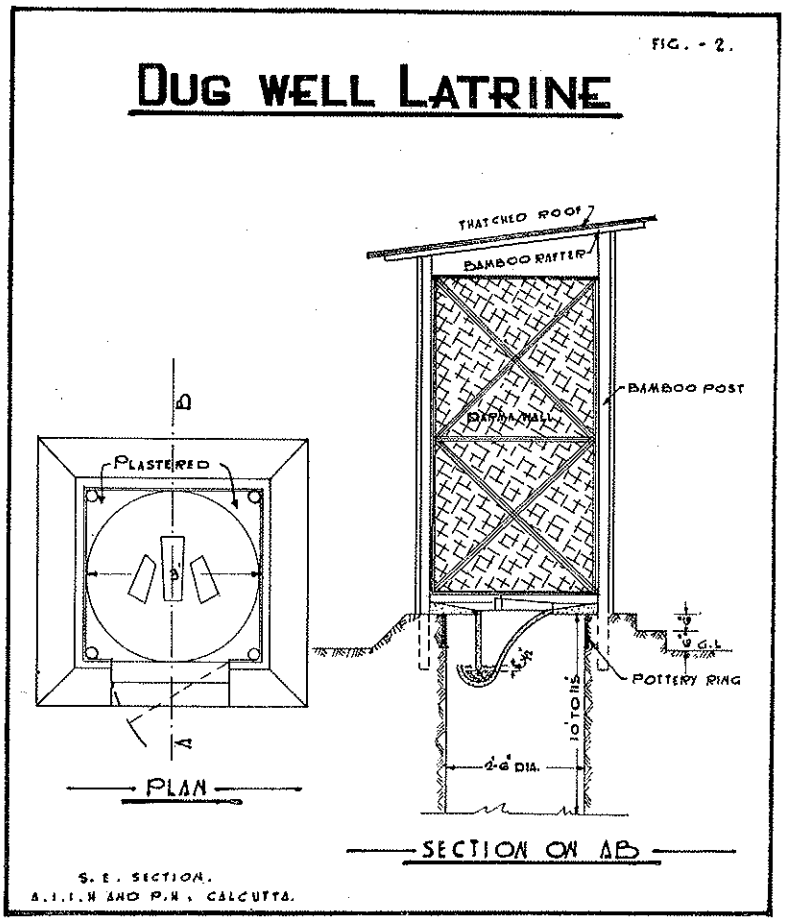


approx. 15′ depth is about 5 to 6 years when used by a family of 5-6 members. When the hole gets filled up, another hole is made on the adjoining grounds and the same plate and superstructure are shifted to their new positions. The shifting of superstructure is feasible only where cheap materials such as bamboos, are used. Where the villager intends to put up a more permanent type of superstructure it is desirable to place the seat separate from the hole with a connecting pipe leading the discharge of the latrine to the hole (Vide Fig. 3). The hole then has to be covered by a concrete slab. When the bore gets filled up, the contents are removed and dumped into a pit and the excreta is covered with earth. The night soil is left undisturbed for 6 to 8 months during which period it is completely digested. Thereafter it can be removed to the fields for use as manure. Alternately, two holes can be dug and the latrine is connected to one. When the first one gets filled the discharges from the latrines is switched on to the next one. The first hole is properly covered and left undisturbed for 6 to 8 months. The contents are then removed to the fields.

In rural areas cheap materials are normally used for superstructure, as such shifting of the latrine to an adjoining site is more economical than having the latrine placed separate from the hole.

Disposal of the Excreta :

The excreta, urine and ablution water collect in the hole where the organic solids undergo anaerobic digestion. The products of decomposition are the digested sludge, sludge liquor and gases. The sludge accumulates in the hole till it gets filled up. The liquor leaches out into the soil. The gases escape to the atmosphere through vent pipes or holes left in the squatting plate. (Vide Fig. 4). The digested sludge is fairly high in nitrogen and is a good manure and is quite safe for use in the field.



Squatting Plate :

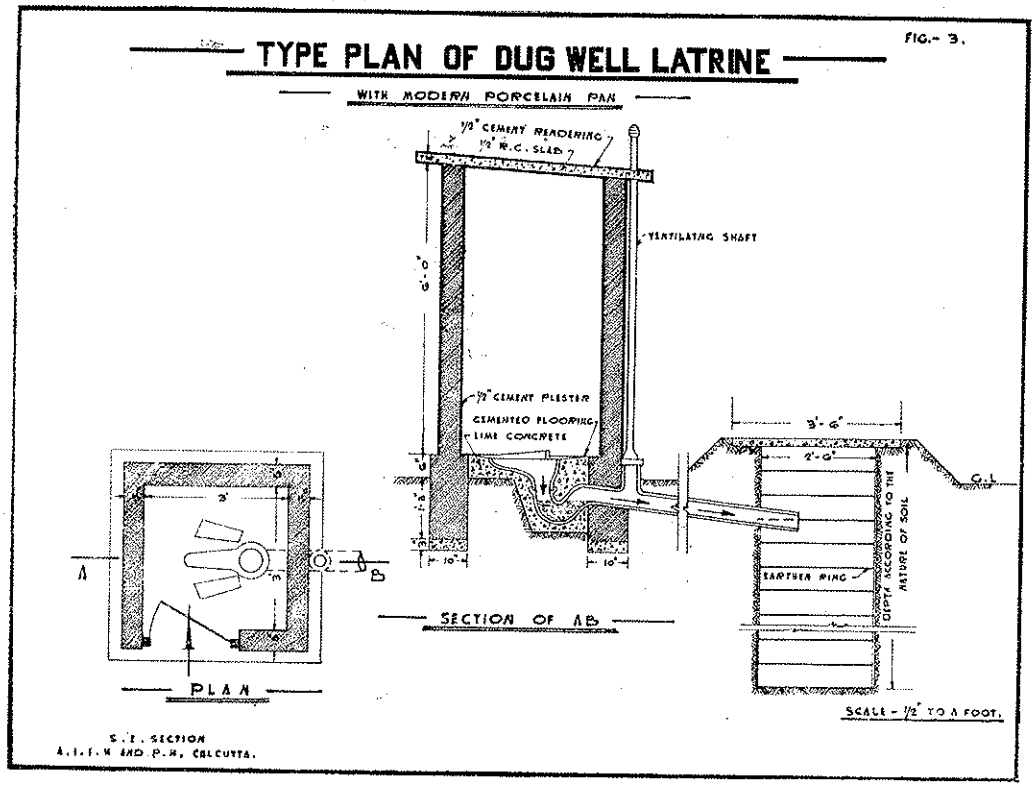
A cheap satisfactory seat was evolved for use in the area. The plate is made of concrete in either a circle of 3′ dia. or a rectangular of 3′—0″ × 2′—6″. Considering the fact that the people were not habituated to the use of latrines all necessary features were incorporated in the design of these plates to make them fool-proof. A trap is fitted to the squatting plate with a water seal of 1/2″. As hand flushing has to be resorted to, deeper seals were found unsatisfactory. The improvement of the plates by the addition of the trap is considerable as it prevents exposure of excreta to flies and the excreta is not visible to the user. (Vide Fig. 4). The trap and the plates are cast separately to facilitate transporting them to the fields. The trap is fitted to the plate at the site and cement grouting is used to make the joint smooth. A gas vent made of bamboo was used to let off the foul gases from the pit. This did not work well. A hole is now left in the trap itself to let off the gases. In these latrines where ventilation is normally very good, gases do not cause much nuisance.

Cost :

The cost of installation of a dug well latrine is as follows:—

Concrete water seal squatting plate (circular)	...	Rs. 7/8/-
Pottery ring	...	„ 4/-
Labour	...	„ 5/-
Superstructure	...	Rs. 15 to 45/-

Quite often the villagers offer their services for digging the hole and for setting up the superstructure. Considering the life of the latrine to be 5 years, a recurring expenditure of about Rs. 10 to Rs. 15/- may be required every sixth year. This, however, is based on the fact that the squatting plate, the ring and about 50% of the superstructure are used again.



The cost of a wooden mould for a circular water seal squatting plate may vary from Rs. 70 to Rs. 150/- depending on the type of timber used for making the moulds.

Limitation :

In hard soil it is difficult to bore deep and the life of a dug well latrine is considerably short. In loose soil the sides cave in, digging becomes difficult and the rings have to be used for the whole depth thereby increasing the cost of such a latrine. In rocky and slay soil the water does not leach out and the hole gets filled up within a short period. When the water table is very high say within 2′ to 3′ from the ground, dug well latrines are not practicable. The villagers have to be educated to the use of such latrines. The squatting plate is fitted with a trap and hand flushing has to be resorted to. If the excreta is not properly flushed it creates nuisance making the latrine unpopular with the villagers.

Precautions :

The latrine should be located on a raised land not subjected to flooding. As the sludge liquor leaches out into the soil there is a likelihood of population of the ground water. The soil does eventually filter out the contamination, but the distance to which the contamination may travel depends on the nature of the soil. The limiting distance varies with the composition and compaction of the soil. As a general rule a distance of 50′ between a borehole or a dug welll latrine and a source of ground water supply may be considered safe.

Popularity :

Dug well latrines were introduced in the area in 1950. The latrine has gained popularity with the villagers and the demand for such latrines is steadily increasing. The Centre is manufacturing the squatting plates and selling them at cost price. In the early stages it was found that some of the latrine seats were soiled and traps were not properly flushed. The staff of the Centre were prompt in educating the people in the proper use of the latrines, thereafter there has been very few complaints on this account.

Results :

Evaluotion of a latrine programme is best obtained by its popularity and an examination of the vital statistics record. The

FIG. - 4.

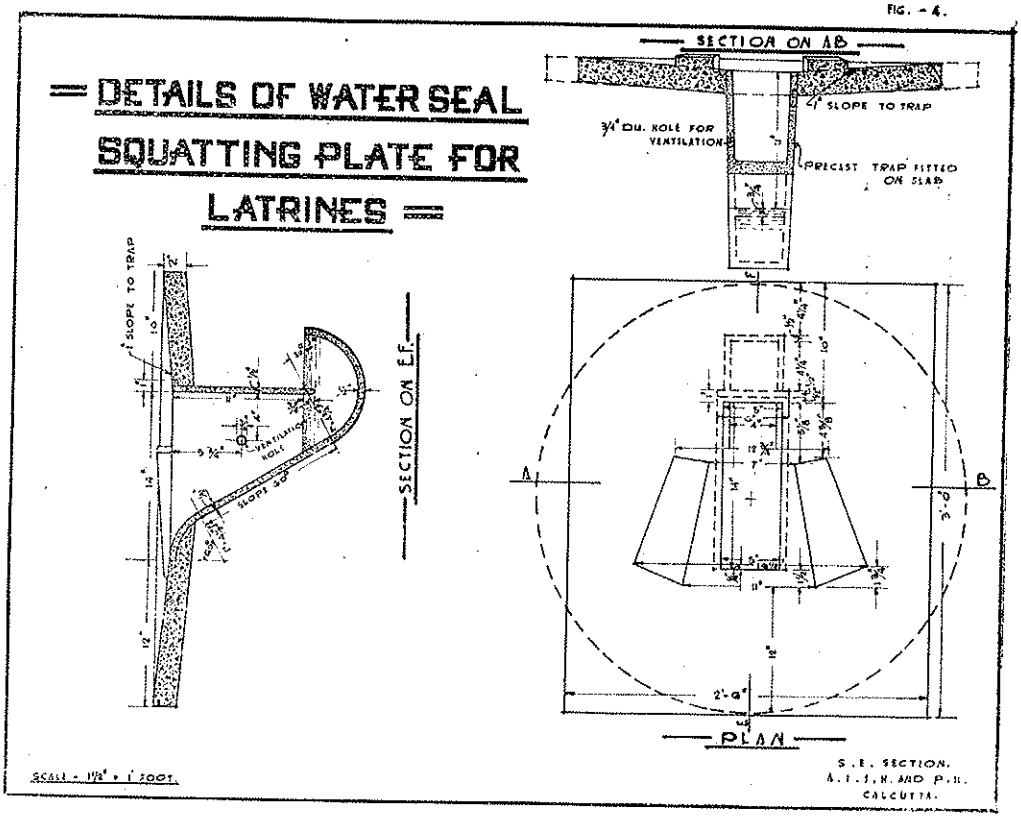


Table I (Vide next page) indicates the number of latrines that are in operation in the area since 1944 and also the vital statistics with respect to certain diseases which are directly related to indiscriminate defecation.

The table shows a sharp decline of the gastro-intestinal diseases in the area. This can be attributed to the overall activities of the Centre on all spheres of public health but particularly to the introduction of sanitary latrines and safe water supply through tube wells. Results should give incentive to other workers engaged in the improvement of health of our rural population.

Research :

Dug well latrine is an improvement on the bore hole latrine, but it has its defects and limitations. It needs improvements. Successful implementation of the sanitation programme in the rural areas depends very much on two major factors (i) evolving of a sanitary latrine suitable for a region (ii) a correct approach to the community which depends on sound Health Education programme.

Both the Engineer and the Health Educator are seriously concerned about the matter. Research is needed in both the fields. It is encouraging to note that research work on both these aspects have already been undertaken by Govt. and non-Govt. agencies at different parts of the country. The Indian Council of Medical Research has recently established 4 field units to evolve latrines which can satisfactorily be used in the respective regions. Ford Foundation through Govt. of India have also sponsored studies in 3 field centres to evolve satisfactory Health Education approach to make these latrines acceptable to the rural community. W.H.O. has also sponsored two such projects in the country. Successful implementation of the rural sanitation programme depends considerably on the contribution of these research projects.

Acknowledgement :

The authors wish to acknowledge their thanks to the Officer-in-Charge of Administration, Singur Health Centre for furnishing them the information with respect to Environmental Sanitation work at Singur. They also like to express their gratitude to late Prof. K. Subrahmanyan who initiated the sanitation programme at Singur and developed the dug well latrine as used at Singur.

TABLE 1

LATRINE PROGRAMME IN THE SINGUR HEALTH CENTRE AREA 1944 to 1956

	Years												
	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
	Numbers that are in operation												
Tube Wells ...	299	319	351	367	376	379	379	378	379	381	385	391	397
Bore-hole Latrines ...	117	626	1431	1915	2335	2648	2852	3004	3039	3053	—	3060	—
Dug well Latrines ...	Started since 1950			...	...	...	5	26	98	158	245	305	410
Diarrhoea & Dysentery:													
Incidence per 1,000 ...	145	102	79	124	—	57	—	40	61	55	48	38	25
Death per 100,000 ...	231.1	162.6	125.9	192.5	66.0	90.8	117.9	63.7	83.9	74.9	65.3	51.76	34
Cholera:													
Incidence per 1,000 ...	73	55	42	29	57	25	—	15	33	24	9	39	13
Death per 100,000 ...	116.4	87.7	66.9	45.0	90.8	39.8	17.5	23.9	44.9	32.6	12.2	53.12	18
Enteric fever:													
Incidence per 1,000 ...	26	32	22	36	37	36	—	22	13	25	13	4	5
Death per 100,000 ...	41.4	51.0	35.1	55.9	59.0	57.3	36.6	35.0	17.7	34.0	17.7	5.44	7

Figures for blank spaces (—) were not available.

SOCIAL MEDICINE IN HOSPITAL PRACTICE

By

DR. A. K. ANWIKAR, M.P.H. (JOHNS HOPKINS)

Reader in Social and Preventive Medicine, Medical College, Nagpur.

Prof. William Hobson regards Social Medicine as a philosophy which should permeate all branches of medicine, for its implications can not be divorced from any branch of medical learning. It is a branch of medicine which provides a connecting link with the wider humanities. It is the study of man within his environment to give him life and to give it more abundantly.

Social sciences have made valuable contributions to the working of our hospitals, and with the added meaning which they gave to hospital-charity, some of our hospitals are new in the process of reaching new horizons. While clinical and laboratory medicines are inter-woven with the strictly scientific pattern of our hospitals, the special services, even though on the periphery of the clinical medicine, not only give life, colour and warmth to the period of study in the hospital but also remove the complication of fear in a hospital routine.

It is common observation that a hospital is compelled to herd patients in an impersonal way, and in spite of our best intentions, it only offers to the stranger—whose strangeness to the hospital is intensified by his illness, a routine nature of care for a short period of time. The hospital service is mostly limited to the patients who are located within the walls of the institution. But the new situation now calls for a change. With the improvement of residential housing in areas served by the hospital and with the availability of hospital service on the extension basis, we are in a position to reconsider the objectives and responsibilities of the hospital towards patients outside its walls as well as to patients inside it. It often happens that the patient receives a high-grade hospital service for a limited period of time, after which low grade facilities and neglect at home. To avoid a situation like this and to preserve the continuity of care given in the hospital a department of Social Medicine is necessary in each large hospital.

For practical administrative purposes, the Department of Social Medicine should have within its scope of work the following specific functions:

1. Medical Social Service.
2. The administration of home-care.
3. Family health demonstration (including preventive medicine).
4. Collection of social statistics.
5. Co-operation with all other divisions and independent services of the hospital.
6. Teaching in social medicine.
7. Research in social medicine.

The idea of social service in a hospital is based on the two-fold belief that the fullness of life is the birth right of every one, and that if an individual cannot attain it by himself, it is the duty of the Society to help him to do so. Since 'Health' is the one of the essentials of life without which nothing can be achieved, the care of the sick naturally makes a great appeal to the public.

Medical social workers are trained in social welfare work and its application to medicine. Their duties include advice to patients and to apprise the doctors and others about sociological and psychological aspects of patient's problems. There investigations aim at collecting facts of heredity, personality, manner of life, home environments financial liabilities, dependants, nature of employment, strain and hazards incidental thereto, reactions and standards of living. The hospital social service also includes the securing of financial aid when required for patients, through keeping in close touch with such community resources as trusts and charities of which neither doctors nor patients may be aware.

When a medical social worker trained in understanding the dynamics of human behaviour and the technique of interviewing, is attached to a hospital, the worker can interview at the point of diagnosis those patients who show resistance to the medical

care prescribed for them. Through 'case work technique' the worker can help the patient to realise and express the reasons why he feels the way he does. As a result he acquires an attitude of objectivity and reasonableness. Opportunities for expressing his partially repressed feelings to somebody who understands and accepts him as he is, may help to relieve him of his anxieties and provide a sense of support. This, in time, increases his ability to solve his problem. Carefully planned interviews, in most instances, can help the patient to give up the irrational attitude so commonly found in one who is in distress, accept the reality of his situation and act accordingly. The reaction of the patient, however, psycho-neurotic it may seem to us, is in essence a reaction to some conflict or fear motivated largely by subconscious psychological processes of which the patient himself is totally unaware.

Thus the services of a medical social worker range from brief help within the hospital itself to a very comprehensive study and extended service. It may involve direct interviews with the patient and his relative or visits to his home or both. Such a service may continue even after a patient is discharged cured from the hospital. Through this medical social worker the hospital service can be greatly improved by:

(a) making a proper planning of medical and social care.
(b) referring cases to co-operative welfare agencies of the community for the adequate care of the patient needed after discharge from the hospital.
(c) giving social orientation of the staff and organisation.
(d) training of student nurses; medical students and students in hospital social work.
(e) maintaining social work records.
(f) periodically reporting the social services rendered.
(g) taking up social research projects or co-operating with other agencies in their research programmes whenever needed.

The hospital social service department should be considered as a professional unit of the Hospital organisation and be organised on the same basis as other departments of the hospital. It should organise a complementary volunteer service and work in close co-operation with it, e.g. to enlist blood donors, collect gifts for children, building up a library for patients, taking patients home, and raising funds for the hospital. The complementary volunteer service should not be mixed up with medico-social work which requires specialised training. The hospital social worker has a definite and distinct role to play in the programme of patient's treatment. Modern medicine and hospitals should consider the social worker as an important specialist who can contribute substantially to a total study of a patient and to a complete diagnosis.

With social and medical progress, we are in a position to replace the medical term "cure" in a practical way by the social, and more inclusive term "rehabilitation". In this general direction, a follow-up clinic should be established in our hospitals with the result that relapses of illness should be less frequent due to continued care for in-patients and out-patients. Progress in this direction will suggest new procedures, new policies and new devices to be undertaken. The patient's home should be taken under our protective wing, to facilitate extramural as well as intramural programme in the hospital, both of them drawing on the same highly concentratel and centralised diagnostic and therapeutic facilities, in accordance with a policy which considers distance in inverse ratio to urgency.

Now that we are on the way to conquer the pathogenic micro-organisms and thereby prolong our lives, we should turn our attention to the causes and conquest of "man's inhumanity to man", for this is the essence of social medicine. Our hospitals are the best laboratory for the study of the social as well as the medical aspects of disease. The Division of Social Medicine should still move ahead with a new organizational concept that will continuously draw attention to the human being as an individual during sickness and near-sickness, psychosomatically and in relation to his family and his environment, and which will care for him completely comprehensively and continuously.

After we have fixed the place of the patient suffering from communicable or prolonged illness on the map of medical care by the simple expedient of employing all social and medical devices for his benefit which were at hand, the hospital should proceed to elaborate a programme of continuation and extension service to reach out into the community and enable the hospital to serve all economic strata of sick people on an extramural as well as on an intramural basis. The out-patient department and, in particular its

follow-up clinic is a move in this direction in addition to the home care programme. We may further add a group practices unit preferably affiliated with the Health Insurance for the group of middle class which can thus be covered medically at all times in hospital, clinic, and home and under almost all circumstances. The full-time principle which governs the employment of chief of division provides private offices for these men in the hospital where the patients can be treated on an individual fee basis.

It is true that there is a strong social component in almost any illness, which involves the principles and practice of psychosomatic medicine, and environmental medicine. This is all the more true in the areas of prolonged illness where the social component is aggravated by the duration of the disease. The vicious circle in which social and medical factors pursue each other in patients during illness must be broken. This too is the essence of practical social medicine. The empiric medicine is largely replaced with scientific medicine and the life expectancy of a new-born child to the point where he can now look forward to an average life span much greater than before. This puts us under increasing compulsion to make years comfortable by recognizing the relationship between the social and medical factors of sickness and near-sickness. Specifically this involves a study of social causation, social abnormalities, social diagnosis and social therapy of a disease interwoven with a program of medical care. It is not enough to state that the human body has been invaded by a disease producing organism or some other pathogenic phenomenon, or to rest content with the prescription of medication or the surgical operation. We want to understand the environment in which the illness became possible. The study of the signs and symptoms of disease is vital to the practice of medicine, but additional vital factors must be studied with equal diligence, such as the living quarters of the patient, his food, his family, the climate in which he lives, the way he makes the living, as well as the pressure, the resistances and the tensions that characterize the struggle for existence and survival. In the natural history of the disease, anxiety, discomfort and unhappiness generally have indirect as well as direct pathological consequences. We, must therefore, take them into consideration along side of such manifestations as pain, haemorrhage, and unconsciousness. We know the influence of poverty on diseases but we shall only do a mechanical job in our hospitals if we do not analyze this influence and take it into full account.

As the next step in the development of the programme, the Department of Social Medicine must be established on a basis of equality with the clinical and the laboratory departments of the hospital. The Department of Social Medicine should absorb the medical-social service department and become responsible for the formulation, recommendation and execution of policies, rules and regulations in that sub-department. It should under no circumstances interfere with the technical medical diagnosis and therapy and should function in an advisory capacity to the clinicians on the environmental aspects of the disease.

The Department of Social Medicine should be in immediate administrative charge of the extramural programme of the hospital, but it will have no jurisdiction over the clinical and the laboratory work of the medical members of the home care staff or the group practice unit staff who do, indeed hold rank on the various clinical and laboratory departments of the hospital. Medical jurisdiction will be exercised by the corresponding heads of the department, who is as much responsible for the care of an extra mural patient in his home as far the care of intramural patient on the wards.

The Department of Social and Preventive Medicine should consist of a full-time Professor and Head of the Department who will rank with heads of other Departments and have similar responsibilities. His staff will consist of the pay roll of the social service department, home care department, group practice unit, Family Health Demonstration Centre, and in addition a medical statistician, an office clerk, and such other personal as may be required from time to time to carry out the functions of this Department. The Hospital Advisory Committee and the committee on social service should be replaced by committee on social medicine. The house-staff of the hospital should be exposed to the facilities of the Department of Social Medicine to the same extent that is now exposed to the facilities of clinical and laboratory departments of the hospital. The Department of Social Medicine should have equal rights in all hospital records and specifically the medical chart of the ward patient in which the findings of the Department of

(*Continued on page 181*)

A TYPE OF DEEP TRENCH LATRINE

By

Dr. A. K. Niyogi

Department of Preventive and Social Medicine, Medical College, Baroda

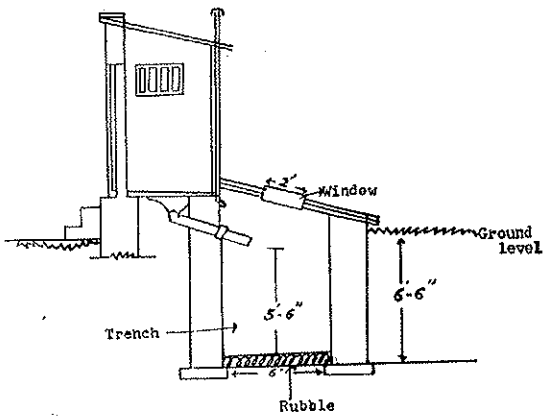
Rural health workers are always beset with the problems of disposal of house refuse and human waste. Any new method for their disposal always draws serious attention from them. So, when a modification of the deep trench latrine was found out in the village of Sangaon, Dist. Kolhapur, Bombay State, it was decided to investigate its possibilities.

Constructions of the latrine :

In this latrine, the seat is outside the trench and not over it. A porcelain pan is used as the receptacle. No water seal is used. From this pan a 3" diameter earthen ware pipe carries the night-soil to the trench. The pipe enters the top part of the trench obliquely, a few inches below the ground level. The night soil falls to the bottom of the trench from its free end. The trench is 7' deep and 6' broad. Its length is dependent on the number of pans that are connected to the trench. The trench has got brick-bats on its floor. The walls are supported by brick or stone pitching, when the soil is not strong enough to support them. The mouth of the trench is covered completely by galvanised iron sheet coated with antirust solution and fixed to a removable wooden frame. In this cover, windows 2' × 2' with properly fitting doors are made. Ventilating pipes are also fixed to the trench near the points where the pipes from the pans enter the trench.

Method of use :

A 10 gallon drum is kept filled with water near the latrine. The pan has to be made wet with a 'lota' of water just before use and after washing, another 'lota' of water is to be used for washing down any foeces sticking still to the pan. Every day or on alternate days, collected household refuse including cowdung, hay etc. are thrown in through the window fixed to the cover of the trench. These materials tend to form a "Pyramid" which is levelled with a hoe fixed to a long bamboo or wooden handle. Due to these refuse, amount of excess water is very small and if any, it is soaked in the ground. When the trench fills up to about a foot from the free end of the night soil pipe, earth is thrown in and the whole matter is rammed and is allowed to form compost. Its turning into compost needs about 6 months. Hence 2 seats have to be made for each family. The compost is taken out through the windows or by removing the cover of the trench.



A Sectional diagram of the Sangaon type of Deep Trench Latrine

Discussions :

Disadvantages of this latrine are three. One is the cost which comes to about Rs. 600/- (for 2 seats in South Maharashtra, when made by the villagers themselves). The next one is that the soil should be such that it is possible to dig up to a depth of 7-8 ft. and the last is that the subsoil water level should not be so high as to reach the bottom

of the trench. Advantages are many. Compost manure which is so valuable for growing crops, is fully obtained from all the house and cattleshed refuse, urine and faeces. An examination at the Public Health Laboratory of the compost manure from this latrine gave a Nitrogen value of 0.8% which is regarded as satisfactory for such a manure. The value of the compost manure obtained from the latrine is a very important point to consider. It is nearly Rs. 150/- for 2 seats per year, so that in 4 years, the cost of the latrine is recovered, in addition to the freedom from insanitation. During a period of about one year when the writer could frequently check the working of this latrine, *unannounced*, no fly breeding could be detected, no nuisance could be found on the pans and no offensive smell within the latrine was felt. It is well known that the temperature generating during composting is about 65°c for the first 4-5 days. This temperature is sufficient to kill practically all pathogens like the usual intestinal ones, *M. tuberculosis, Poliomyelitis* viruses, ova of Ankylostoma and Ascaris and cysts of *E. Histolytica*. Such a temperature is not obtained in the aqua privy. Where the 2 latter disadvantages mentioned above do not come in the way, i.e. in areas like Maharashtra Desh, and similar areas of the Deccan, this type of latrine will be very useful for disposing hygienically the human waste, house and cattleshed refuse and getting them back in the form of very valuable manure. For villages in such areas, it will be more advantageous to have this type of latrine than to have the aqua privy.

The result of the use of this type of latrine was so satisfactory, that a few well-to-do villagers of Sangaon have made them, at their own cost, for public use on the condition that the public using them will not claim the compost manure They made this investment in order to forego the trouble of buying night soil compost manure from Kolahpur Municipality for their sugar cane field.

The modifications mentioned above and made by Sangaon villagers to the usual deep trench latrine are quite distinctive and have made this latrine very useful. Hence, this modified one may be called the Sangaon Type of deep trench latrine.

(*Continued from page 179*)

Social Medicine will be recorded either directly or on a consultation basis.

It may be rightly considered to expect the City Corporation and community welfare organizations to shoulder the budget subsidizing extramural and intramural care of a patient, on equitable basis.

The research in social medicine should be directed to assemble and study social factors and figures concerning all patients, without exception, who come under jurisdiction of our hospital. The emphasis will naturally be placed on communicable diseases and such prolonged illness as are existent in any state. The solution of this socio-medical problem will automatically benefit all others, and it is therefore a bold and inviting target. The search for new and improved basic principles for practical application, under varying conditions, will be the primarily investigative duty of this Department. It will, indeed, be in a strategic position to evaluate such outstanding problems as the relation of supply to demand in considering intramural and extramural bed needs of a community, as well as the need for new clinics and new health and medical activities of various kinds. The patients who should be studied in this Department should be drawn from the following sources: (1) Applicants for admission (whether admitted or not), (2) Ward patients, (3) Outpatients generally and follow-up patients specifically, (4) Home care patients, (5) Group practice patients (including Family Health Demonstration centre), (6) Private and semiprivate patients, with specific reference to a home care programme, (7) Patients from Pay-clinics at the hospital, (8) Such other patients, elsewhere, as may be required for cooperative or control purposes from time to time.

ACKNOWLEDGMENT

My thanks are due to Dr. W. Hobson, W. H. O. Professor in Social and Preventive Medicine, Medical College, Nagpur for his kind permission to publish this article.

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ON A METHOD OF EVALUATION OF EPIDEMIC INDICES RELATING TO CHOLERA

By

SUDDHENDU BISWAS M.Sc.,

Demography Section, Indian Statistical Institute

1. INTRODUCTION

Cholera, more often known as Asiatic cholera, is a grim disease ascribed to a specific infection with *Vibrio cholerae*. It has been present in India from the remotest antiquity and persists as a perennial scourge along the Ganges river. Since some cases of severe diarrhoeal disorders or baciliary resembling this disease are often reported as Cholera, Statistics relating to the incidence of this disease should be accepted only with a certain amount of reservation. However, the mortality statistics of cholera incidence in cities and towns could be more easily relied upon, and these clearly indicate persistence of cholera in certain densely populated deltaic regions. Nevertheless, cholera has not only confined itself within the borders of Asia, but had been responsible for wide-spread epidemics in almost all countries of the temperate zone in the nineteenth century. With improvement in sanitation and advancement of the health consciousness of the people in the European countries and with the strict enforcement of international quarantine regulations, this disease has virtually disappeared from the European countries. It is, however, typical of tropical countries that this disease still persists in an endemic form in certain densely populated areas, especially in the Gangetic delta, which renders these areas huge reservoirs of infection. Poor sanitation and the low level of health consciousness alone, could not have rendered this disease endemic, in these areas for there are other areas in India densely populated and handicapped equally in respect of sanitation and level of health consciousness, where the disease was never endemic. This fact led to a series of investigations about the characteristic features of this area, such as its general topography, climatic conditions and their association with high endemicity.

Bryden (1869) was the pioneer in this investigation, and his study revealed certain interesting features about the geographical distribution of the incidence of cholera. He showed with the help of a map that the tract traversed by the disease over different regions in India had always their origin from one or the other of the highly endemic areas of the Gangetic delta. These findings were later confirmed by Rogers (1928) by a more rigorous statistical analysis of the cholera mortality data. Incidentally, Rogers also ascribed a vitally important physical factor, viz., a minimum pressure of 0.4 mm. of absolute humidity to the spread of the disease. He further stated as this meteorological factor is a constant, the course of the transmission of the disease remained virtually unaltered inspite of the extension of the inter-district and inter-state communication which took place during the 60 years following Bryden's investigations. Subsequently, Russel and Sunderrajan investigated into the periodity of cholera incidence (1928) in different provinces of India and their correlation with the meteriological condition. More recently, Raja, Swaroop and Lal (1941) carried out an intensive study in Bengal with monthly death rates due to cholera obtained for a period of 30 years for each district (1901-'31) wherein they attempted to classify the districts into types characterised by their endemic and epidemic patterns. For the investigation of the degree of endemicity a frequency distribution was made of varying intervals of absence of cholera. The yearly variances within the cholera districts provided with

an index for the classification of the districts by the degree of epidemicity.

The study of endemicity was continued by Swaroop (1951) with the coverage extended over all the districts of the Indian Union and the data included within the scope of the study were the weekly incidence figures along with the monthly and yearly mortality figures. A statistical evaluation of the three types of endemicity indices based on the yearly, monthly and weekly data was made for the classification of the districts into varying levels in respect of endemicality. As a result of this classification, certain important features showing the association of endemic prevalence of cholera with certain topographic and climatic conditions of these areas concerned, were observed. Most of the studies so far carried out related to the endemic prevalence of cholera and their seasonal pattern. The only study carried out so far relating to the epidemicity of cholera was the one made by Raja, Swaroop and Lal (1941). As this study was based on annual mortality figures, the indices worked out were rather crude in as far as the variations within the years were pooled thereby reducing considerably the efficacy of the index as a measure of epidemicity. The indices worked out in the above study neither give any idea about the frequency of the epidemic nor does it help us to study the important characteristics of the epidemic pattern which differentiates the so called non-endemic areas with the endemic ones. Further, the endemic areas could always act as vast reservoirs of infection and in these days of rapid communication the infection could be spread even to the remote areas which have been so long enjoying a fair amount of security against the ravages of the disease. The so-called non-endemic areas experience occasional outbreaks, the frequency of such outbreaks depending on the degree of contact with the endemic areas. In these days of rapid inter-district or inter-state communication, the non-endemic areas so long considered as geographically insulated from endemic areas, present an equally important problem in the field of public health as those areas in which the disease persist as a perpetual menace. An attempt is, therefore, made in this paper to study the epidemic pattern of cholera in non-endemic areas and contrast those patterns with those obtained in endemic areas from three points of view:

(1) The frequency of epidemic outbreaks,
(2) The average duration of epidemics,
(3) The average intensity of epidemics.

2. DATA

At the very outset of this study, it was considered advisable to restrict the choice of endemic and non-endemic areas to those inhabited by compact communities since clear patterns of epidemic prevalence are likely to emerge only when perfect homogeneity of epidemiological factors within the communities concerned, are assured. On the other hand, due consideration had to be paid to retaining a fairly good size of the population of the unit selected, so as to reduce the erratic results arising from the smallness of the sample. Taking account of these facts, a subdivision (with an average population of 700,000) was considered to be reasonably satisfactory choice for the study of epidemic patterns. Nineteen subdivisions were selected for this study among 45 subdivisions of West Bengal so as to obtain an adequate representation of the endemic as well as non-endemic areas of West Bengal. The population in these subdivisions as enumerated in the 1941 and 1951 censuses and the average annual cholera mortality rates for the period, viz., January 1949 to June 1956 are shown in Table I.

3. ANALYSIS

The weekly mortality figures of each selected subdivisions were arranged in a two-way table, the rows and the columns denoting the year and the chronological order of the weeks within the year respectively. By this arrangement variation of the weekly rates in any one column could be rendered independent of the seasonal effect of cholera mortality.

If one can assume the complete absence of secular trend and the absence of any epidemic, then the weekly death rates entered in any particular column can be considered as a statistically independent set of observations from a definite Poisson distribution because the seasonal factors affecting cholera mortality have been held constant within any specified column. Any weekly rate included in a column which is large enough to be considered as statistically an outlying observation must probably indicate the distortion of epidemic balance. Therefore, a statistical method to detect such outlying observations

TABLE I

Population and cholera mortality rate of 19 Sub-divisions of West Bengal.

	Name of the Sub-division	Population as enumerated in 1941 census	1951 census	Population density per square mile 1951	Average annual cholera mortality rate from 1949-1953 **
1.	Calcutta (City)	2,108,891	2,520,921	88,953	85.88
2.	24-Parganas Sadar ...	1,225,485	1,513,948	1,368	57.29
3.	Barasat Sdn.	317,261	393,980	1,026	22.84
4.	Basirhat Sdn.	594,077	713,619	873	82.68
5.	Diamond Harbour Sdn. ...	818,309	901,120	714	97.10
6.	Barrackpore Sdn. ...	579,995	877,900	7,371	24.95
7.	Bongaon Sdn.	133,104	280,742	653	23.15
8.	Howrah Sadar	830,345	928,456	5,333	64.84
9.	Uluberia Sdn.	659,959	682,917	1,769	92.98
10.	Hooghly Sadar	398,969	454,573	1,019	22.22
11.	Serampore Sdn.	634,275	729,331	2,085	36.47
12.	Midnapore Jhargram Sdn. ...	426,245	461,703	389	11.48
13.	Burdwan Sadar	737,651	802,507	623	21.80
14.	Murshidabad Sadar ...	499,749	544,228	826	12.31
15.	Malda Sadar	844,315	937,580	674	20.58
16.	Bankura Bishnupur Sdn. ...	352,959	353,896	496	18.08
17.	Jalpaiguri Sadar	524,884	546,142	421	6.22
18.	Darjeeling Sadar	147,327	169,631	470	0.00
19.	Darjeeling Siliguri Sdn. ...	90,014	116,475	437	6.87

** Rates per 100,000 population.

The weekly mortality rates of each of the 19 sub-divisions per 100,000 of its mid-year population were obtained from the registration data for a span of 7½ years (January, 1949 to June, 1956).

is a prerequisite to the study of epidemics.

The column observations are at the outset of our analysis transformed into a set of normal variables ($X_1, X_2, \ldots\ldots X_n$) where $n=7$ or 8, by the usual square root transformation process. Subsequently, the normal variates are transformed to a new set of variates ($\tau_1\ \tau^2\ldots\ldots\tau_n$) denoted hereafter τi ($i=1, 2, 3, \ldots. 7$ or 8) where $\tau_1=\frac{x_1-\bar{x}}{s}$ ($i=1, 2, 3\ldots\ldots 7$ or 8), $\bar{x}$, s being column means and standard deviations respectively. The theoretical distribution of τ as given by Thompson is

$$p(\tau)=\frac{\sqrt{\frac{N-1}{2}}}{\sqrt{(N-1)}\,\tau\sqrt{\frac{N-2}{2}}}\cdot\left(1-\frac{\tau^2}{N-1}\right)^{\frac{N-4}{2}}$$

or in a more concise way $t=\sqrt{\frac{N-1}{N-2+t^2}}$

where t follows a students' t distribution with (N-2) degrees of freedom. The critical values of τ exceeding the 95% level of probability (right side) for different degrees of freedom has been computed and shown in Table II.

TABLE II

Upper limits of τ for different degrees of freedom (95% probability)

Degrees of freedom (1)	Upper limit of τ (2)	Degrees of freedom (1)	Upper limit of τ (2)
1	1.39	9	1.69
2	1.56	10	1.74
3	1.61	11	1.80
4	1.63	12	1.92
5	1.64	13	2.04
6	1.64	14	2.38
7	1.65	15	3.41
8	1.65		

Any value of τ in a given column which exceeded the 95% (right side) level of probability were rejected straight away and the mean and the standard deviations of the residual observations of the column were computed afresh and the same procedure of rejecting the observations (τ_i) was employed. This process was repeated till the residual values of (τ_i) in the column admitted no further rejection. (Pearson & Chandrasekhar, 1936).

If now, we consider that during the weeks relating to the rejected observations the subdivisions had experienced epidemics we shall be marking a number of epidemic patches in the sequence of 390 weeks that have been included in our study. This method, however, is not very helpful in precisely determining the onset and end of an epidemic. Cases are not very infrequent

TABLE III

TABLE 3—*Estimates of epidemic indices for 19 Sub- divisions (period of study January 1949 to June 1956)*

Name of the Sub-divisions	Frequency of epidemic patches and rank		Average duration of epidemic patches and rank		Average intensity of epidemic patches and rank	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Calcutta	9	VI	9.89	I	6.72	I
2. 24-Parganas, Baraset ...	13	II	5.77	XIV	2.64	XI
3. ,, Basirhat ...	12	III	9.73	II	5.76	III
4. ,, Diamond Harbour	12	III	8.83	VI	6.24	II
5. ,, Barrackpore ...	16	I	5.13	XV	2.11	XIV
6. ,, Sadar ...	11	IV	6.82	XI	4.10	VI
7. ,, Bongaon ...	8	VII	7.75	X	5.42	IV
8. Howrah, Uluberia ...	11	IV	9.55	IV	3.93	VIII
9. ,, Sadar	10	V	8.60	VII	4.67	V
10. Hooghly, Srerampore ...	12	III	6.75	XII	2.53	XII
11. ,, Sadar	9	VI	8.89	V	2.07	XV
12. Midnapore, Jhargram ...	13	II	4.62	XVI	1.61	XVII
13. Burdwan, Sadar	9	VI	9.56	III	4.06	VII
14. Murshidabad, Sadar ...	12	III	6.50	XIII	3.40	X
15. Malda, Sadar	9	VI	8.44	VIII	3.92	IX
16. Bankura, Bishnupur ...	6	VIII	8.15	IX	2.37	XIII
17. Jalpaiguri, Sadar ...	6	VIII	3.00	XVIII	1.70	XVI
18. Darjeeling, Siliguri ...	3	IX	3.33	XVII	1.42	XVIII
19. Darjeeling, Sadar ...	0	X	0.00	XXI	0.00	XIX

where the week immediately after or before an epidemic week (detected by Thompson's criterion) for the same year is not discarded as epidemic, though the rate of the former is sometimes larger than that of the latter. This anomaly arises owing to the fact that the variables in the columns either preceding or succeeding the column of the aforesaid week being generally high may have lower values of τ adjacent to the one rejected. Also two adjacent epidemic patches may sometimes be separated by too short an interval, say, one week which on epidemiological considerations seem to be highly improbable. Such anomalies, however, have been eliminated by the method described below.

If the observation relating to the ith week of the jth year, X_i, j, has been rejected as an outlying observation of the ith column whereas X_{i+1}, j, X_{i+2}, j relating to the succeeding two weeks have not been rejected by the application of the same method on (i + 1)th, (i + 2)th, columns respectively, then by the method of extending patches we will consider X_{+1_i}, j also as an outlying observation, if X_{i+1}, j is $>X_i$, j or is greatest among the observations of (i + 1)th column. If X_{i+1}, j does not satisfy the above conditions, then X^{i+2}, j may be probed in a similar manner, and if X_{i+2}, j also does not satisfy the above conditions, then X_i, j must be considered as the end of a patch. If, however, X_{i+2}, j satisfies the conditions stated above, but not X_{i+1}, j then the latter should also be considered as an outlying observation. In general, if two adjacent patches are separated by a single nonepidemic week, the two patches are joined together into a single patch. If X_{i+1}, j or X_{i+2}, j are rejected thus, using these observations as starting points one could continue extending the patch by drawing successively until no further extension is possible by this rule. The same rule of extensions of the patch can be made on the left side to obtain the onset of epidemic.

Formation of epidemic patches leads us to the crux of the problem since our study of the epidemic patterns of all the subdivisions is based on their characteristic features, viz., (1) number of epidemic patches within the given period of study for different subdivisions (2) average length of epidemic patches for different subdivisions (3) average intensity of epidemic curves, (average maximum weekly rates over all the epidemic patches).

4. RESULT

The number of epidemic patches in the sequence of 390 weekly mortality figures (January 1949 to June 1956) with their average lengths and intensities are shown in Table III above.

It is true that these patches do not strictly indicate periods during which the particular communities referred to had experienced epidemic situations. What can at most be

inferred about the periods pertaining to those patches, is that the mortality figures experienced by those particular communities were somewhat unusual for those communities in that part of the year. The only advantage in employing statistical method for picking out the so called unusual weeks and extending them on either side to form a continuous patch was to introduce a certain amount of objectivity in the marking of such patches, so that the indices of the 19 subdivisions given in Table III can be considered as more or less statistically sound.

5. CONCLUSION

Any inference drawn from these indices is strictly limited to those that follow a post mortem examination, for one does not know anything about the epidemiological conditions prevailing in the subdivisions during the weeks included in the patches. Since an epidemic is the result of a change in the balance between the host population, environment, and the nature of invading parasites and moreover, as a multitude of factors could effect such changes, the assessment of the factors from their results are merely a matter of conjecture.

An overall glance at the figure in Table III reveals that in the subdivisions, viz., Jalpaiguri sadar, Siliguri and Darjeeling sadar, the epidemics are not only very rare but also have exceedingly short duration and low intensity. These three form a class of non-epidemic and nonendemic regions. By virtue of their typical topographic features, low population density and relatively high degree of insulation from the rest of the country, the infection rate is low and the import of new cases is also low

Among the rest of the subdivisions, varying epidemiological features are revealed by these three indices. For instance, Calcutta had relatively fewer outbreaks of epidemics, but the epidemics lasted for considerably longer periods and also attained high peaks; and in respect of their average duration as well as intensity the highest recorded indices go to the credit of Calcutta. This is not somewhat surprising if we bear in mind that Calcutta has a uniformly high density of population, bulk of it being bustee dwelllers, such that the disease prevails in a highly endemic form.

Peculiarly enough, subdivisions like Bongaon and Malda, etc. had a similar epidemiological, pattern, viz., relatively few outbreaks of epidemics but in respect of average duration as well as intensity of epidemic curves, they were significantly high. These two subdivisions are characterised by continuous additions to their population due to the inflow of refugees from Eastern Pakistan as a consequence of which the epidemiological patterns similar to those of highly endemic areas has gradually developed in these subdivisions.

Subdivisions like Howrah Sadar, Uluberia, Basirhat and Diamond Harbour not only have frequent outbreaks of epidemics but were also ranked high in respect of average duration and intensity of epidemics. These places by virtue of their topography and high density of population show the characteristic features of high endemic areas and in addition, by virtue of their close proximity to the city of Calcutta experience frequent outbreaks of cholera epidemic due to import of fresh cases from Calcutta, probably by vegetable and fish vendors.

Another class of four subdivisions, viz., Midnapore, Jhargram, Murshidabad, Barrackpore, Baraset exhibit very typical epidemiological features. They have experienced during a span of $7\frac{1}{2}$ years 13 to 16 outbreaks of epidemics but the duration and intensity of such epidemics are remarkably low. This might be typical of comparatively nonendemic areas having frequent import of new cases from endemic areas

Finally, for subdivisions like 24-Parganas Sadar, Serampore, Hooghly Sadar, Burdwan and Bankura, though no definite epidemiological pattern is revealed those prevailing in these areas could however, be ascribed to semi-endemic conditions.

These three indices, can, therefore, be consiered as summarising the epidemiological patterns available in various subdivisions of West Bengal. But in this paper, the computation of these three indices were based on data extending over a period of $7\frac{1}{2}$ years, and as such the values obtained should be considered as very approximate and consequently not adequate for drawing precise inferences. But this study answers the epidemiological problem only partially in as the epidemiological factors operating on the populations at the time of epidemics are unknown. A more extensive investigation is needed to probe into the factors that cause the variation from one community to another. Vaguely it may be stated from the results obtained in this study, that there exists areas in the close proximity of Calcutta and other densely

(*Continued on page 196*)

A NOTE ON THE OUTBREAK OF POLIOMYELITIS IN THE ANDAMANS IN 1957

By

DR. S. C. SEAL,

Professor of Epidemiology,

All India Institute of Hygiene & Public Health, Calcutta

An investigation of an outbreak of Poliomyelitis in Port Blair of the Andaman Islands was carried out between April 17 and May 10, 1957 at the instance of the Director General of Health Services, Government of India. The author visited almost all the affected islands (past and present) which involved an inter-island travel of about 950 miles by sea—600 miles in the Nicobar group and 350 miles in the Andaman group of islands.

Description of the Islands :

The Andaman and Nicobar are the two groups of islands in the Bay of Bengal situated between the 6th and the 14th parallel of north latitude and between 92° and 94° of east longitude with 10 degree channel separating them. The Andaman group consists of 204 large and small islands stretching from Landfall in the north, about 560 miles from the Hooghly mouth to the Little Andamans in the south, a length of about 290 miles. The "Great Andamans" consist of five main islands namely North Andaman, Middle Andaman, Baratung, South Andamans and Rutland island separated by four narrow straits. The Nicobar islands number 19, from Car Nicobar in the north to the Great Nicobar in the south covering a length of 163 miles. The extreme width of the Andaman group is 32 miles and that of the Nicobar group 36 miles. The former consists of mass of hills enclosing narrow valleys covered by dense tropical forests. The islands in the Nicobar group are partly hilly and partly flat, probably originating as Coral island. The area of the two groups is 3215 sq. miles (Andaman—2580 and Nicobar—635 sq miles).

The climate is tropical and the islands are exposed to north-easterly gale from November to January and to south-westerly gale from May to October. The average annual rainfall is 125 inches. The temperature ranges between 85 and 92 degrees Fahrenheit throughout the year and the humidity is about 80%.

Population :

The present population of the Andaman and Nicobar islands is about 39,000 of which about 27,000 live in the Andamans and 12,000 in the Nicobars. The population consists of Andaman Indians including settlers—26,000, Aborigins 1,000 (Onges—600; Andamanese—23, Jarawas etc.—377 roughly); Nicobarese—11,000 and Shom-Pens of Great Nicobar—160.

Methods :

In the first stage the hospital records, meteorological data and maps were collected and examined. The clinical manifestations were studied from the hospital records and the patients still lying in the Polio ward. The remaining epidemiological investigation was made by actual house to house visit to the patients' houses and their neighbourhood according the plans made from the addresses obtained from the hospital.

Blood and stool samples were collected from patients, convalescents, contacts and non-contacts and a few non-human sources like, fowls, ducks, goats, etc. Some samples of flies which were plentiful were also collected. Blood samples were preserved all along in the cold (thermos or refrigerator) and the serum separated and clarified in centri-

fuge within 18 hours. These were then heated at 56°C for 30 minutes and placed in screwcapped bottles or rubber capped test tubes containing 400 units of strepto-penicillin before returning to the cold storage.

Other samples namely stool, sewage, drain-sweepings and flies were collected in bottles containing 50 per cent glycerine and 400-800 units of strepto-penicillin and preserved in ordinary room temperature.

The above samples were brought over to the mainland by ship and transferred to the Polio Research Unit, Indian Council of Medical Research, at Bombay under Dr. P. V. Gharpure, on the 4th June 1957.

Short history :

In Port Blair, sporadic cases had been treated in the hospital from time to time previous to the present outbreak. This is supported by the report of investigation of the Polio outbreak in the Nicobar group of islands in 1947-48. During the present field investigation the author also detected residual paralytic polio cases in two young children among the residents of Port Blair. These children were admitted to the hospital in February 1956. The number of cases being few and far between it did not find a place in the list of main diseases treated in the hospital and published in the annual reports.

It may be mentioned here that in the Andaman and Nicobar Islands no facility for treatment or medical care exists other than in the Government hospitals. There is no private medical practitioner nor any chemist and druggist shop.

In the Nicobar islands a big devastating outbreak of Poliomyelitis occurred in 1947-48, subsequently followed by stray cases in 1955 and 1956. According to the medical officer of the Nancowery Hospital 4 cases had occurred in the associated islands in 1955 and 6 cases were treated in the hospital in 1956. Even earlier than 1955 two cases were reported in the island of Tarassa.

An old case of residual paralysis was also detected in one of the islands (East Bay Kachal) during the author's visit, which was not related to the 1947-48 outbreak. It appears from the history that he got the attack during the earlier years of the World War II while he was serving under a Government Contractor, which necessitated frequent visits to Port Blair. He was treated in the Port Blair Hospital for his fever and paralysis.

Clinical features of the cases :

All cases observed were paralytic type, the majority having paralysis of the lower extremities and particularly of the left leg. Only 2 cases, one aged 5 months and another aged 3 years had bulbar type of paralysis and died of respiratory failure. One case in Long Island (Middle Andaman) had symptoms of polioencephalitis with cranial nerve paralysis in addition to the paresis of both the extremitis. The usual history is sudden fever with complaints of headache and pain and constipation. After 2 to 3 days symptoms of paresis or paralysis in the lower extremities was noticed. Sore throat was not present in most cases. There is no record of non-paralytic, abortive or inapparent cases nor these could be ascertained in the field. One or two of the reported cases escaped with paresis only or mild paralysis and some of them regained the movement of their extremitis within a few weeks of their discharge from the hospital.

Number of cases in the present outbreak :

The total number of paralytic cases was 33 including 25 treated in the hospital or reported to the medical authorities. These were distributed as follows:

South Andaman Island—26 cases; Middle Andamans—6 cases and North Andamans—1 case. Only two died (fatality rate 6%). Their spatial and geographical distributions are shown in maps I & II.

(*Vide next pages*).

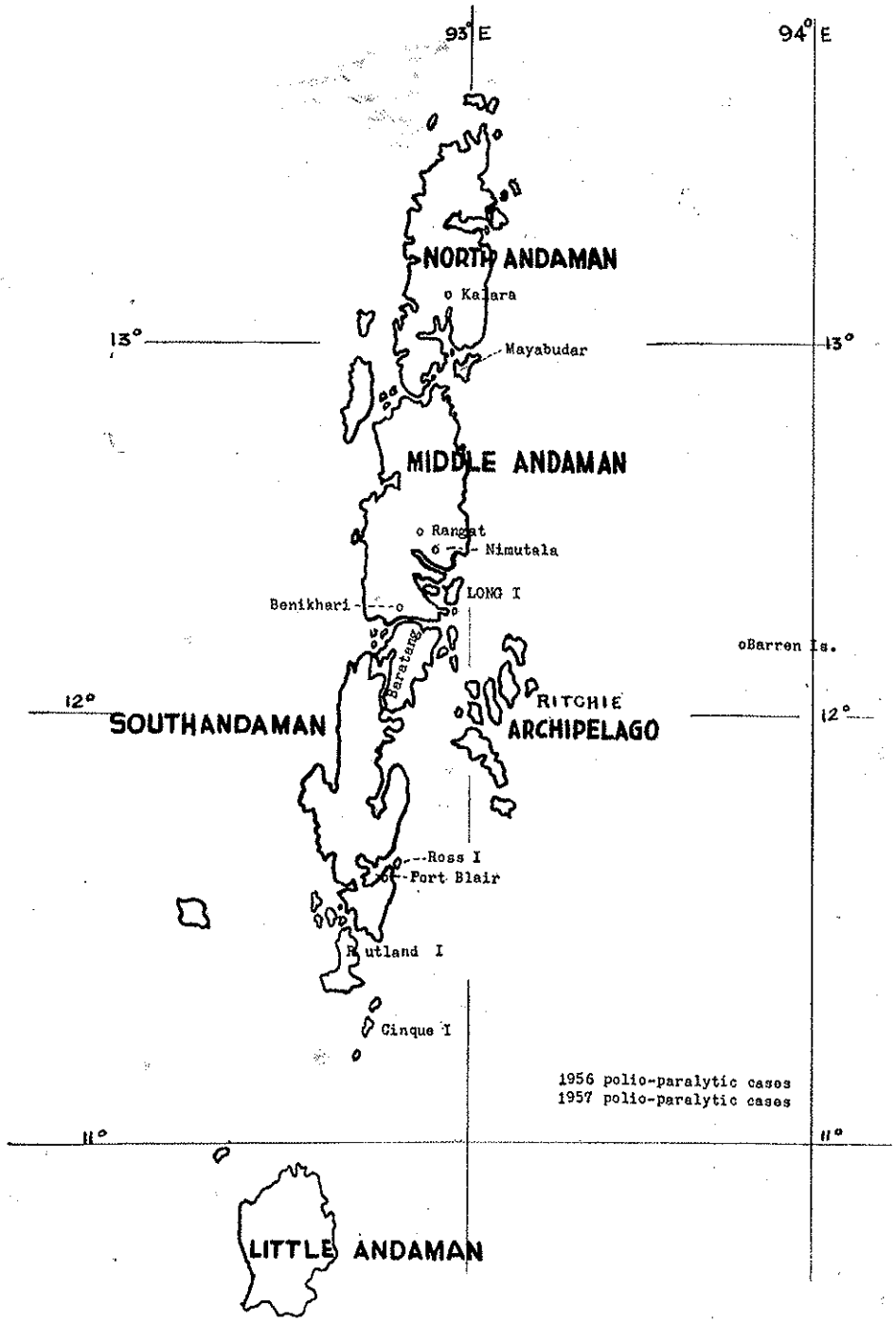
Age & Sex :

All the cases were below the age of 8 years distributed as follows: Infants—4; 1-2 years—12; 2-3 years—9; 3-4 years—2; 4-5 years—3; and 5-3 years—3. Thus 25 or 75.8 per cent were aged 3 years or below and 91 per cent were of 5 years or below. Male—16, females—17. Although most of the houses of polio cases had five or more children polio cases were single in the family. No adult suffered.

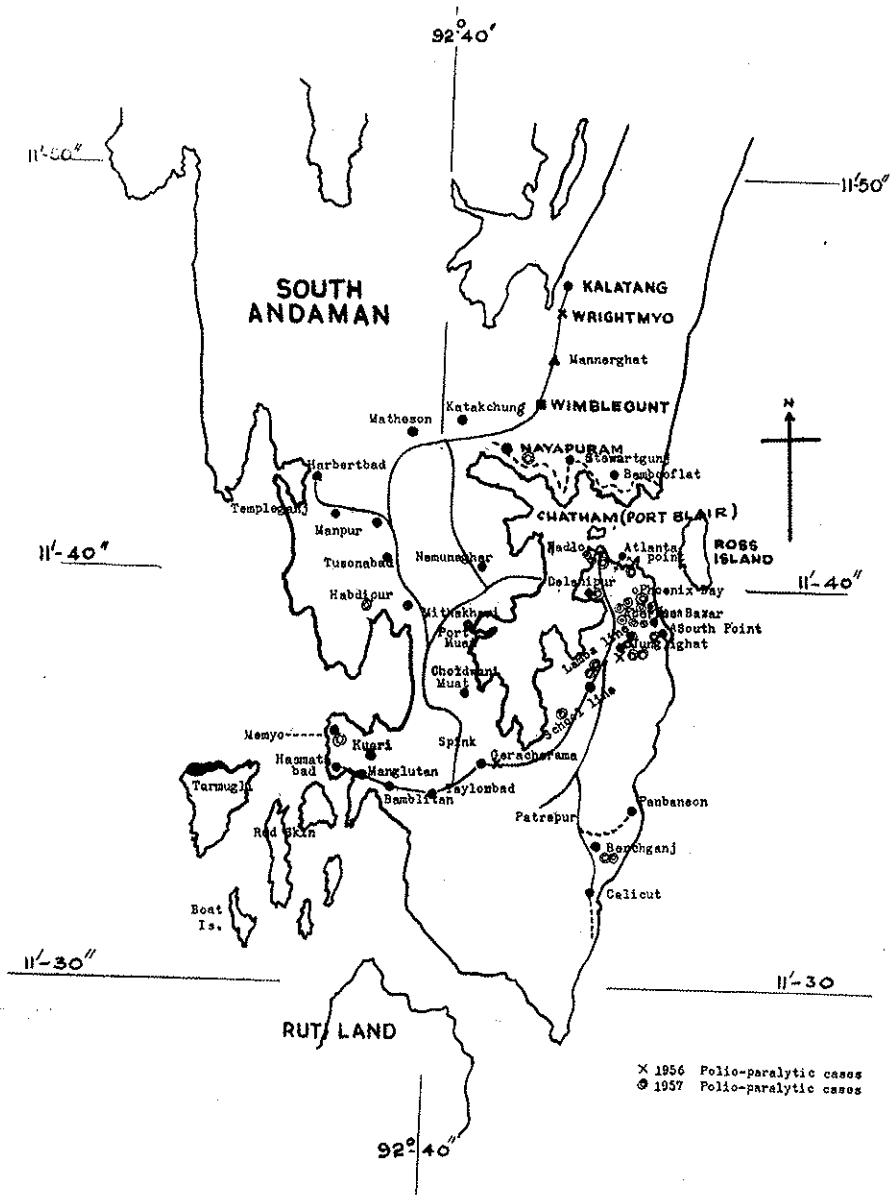
Duration of the outbreak :

The first case detected in the field occurred on the 28th December 1956 (the date of admission in the hospital was 31-12-56) and

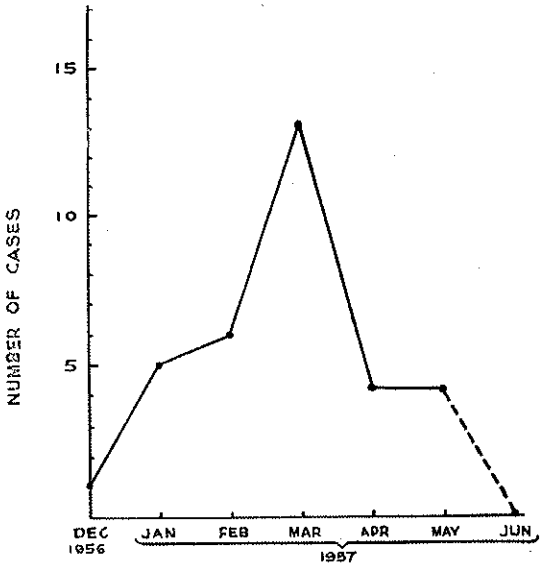
MAP 1


93° E
94° E
NORTH ANDAMAN
o Kalara
13°
Mayabudar
MIDDLE ANDAMAN
o Rangat
Nimutala
LONG I
Benikhari
Barathang
oBarren Is.
12°
SOUTH ANDAMAN
RITCHIE
ARCHIPELAGO
Ross I
Port Blair
Rutland I
Cinque I
1956 polio-paralytic cases
1957 polio-paralytic cases
11°
LITTLE ANDAMAN

MAP II


92°40′
11°50″
11°50″
SOUTH ANDAMAN
KALATANG
WRIGHTMYO
Mannerghat
WIMBLEGUNT
Matheson
Katakchung
NAYAPURAM
Stewartgunj
Bamboflat
Harbertbad
Templegunj
Manpur
CHATHAM (PORT BLAIR)
Haddo
Atlanta Point
ROSS ISLAND
11°40″
Tusonabad
Nemunashar
Delanipur
Phoenix Bay
11°40″
Habdipur
Mithakhari
Port Mout
Aberdeen Bazar
South Point
Aghat
Lamba Line
Choldhani Mout
Cholpur Line
Memyo
Kuari
Spink
Haumatabad
Manglutan
Carachorama
Tarmugli
Baylonbad
Bambilian
Panbanson
Patrapur
Red Skin
Benchganj
Calicut
Boat Is.
11°30″
11°30
RUTLAND
92°40″
× 1956 Polio-paralytic cases
⊙ 1957 Polio-paralytic cases

the last cases so far reported was on the 4th May, 1957. The largest number of cases was in the month of March, the actual distribution by months being December '56—1, January '57—5, February—6, March—13, April—4 and May—4 (see graph below).



Polio-paralytic cases by month.

Meteorological and the environmental data :

The meteorological data from the local office show that the first four months of the present year, 1957 has been different from the same period of previous three years, the change being fairly marked in regard to the rainfall, the total amount being 5.12, 6.52, 11.71 and 1.36 inches during 1954, 1955, 1956 and 1957 respectively. In fact, this draught brought about a serious shortage of both drinking and domestic water supplies. The average relative humidity was also less compared to other years (see Table I).

The maximum and minimum temperatures for the first four months of the last four years are given in Table II. In 1957 the temperatures recorded were lower than in other years.

Condition of Sanitation in Port Blair and surrounding places :

The town having no municipality, the sanitation work is in charge of the medical department.

(a) *Water supply :*

Almost the entire water supply in Port Blair is dependent upon the rain water collected in a protected encatchment area.

TABLE I

Meteorological data for the years 1954, 55, 56, and 1957.

Month	YEAR 1954 8-30 A.M.	1954 17-30 P.M.	1955 8-30 A.M.	1955 17-30 P.M.	1956 8-30 A.M.	1956 17-30 P.M.	1957 8-30 A.M.	1957 17-30 P.M.
January	75	80	71	79	65	75	70	77
February	69	75	72	76	73	77	69	75
March	74	76	67	75	71	77	62	70
April	64	74	65	75	75	82	62	72

TABLE II

The maximum and minimum temperatures for the first four months of the years 1954, 1955, 1956 and 1957

Month	YEAR 1954 Max.	1954 Min.	1955 Max.	1955 Min.	1956 Max.	1956 Min.	1957 Max.	1957 Min.
January	86.2	73.2	86.3	74.1	85.3	70.0	86.0	71.3
February	88.5	72.3	87.5	70.7	85.5	70.3	87.1	70.7
March	90.0	74.1	89.6	74.0	88.6	74.2	88.1	70.6
April	92.2	75.7	91.7	75.6	87.9	75.0	75.2	62.0

Water from this area is pumped into a filter bed at a higher plane and is supplied after filtration and chlorination through pipes. This supply is said to be satisfactory during the monsoon months but it is inadequate during the months of January to May. This year the condition was extremely serious due to draught.

In the villages people depend entirely on the shallow wells and springs most of which dried up completely this year. The situation was no better in the North and Middle Andamans except in a few places.

(b) *Disposal of night soil :*

The Government quarters are mostly supplied with commode system and the rest of the town area has open pail system of latrines. Severe shortage of water supply actually created excessive amount of filth and

flies. The faeces are collected in drums in the morning and are dumped into the sea. In the village, people evacuate themselves in the fields and jungles. Even in the town area the children defaecate in and around the houses or fields which are usually washed away in the rainy season.

(b) *Disposal of refuse :*

In the town area refuse and rubbish are collected in refuse carts and tracks and are dumped into the sea. Refuse and garbage are not removed at all from the village areas.

(d) *Drainage :*

Drains in the town are open but have steep gradient in most of the places. These work well during the rains but during the dry season these are turned into muddy puddles near the houses due to accumulation of waste water from kitchen, bath rooms and latrines etc. causing fly breeding and nuisance.

(*e*) *Poultry and animal keeping :*

The poultry keeping has been greatly popularised particularly fowls are almost universal and some families have ducks, goats, cows and buffaloes. Some have dogs and cats in addition. These birds and animals have been another cause of increase of filth and dirt and fly nuisance. Fowls often suffer from epidemic of Ranikhet diseases and the goats from roundworm. Paralysis of legs have been found in fowls and ducks.

(f) *Fly, mosquito, cockroach and rat infestations :*

Flies are in great abundance, particularly this year. Cockroaches, mosquitoes and rats are also prevalent.

Social condition, habits and customs :

The general mode of living of the residents is far from satisfactory although they have got better looking houses compared to those in the villages of the mainland. Poultry, cattle and goats keep their houses almost always dirty and filthy. Scarcity of water may be largely responsible for it. Literacy and education are of low standard. People are on the whole lazy type, particularly the cultivators. Members of some communities have the habit of eating from the same plate and of drinking from the same bowl. Most of the houses are frankly overcrowded. Food is always in short supply, particularly milk and vegetables and the prices are high. Even the fish which is abundant in the seas around is not always available.

Probable mode of spread of infection :

The present investigation led to the suggestion that the faecal and not the pharyngeal excretion was the commonest mode of spread of infection, there being hardly any patient with history of throat trouble, colds or cough. Draught, flies and poor sanitation might have played some indirect or direct role in the dissemination of infection.

Investigation also showed that the cases in the Middle and North Andaman islands were not of indigenous origin but could be traced to have direct or indirect connection with Port Blair. Isolated cases which occurred in distant villages had similar history of contact with Port Blair. The possibility of extra-human reservoirs such as domestic fowls, ducks, goats etc. is also under consideration awaiting confirmation by laboratory tests.

Institutional dissemination :

Seven cases gave history of either being admitted in the children ward for some other illness or had intimate contact with it prior to polio infection. Usually 10 to 15 days after their discharge or contact they developed symptoms of fever and paralysis. It may be mentioned here that polio ward was first located in the children ward and later in the corresponding upper floor of the same wooden building. The latter was removed to a new building only after a long association with the polio ward. Besides, due to the shortage of medical staff the same doctor was attending the polio ward and the out patient's department.

Tentative conclusions :

Several facts brought out by this investigation which indicate that Port Blair is an endemic area of Polio infection are:

(1) Age incidence is mostly confined to infants and young age group below 5 years, no paralytic case being reported above 8 years of age.

(2) Single case in the family in spite of the presence of other children in the house.

(3) Stray distribution of cases except in the overcrowded area like the Aberdeen village (centre of the town).

(4) Existing insanitary conditions with overcrowding which usually facilitate endemicity,

(5) Habits and customs of the people facilitating exposure to endemic infection.

Besides the above, two cases of residual paralysis in young children who were admitted in the hospital in February 1956, were detected in the town during investigation. Another residual paralysis case in an elderly Nicobarese who was treated in Port Blair Hospital during the earlier part of the last World War, was detected in East Bay Kachal Island. These findings along with Dr. Moses's report lend support to the view that, though uncommon, paralytic polio cases had been occurring in Port Blair from time to time. The present outbreak had probably been precipitated by the unusual weather conditions and consequent deterioration of the environmental sanitary conditions. Further evidence in support of the above conclusion will be obtained after the results of the laboratory investigations are known. The results of the first batch of 29 sera selected from representative age groups, so far obtained from Dr. Gharpure are infavour of the conclusion already drawn (*see* Table III). The author has also been informed by Dr. Gharpure that a polio virus strain has been isolated from one stool sample of an early case of Polio.

There is obvious difference between this outbreak and the one that occurred in the Nicobar Islands in 1947-48. While in Port Blair the outbreak is of a mild type, occurring among the infants and children group, as characteristic of the endemic area, the epidemic in the Nicobar Islands was among the virgin population without previous experience of the infection and had disseminated widely affecting all age and sex groups with high incidence of paralysis and death.

The detailed report of the investigation will be published after completion of the laboratory investigation.

Small-pox Vaccination and Paralytic Poliomyelitis :

The following observation has been made during the present investigation:

Twenty-five out of 33 cases had no primary vaccination against small-pox prior to polio infection. Two of them actually developed polio within two weeks of primary vaccination, after probable exposer to polio infection. Another observation which is also interesting in this connection is that after recovery from polio infection when the residual paralysis was still existent attempts to vaccinate two of these previously unvaccinated children failed to give positive result (primary take), though the lymph was found potent in other cases. There were other children in the house who were mostly vaccinated, at least once, but no secondary case was detected among them. These observations raise a question whether small-pox vaccination does prevent paralytic poliomyelitis.

The author therefore, enquired about the vaccination status of the local population as well as of the Nicobarese particularly prior to the last epidemic there. He was told that vaccination was not compulsory in Port Blair due to the existence of strict quarantine laws and absence of small-pox in the Island and as such some infants and children population might remain unvaccinated. The local population was also found to be somewhat reluctant to take vaccination. In regard to the vaccination status of the Nicobarese prior to the last big epidemic it was stated that almost the entire population of the Nicobar Islands were unvaccinated prior to 1947-48.

Another fact which may also be mentioned in this connection is that none of the Indians including children who had gone from the mainland suffered at any time. The fifty Indians including children who were in the Nicobar Island during that big epidemic causing more than 300 deaths out of about 1000 paralytic cases, all escaped. But they were all vaccinated compulsorily as required by the quarantine laws. However, the possibility of such persons having acquired the immunity in the mainland has been kept in mind. In any case, the above observation warrants further investigation which is being carried out now and the laboratory evidence so far obtained has been favourable. The results will be communicated as soon as possible.

Acknowledgment :

Thanks are due to Shri T. G. N. Ayyar, I.C.S., Chief Commissioner of the Islands and to Dr. A. C. Kapoor, M.B.B.S., Senior Medical Officer for their help and assistance with the necessary transport and laboratory facilities to carry out this investigation. The author is also indebted to Dr. P. V. Gharpure of the Polio Research Unit at Bombay, under the Indian Council of Medical Research for kindly agreeding to collaborate with him in the laboratory part of the investigation.

TABLE III

Results of neutralisation tests of the first batch of 29 sera collected in the Andaman and Nicobar islands against Types I, II and III Polio viruses.

Sample No.	NAME	Age	Relig & Sex	Locality	Nature of the subject	Results of Neutralisation test			REMARKS
						Type I	Type II	Type III	
1	Hyderu	22	M.M.	Manerghat, S.	Non-contact	+	+	+	Convalescent from chicken pox.
2	F. R. Mishack	17	M.M.	Port Blair	do.	O	+	+	
3	Hamid Ali	19	M.M.	Port Blair	do.	+	+	+	
4	Manimohon	47	H.M.	Diglipur, N.	do.	+	+	+	Refugee from India.
5	Sekandar	40	M.M.	Bambooflat Jetty S. Andaman	do.	+	+	+	Local resident.
9	Prahlad	38	H.M.		do.	+	+	+	Refugee from India.
10	Kali Ram	25	H.M.		do.	+	+	+	Sweeper in Bambooflat Hospital (from India).
11	Gabriel	16	Ch.M.		do.	O	O	O	Born in Andamans.
12	Baigum	14	H.F.		do.	+	+	+	Living in the island for the last 12 years.
13	Rahim Ali	40	M.M.	Port Blair	do.	+	+	+	Local resident.
14	R. C. Ray	36	H.M.	Ferrarganj	do.	+	+	+	Refugee, came 6 years ago.
15	A. K. Kundu	26	H.M.	Port Blair	do.	+	+	+	From main land 1½ yrs.
16	Mohammad	25	M.M.	Janglighat	do.	+	+	+	From Malabar 1½ yrs.
17	Sham Narayan	40	H.M.	Janglighat	Old case	+	+	+	Local resident.
42	Alivet	17	Ch.M.	Tamalu (Nicobar)	do.	+	+	+	
47	Martha	12	Ch.F.	Tamalu (Nicobar)	do.	+	+	+	
50	Wilfred	18	Ch.F.	Tamalu (Nicobar)	do.	+	+	+	
53	Avelin	12	Ch.M.	Tamalu (Nicobar)	do.	+	+	+	Suffered in 1947 in Nicobar.
57	John George	20	Ch.M.	Big Lapati Nicobar	do.	+	+	+	
58	Wilson	20	Ch.M.	Big Lapati Nicobar	do.	+	+	+	
61	Simon	20	Ch.F.	Big Lapati Nicobar	do.	+	+	+	
63	Jaini	20	Ch.m.	Big Lapati Nicobar	do.	+	+	+	
68	Michael Junior	11	Ch.M.	Big Lapati Nicobar	Non case	+	+	+	
69	Sekerias	12	Ch.M.	Big Lapati Nicobar	do.	+	+	+	Did not suffer in 1947.
73	Ignis	14	Ch.F.	Big Lapati Nicobar	do.	+	+	+	
95	Achipan	12	Ch.M.	Kundul (Nicobar)	do.	+	+	+	
104	Itap	14	Ch.F.	Pilo Milow	Old case	+	+	+	
109	Janson	12	Ch.M.	Kaponga	do.	+	+	+	Suffered in 1948.
118	Sreil	11	Ch.M.	East Bay Katchal	Non case	+	+	+	Did not suffer in 1947.

A PRELIMINARY REPORT ON EPIDEMIC OF CONTINUOUS FEVER IN HUMAN BEING IN SOME VILLAGES OF SORAB TALUK, SHIMOGA DISTRICT (Malnad Area) IN MYSORE

By

Dr. S. Seshagiri Rau,
Director of Public Health, Mysore.

Introduction :

A number of cases of continuous fever of 8 to 15 days duration occurring in persons between the ages of 10 to 50 years were reported from the Primary Centre at Ulvi in Malnad area of Mysore State. The cases were known to occur since the 20th of January 1957 and are still continuing. As could be seen from the details of the case histories, the signs and symptoms of these cases simulate enteric fever although the duration of the febrile period in most cases was rather short. The peculiarity of this epidemic lies in the fact that before the onset of this epidemic a number of monkeys were found to be ill with a high mortality rate. A similar incidence occurred in the same area during the same period in 1956. A mass immunisation against T.A.B. was undertaken, the water sources chlorinated and other preventive measures against intestinal diseases instituted. Similar occurrence during the same season this year also suggested the possibility of a close association between the mortality in the monkeys and the illness amongst human beings in that area. Hence this investigation was undertaken by the Department of Public Health in Mysore, Bangalore.

Materials and Methods :

1. *Human cases*:—A total of 51 sera were collected for serological tests (Widal and Weil-felix reactors) out of the 67 cases reported up to date.
2. Blood and blood clots for culture.
3. Stool specimen (10 cases) for culture.
4. Post Mortem materials from a monkey both for histological and microbiological studies.

Serological Examinations:—The sera from these cases being suspected of enteric fever were subjected to Widal and Weil-Felix reactions. The tests were done by the Standard microscopic agglutination reaction against the H and O antigens of Typhoid and Paratyphoid A and B organisms as well as against the O antigen of Proteus X 19, X_k and X_2 organisms. The dilution of the sera used in these tests varied from 1 : 50 to 1 : 400.

The results have been completely negative except in four cases which gave a positive reaction against typhoid antigen.

Blood culture:—Both the whole blood and the blood clots were inoculated into the enrichment media directly, on the spot, for the enteric group of organisms and while these tests were in progress it may be stated that none of the blood specimens gave any growth of the organisms of this group, the cultures being sterile.

Stool specimens:—The specimens of stool collected on the spot and inoculated into enrichment media have shown negative results except in one case where a salmonella group or organisms has been isolated which is under study.

Material from the monkey:—Culture from the blood and stool from a moribund young monkey which was caught in the epidemic area and which subsequently died at Bangalore have proved negative as also the blood collected from another monkey in the epidemic area.

The viscera of the monkey including the brain have been taken up for histological studies. The brain in particular is preserved in a frozen state of virus studies.

Discussion:—In view of a large number of cases occurring in small rural area indicated the possibility of an enteric infection, serological and cultural tests were first taken up. But, both the serological and cultural tests have revealed that the epidemic is not one of enteric infection. The occurrence of many deaths among monkeys following illness in the same area would suggest the possibility of a monkey-man infection. With this the cause of the illness in monkey would assume paramount importance. The post mortem appearances of the monkey's viscera reveal nothing of importance.

As a matter of fact all the internal organs appeared to be normal and revealed no significant pathological changes.

The possibility of the monkeys eating either poisonous fruits or poisonous pesticides used for agricultural purposes were also kept in view through the chemical analysis of the viscera of a dead monkey has not revealed any known poison. The death of the monkeys due to poisons cannot be completely eliminated until a careful enquiry and interrogation is completed.

It is known that the yellow fever virus, Sabin's B. virus Mengo-encephalitis virus are known to affect monkeys and incidentally the man. Fortunately however yellow fever virus is not known to incriminate the monkeys and man in India. However, the viral aetiology is kept in mind and the materials from the monkey are being processed and tested for virus isolation.*

Further epidemiological studies are also contemplated. The occurrence of this epidemic of pyrexia of unknown origin assumes greater importance because of the simultaneous illness and deaths in monkeys also in the same area.

Summary:—(1) An epidemic of continuous fever not belonging to the enteric group occurring in Ulvi (rural area of Malnad) is described.

(2) Preceding the incidence of this epidemic a large number of sick monkeys with high mortality were noticed in the nearby forest area.

(3) The possibility of monkey-man transmission is kept in mind, after excluding the possibility of the deaths of the monkeys due to poisoning either by eating poisonous fruits or agricultural pesticides.

(4) The monkey material is being examined for a virus aetiology.

(5) The mode of transmission, arthropod or otherwise from monkey to man, if any, is also under study.

* Since the paper sent to press, virus has been isolated at the Virus Research Laboratory, Poona, as well as at the State Laboratory, Mysore.

(*Continued from page 186*)

populated places near the lower Ganges which are relatively nonendemic but experience equally or more frequently outbreaks of epidemics as the endemic areas. Probably this might have been due to the frequent import of fresh cases into these areas from endemic areas specially from Calcutta brought about by the daily passengers and other frequent visitors to the city. This fact, if true, points towards an important measure to be taken in the control of epidemic. The so-called daily passengers or such other people living in the non-endemic areas who are likely to visit Calcutta and other endemic areas too frequently must therefore be first sorted out for any control programme such as, immunisation.

Acknowledgement

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HOSPITALS IN COMMUNITY HEALTH PROGRAMMES

The evolution of the hospital system in many parts of the world dates long before the Christian era. History records their existence in the Buddhist era in China, India and Ceylon. In the Christian era there are records of hospitals in the Roman Empire, in the Islamic world and in the Western world. These hospitals were not of one pattern but there is evidence that they grew as a result of the community's continued efforts for creating a machinery primarily geared to fight diseases and in terms of the concept of Medicine and the goal of health prevailing at the time. With the rapid development of Medicine through the centuries ending in the intensive specialisation in the present day and with the changes that have occured in community life in general all over the world, the form, function and facilities of a hospital have also undergone enormous change. Nevertheless one could notice clearly that in every country this institution called "Hospital" has come into existence determined by the needs of the community to which it has been adjusted and fitted to serve the humanitarian, educational and social requirements of the local community. Consequently, even to-day there could not be one rigid pattern of hospitals in all countries. It would necessarily have to vary from country to country and even in the different parts of the same country. In fact, the type suitable and feasible under rural conditions will not perhaps be suitable for highly urbanised areas. For hospitals are so closely interwoven with social and cultural structure of the community, the status of Medicine, the availability of trained personnel, educational level of the population, their habits of living and the purchasing powers of the consumers, that the pattern of the hospital is bound to vary according to the situation.

Whatever the type developed, the primary concern of these hospitals has been the care of the sick—unfortunately sometimes only the sick part of the sick and not the whole man. The conception of a hospital as a health centre from which should radiate not only measures calculated to cure the sick but such measures as are rehabilitative, preventive, social and educational, so as to include in its orbit of care not merely the individual but his family and the community he lives in, is but of recent origin. In spite of the strenuous efforts now being made in the advanced countries for widening the

functional scope of hospitals, forging and fusing them into important links in the whole chain of National Health Services, retaining at the same time their individual integrities, progress has hitherto been remarkably slow.

In less advanced countries the hospitals, generally speaking, are in various levels of efficiency as regards plant, personnel, equipment and service. Different organisations—State and non-State—have been responsible for founding these hospitals and there is, for obvious reasons, lack of uniformity in their organisation, in the staffing pattern, in equipments and in their standards of accomplishment. In India, even where the State directly controls the majority of hospitals, such hospitals as have a satisfactory and high standard are not many and are found only in comparatively bigger cities. There is a wide difference between the standards maintained in the city hospitals and those in rural areas even though the population of India is 80% rural.

With advancement of medical science, the concept of the goal of health has changed considerably. The goal of health today is not merely cure and alleviation of diseases; it looks beyond this narrow circumscribed horizon of such limited service. It aims at maximum physical, mental and social well-being of the community. Towards achievement of this stupendous task, there is a vast field of co-opeprative endeavour amongst the physicians, various associated professions, individuals, groups and agencies engaged in health activities in the community. Such co-operative and co-ordinated effort would provide a wide spectrum of comprehensive health care, promoting positive health, preventing disease, detecting and treating diseases at the earliest moment so as to prevent disabling consequences or at least limit them to the minimum extent and rehabilitating the individual into a useful and as practicable a life as possible under the circumstances.

Let us examine to what extent our hospitals in India have geared themselves towards serving the ends of comprehensive health care.

The functions of a general hospital can be broadly summarised under the heads (i) Restorative, (ii) Preventive, (iii) Educational, (iv) Research.

In regard to hospitals in the rural areas the farsighted policy of the Planning Commission and progressive States in India has evolved a plan by which integrated medical relief and public health could be offered to the rural population of India through the establishment of health centres, a large number of which has been established and the whole country is to be covered by the end of the second Five Year Plan. In a country where the scientific man-power of different categories is deplorably inadequate, this attempt at conserving man-power and utilising them in an integrated plan of service combining medical relief and preventive work, both physically and functionally, is wise and economical.

The non-teaching hospitals in the cities, though large, have hitherto confined their restorative activities to treatment of the sick and injured. Rehabilitation of the patient—physical, mental and social—which forms an important restorative activity, is seldom or never undertaken. We wonder if it is even contemplated. Preventive functions directly in co-ordination with other health agencies, are equally unknown. Some unconscious efforts and contribution towards preventive services are being made through the maternity and infant welfare clinics, TB clinics, VD clinics, laboratory facilities, mass

screening etc. What is wanted is conscious effort and a positive outlook directly focussed on these problems.

In large teaching hospitals which occupy a high position of prestige owing largely to the concentration in them of talents, skills and equipment, appear equally indifferent towards rehabilitation of patients through the introduction of measures including appointments of medical social workers as a formidable ally of the physicians undertaking diagnosis and treatment. In 40 odd medical colleges and hospitals in India it is prpobably in one or two run by the particular State Government that this important personnel for medical social work is to be found. Even where they are present it is worth enquiring as to whether they receive the recognition due to them and their efforts in developing the field of Social Medicine. In regard to preventive functions it is not surprising that there is no intimate liaison with the prevailing health agencies. In fact, very few of the Medical Colleges have yet provided a full-time Professor of Preventive and Social Medicine, and a hospital without such a department on a par with other clinical departments, cannot lay a sound foundation for teaching Preventive and Social Medicine with proper development of integrated studies in the pre-clinical as welll as the clinical course with a field practice area associated with the Health Services of the community. In most instances these hospitals have maintained their "clinical aloofness" without any attempt to expand the services beyond the isolated curative activities within its walls. Nor have they shown any indication of a desire for co-ordination between the hospital services and those of public health, with the result that the medical students of to-day, who are the practitioners of tomorrow, still traverse the narrow path of "Hospital Medicine" entirely unconscious of and unprepared for the wider opportunities that the future holds for them in the field of health services of the community.

On the educational functions of the teaching hospitals we do not intend to dilate except pointing out that on them lies an onerous task of training the undergraduate and graduate medical students, the nurses, the medical social worker and other allied professions. If fruitful and satisfactory results are to be achieved, due emphasis should be laid on the preventive and social aspects of diseases in their training.

In regard to research functions it is true that some amount of clinical research of varying standards is carried out in the teaching hospitals, but might we ask if ever any of them have attempted research in the psychological and social aspects of disease and health? Have any thoughts been given to the need for research in Hospital Practices—both technical and administrative?

It is high time that the leaders of the profession and the authorities in charge of hospitals alike appreciate the current trends of the functions that a hospital is expected to serve. If it is no longer to remain as an isolated entity dedicated only to repair of sickness but so developed as to serve the needs of the community, if it is to provide comprehensive health care as understood to-day, it should be built up functionally as an important unit intimately interlinked in various ways with other agencies of Health Service in the community. For this the leaders of the profession—our clinical colleagues—would have to come down from their isolation in the ivory tower and meet their

partners on the field level in a common endeavour to provide comprehensive health service to the community.

We appreciate that as constituted to-day, integration—both functional and physical, between hospitals and public health service—cannot be accomplished in the case of city hospitals as it was possible in the case of peripheral hospitals and health centres in the rural areas. Each of the services is far too specialised and well defined to lend themselves to be instantly integrated or merged. What, however, is not only possible but very desirable is the co-ordination of the two on as many fronts and points of contact as would enrich the efforts each is making towards the Health Services of the community. If the hospitals could be made to appreciate that theirs is a role in the community service which extends beyond what now is their primary concern, namely, restoration, that their sphere of influence extends far beyond their own walls to the homes of the families they serve, that they have dependable outposts in the general practitioners and the local health service, that they form the centres of high prestige and eminence from which radiate follow-up services and medical social studies in the communities, that they form the most valuable storehouse of statistics of illness in the community a study of which may lead to findings of enormous importance to the Health Services of the locality, the task of co-ordination and synthesis of hospital and health services should not present an insurmountable difficulty.

The avenues through which the approach for this synthesis and co-ordination should be made will be taken up in a subsequent issue of the Journal. Suffice it to say that the expansion of the out-patients department—physically and functionally—linking up the hospital with the community through its extra mural activities, will be the first step towards the achievement of the task. Meanwhile we shall keep hoping that the authorities at all levels—the Centre, State and Local (institutions), primarily concerned with framing policies and programmes of hospital work in this vast country of ours with large population but limited resources in man, materials and money, will pause and ponder over the issue and finally decide in favour of integrated health service where integration is immediately possible, or of co-operative co-ordination as the case may deserve, for economy as well as efficiency of service to the community.

THE INFLUENZA PANDEMIC

A wave of Influenza pandemic is now passing across the Asiatic countries and is proceeding towards west. India has been one of the biggest victims so far, as she had been during the last pandemic in 1918-19. Although such a world wide dissemination was apprehended after the last world war and again in 1951-52 when Europe was particularly affected, but it did not come then. This is perhaps the only disease which has maintained the pandemic character for which the reasons that may be assigned are: (i) host-parasite relationship is not intimate, (ii) proneness of the virus to mutate readily and (iii) high host susceptibilty. The mutation is generally towards higher infectiousness and greater virulence. Perhaps on biological grounds the virus assumes at certain

intervals of time (secular trend) an aberrant character that qualifies it to sweep through the world and to gain anoher long lease of life. At that time it appears that the human being is almost helpless as if nothing can be used to prevent the onslaught of this formidable opponent. In fact, the casualties caused by it last time were the highest (25 million) ever recorded in the history of the world. It often chooses its main victims. Normally deaths are concentrated in the old age group plus some in infancy but the 1918-19 pandemic was characterised by largest number of deaths among the young adults.

Fortunately, this time it has not yet assumed such a malignant role but the chance is not yet gone if its behaviour in the last epidemic is recalled. The hope is that there has been a great deal of difference between then and now. First of all, the people will not be taken unaware. "Forewarned is forearmed". The causative germ (i.e. the viral origin) has been known, the mode of epidemic rise better understood and the prophylactic vaccine has been evolved. Also, the sulphadrugs and the antibiotics are our new additional weapons. These were practically unknown last time, but at the same time the world has become comparatively much smaller now for quicker movement of population and propagation of infection.

The recent knowledge about Influenza has been primarily due to the series of regional laboratories organised and maintained by the World Health Organisation. So far three main types of virus, namely A, B and C have been defined and a large number of variants of type A has been isolated. The current strain (the Asian Flu strain) isolated by the Coonoor Laboratory in India is supposed to be a variant of type A. The virus is thus amenable to quick variation and according to some scientists the present variant is the outcome of the influence of radio-isotopic fall-outs from the test atomic explosions. The last pandemic strain, too, is supposed to have been stimulated by the mustard gas used (Burnet, 1955.[1] It might be as well stellar or telluric, because the possibility of spontaneous rise of the same type of virus simultaneously at different places of the world has been observed by the W.H.O. workers and hence direct or indirect contact transmission is not always needed, though it is the general mode of spread. When such an uprising occurs prevention by usual means becomes almost impossible and the natural course of events reigns supreme.

Another characteristic of the influenza virus is that unlike various other virus infection the sufferer or the survivors attain immunity against the particular type of virus only. They not only remain susceptible to its variants but also lose the immunity against the same virus within a short time due to non-persistence of the same organism which caused the infection. This makes the praftical use of influenza virus vaccine less helpful than other vaccines, although this is perhaps the only measure that can give us some protection against the disease, provided it is made out of the prevalent strain and is used a little ahead of time. Secondly, the preparation of Influenza vaccine is technically much more difficult than the common vaccines in general use, particularly for a large scale production. Not only it is highly expensive and certain specialized equipments are necessary, large quantities of developing chick embryos incubated for a specialized period of time (11 days) would be required. Although a small-scale production may be possible in India it is doubtful whether any laboratory in India is equipped enough for large scale production

to take care even of a small part of the population. Again, apart from the question of administration of vaccine in a huge scale there is yet another difficulty to be faced. Not only the offending strain has to be isolated first, the same after isolation requires to be adopted to the chic embryo for large scale production and this also takes time, and it may be that by the time the vaccine is ready the epidemic has spread widely or the virus has undergone another mutation. The vaccine can however be useful for the unaffected areas provided when the epidemic comes the antigenic character remains homologous to the vaccine strain.

It is understood that Australia has already produced a vaccine from the current strain but it is not known whether India can get her huge requirement from that country.

Among the other precautionary measures that can be taken prevention of over-crowding, introduction of strict quarantine measures, isolation of the sick as far as practicable and strict observance of various personal precautions advocated from time to time etc. can perhaps effect a delay or reduce the tempo of the epidemic to a certain extent. The use of antibiotics may be helpful to prevent secondary infections which are sometimes responsible for the fatal results, but their use should be sufficiently controlled as, any resistant strain such as staphylococcus etc. getting involved in the epidemic might cause greater disaster. Perhaps sulphadrugs are better so long as the antibiotics are not absolutely indicated.

Apart from the difference in clinical manifestations noted in this present outbreak one peculiarity which has been noted is the extreme and prolonged prostration and sleepiness in some cases. This generally occurs in those persons who continue to carry out work in spite of flu. In such cases not only the convalescence is prolonged but complications often arise. Medical attendants may therefore do well if they emphasize and insist upon complete bed rest of all cases till full recovery. For other peculiarities noted in this epidemic the readers may refer to the note on page 213.

[1] Burnet, F. M.—Viruses and Man—Penguin Books Ltd., London, 1955.

MORBIDITY DATA

The fundamental and the basic need of a well-planned health administration is the proper collection of health statistics, and it seems, sufficient attention has not been paid to it by the Health Departments in India. It is not understood why concerted attempts have been avoided in this regard. Many conferences are held and advisory councils sit but rarely or not at all, a decision is made on this fundamental issue, though the present method has been universally known to be most unsatisfactory.

The collection of health statistics, popularly known as Vital Statistics, mainly include items of births, deaths (mortality) causes of death, sickness (morbidity) and certain demographic data according to place. Among these, data on births are grossly incomplete, those on deaths a little better and those on causes of death frankly unreliable. Very little data are available on mor-

bidity except the hospital and dispensary statistics. Even so, the death rate has been brought down considerably during the last one decade and has resulted in several complications. For instance, with birth rates stilll remaining high the rate of population growth has received further stimulus. Similarly with morbidity remaining high general death rates alone no longer give any comparative appraisal of the health status of a community. Furthermore, recent surveys have shown that in spite of the reduction in death rates being perhaps principally due to control of malaria and several other epidemic diseases, the expenditure on medicines and medical care, contrary to expectation, rather registers an upward trend. It has, therefore, become expedient to investigate the situation more closely and this requires proper and adequate collection of morbidity statistics.

There is no doubt that the measurement of health of a State presents exceptional difficulties. It is not as simple a procedure as holding one up against a standard series of test tubes and make a simple reading of health. We have so little data on the knowledge of what is necessary for a correct assessment of the family as the basic health unit, of the extent to which the children are being cared for both physically and mentally or in what environment each and every member of the family in the community is living. Not only there is virtual absence of records of such abstract qualities except perhaps for a few isolated attempts of organised health surveys but also there is very little record of obvious sickness among the communities, except somewhat imperfectly, for those who are attending hospitals, dispensaries or clinics. The medical practitioners in the country do not, in most instances, fulfil their duties of reporting cases of infectious diseases which they are called to attend. Even in the city where a large number of infectious diseases are notifiable the private practitioners are equally negligent about notification. There is yet another difficulty in the matter of reporting. In India, practitioners other than the qualified allopaths *viz.* Ayurvedic, homeopaths, unqualified allopaths and quacks etc. far outnumber the practitioners of scientific medicine and a reporting from them can neither be expected nor if reported, will it be useful, as the method of diagnosis and nomenclature of diseases are different. Furthermore all sicknesses are not due to infectious agents and do not fall under the category of notifiable diseases.

Again, there are some inherent difficulties in collecting morbidity data; for instance, the definition of what is sickness is not always clear cut. To some, sickness represents any departure from perfect health even though there may not be any inconvenience or functional disability. To others, a person is sick when he feels to be unwell and yet there are othres who recognize only that sickness which disables a person and limits his customary activities. Though there may not be much difference of opinion regarding a frank case of cholera, pneumonia or a fracture but there are so many diseases for which diagnosis remains doubtful or controversial without a careful examination and laboratory test. On the other hand, when an epidemic is going on, other prevalent diseases of nearly the same nature are included in the epidemic list. The question therefore arises of a standard definition as well as of the minimum degree of severity and duration of illness which would come under the category of sickness recording.

The trouble, however, does not end here. There may be many more illness in a given period than there are sick persons, since some individuals may have more than one illness at the same time or successively, and the problem arises of deciding which is the most significant at any moment. One may be severe and the other may be prolonged and so on (*e.g.* appendicitis and amœbiasis). Many have indefinite onsets and it may be difficult to judge at what point of time an individual becomes ill. Thus for the present or perhaps for sometime to come morbidity data on most of the illnesses must be obtained by special methods. Among these, surveys are, however, the best method, particularly general health surveys by sampling technique which will be economical from every point of view. Morbidity survey will be a part of this survey. The first survey of its kind is the General Health Survey of Singur carried out in 1944.[1] It seems that the same purpose can be fulfilled in a much shorter time for a bigger area by adopting the short survey technique as has been adopted in case of the rapid medical and general health survey of the Sikkim State.[2] Yet a third kind of survey has been adopted by one of the workers associated with the above surveys for carrying out general health and socio-economic survey of the Community Project areas[3] and a good deal of progress has already been made.

Recently, the Indian Statistical Institute also carried out a Pilot health survey in West Bengal.[4] The investigators have rightly pointed out the inherent difficulties in the morbidity survey and the discrepancies that may arise due to the absence of standardised method. One of the objectives of this study was to assess the extent of agreement between the reported causes of diseases and the diagnostic reports at the time of treatment in the hospital or dispensaries, by two groups of workers—medical and non-medical. There would be variation not only between the medical and non-medical (inter-viewers' variation) but also between the respondents (inter-respondent) and between medical and medical interviewers (inter-clinician)[5]. But whatever may be the conclusions arrived at, there are undoubtedly many snags in this study, the most important of which is want of adequate experience and training in the collection of morbidity statistics, the various difficulties of which have been enumerated above. Furthermore the city like Calcutto where patients often behave like mushroom doctors, does not seem to be a suitable place to carry out validity studies for various reasons. Diagnosis to be valid should be supported by laboratory examinations. For instance, a dactor would not diagnose a case to be one of tuberculosis without having sputum being examined and/or screening or X-ray being done. Another important point is that the differences arise in certain types of diseases more than in others. Sickness being a biological phenomenon, personal variation is likely to occur as much as the variation of symptoms and signs of the same disease in different persons, and recording with mathematical precision cannot be expected. In such cases, lay man's diagnosis would be more danggerous and incorrect than even of medical men who have been trained for making differential diagnosis. Besides, if the person is actually sick at the time of survey the medical man can clinically examine him and confirm his diagnosis, which is not possible by a layman. Therefore, any attempt to carry out morbidity survey without engaging the

medical men, sufficiently trained in the field survey work with a field laboratory to their aid and without proper standardisation of technique, would be great waste of time and money. There is undoubtedly a great need in the country for the collection of such statistics and if the Government is keen to carry out nation-wide health surveys these should be left in the hands of an expert committee consisting of persons who have had sufficient experience in the line for proper planning, experiment and execution of the scheme.

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[3] Community Project Health Survey under the All India Institute of Hygiene and Public Health, Calcutta—in progress.

[4] A Pilot Health Survey in West Bengal, 1955—Indian Statistical Institute, Calcutta.

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CURRENT PUBLIC HEALTH LITERATURE

POLIOMYELITIS

SALK, J. E.—**Poliomyelitis vaccination in Fall of 1956**—*Am. J. Pub. Health*, 47: 1: 1957

The question of degree and duration of vaccine effectiveness has been considered by directing attention to the mechanism of immunity to paraytic poliomyelitis and to the factors that are of importance for the preparation of effective vaccine, and for effective use. It appears that immunity to paralysis is mediated either through the presence of antibody in the circulating blood, or through the rapid reappearance of antibody triggered by exposure of a hyper-reactive immunologic mechanism. A summary of recommendations has been made on the basis of this concept, together with a consideration of available data in support of it.

In relation to the question of vaccine effectiveness, it has been suggested that a realizable goal is the achievement of a level of potency such that two doses will induce the desired effect. This has been achieved, under laboratory conditions, under manufacturing conditions this seems to be true for the type II component. When this effect is achieved, it would still be desirable to continue the administration of three doses to provide the extra margin of assurance to overcome variation in response among individuals. Technical means whereby this might be accomplished have been suggested, and other technical modifications that would facilitate vaccine production and testing have been discussed. Most significant of these would be the elimination of the need for monkeys either for the production of virus for vaccine or for testing. That this can be accomplished has been suggested by reference to work in progress.

It would appear from this review that responsibility for the problem of eliminating paralytic poliomyelitis rests with each individual for whom there is a need for vaccine, either for himself or for those for whom he is responsible; this responsibility is shared by those who are in a position to bring this knowledge to him and to help him avail himself of the necessary treatment. Little need be said about this other than to emphasize hat the indications provided in this review suggest that there need be little, if any, paralytic poliomyelitis in the United States in 1957 if all who are potentially susceptible are treated with vaccine that is now available.

GELFAND, H. M., FOX, J. P. & LE BLANC, D. R. —**Observations on Natural Poliovirus Infections in Immunized Children.** *Am. J. Pub. Health* 47: 412, 1957.

Some 300 incompletely immune members of 118 Louisiana households were given a two-inoculation primary course of Salk vaccine. The serologic response at one month after the second inoculation has been determined by measuring the ability of the sera to inhibit the cytopathic effect of polioviruses. Overall, the three components of the vaccine were not equally antigenic, the Type 3 component being the least so. The de novo response to a particular type of antigen was enhanced materially by the preexistence of heterotype antibody.

In the first seven months folowing vaccination, child members of these household, were closely observed for alimentary infections, a total of 40 household episodes having been detected. These 1956 observations (made after vaccination) on the frequency of household episodes of infection, the extent of intrahousehold spread of virus and the frequency, duration, and amount of virus excretion in the faces have been compared with similar observations made in the same study group in the period prior to vaccination. This comparison has led to the conclusion that two doses of Salk vaccine did not materially influence the frequency or duration of alimentary infection of the amount of virus excreted in the feces.

The prediction is made that a third booster inoculation also will fail to influence enteric infection and that, as a corollary, extended use of killed-virus vaccines will not result in the gradual elimination of polioviruses from vaccinated areas.

PEACH, M. ANN & DUDGEON, J. A.— **Poliomyelitis Antibody in a group of**

London Children. *Brit. M. J.* I: 1033, 1957

Sera from 90 London children aged 12 months to 10 years were examined for the presence of antibodies to the three types of poliomyelitis virus. Tests were carried out of both complement-fixing and neutralizing antibodies. Neutralization method in tissue culture was found to be the more reliable guide to past infection. About 37% of children below 4 years of age showed antibody to poliovirus, including 8% showing antibody against 2 virus types of the Children between 5 to 8 years 76.2 per cent showed antibody against 1, 2 or 3 virus types and of those between 9 and 14 years, 90% showed antibody of 1, 2, and 3 types. The incidence of past infection with each of the three virus types was fairly uniform, type 3 being slightly less common amongst the younger children.

SYPHILIS

BASAK, N., FALCONE, V. H. & HARRIS AD—**A year's experience with a Nation wide TPI testing service:** *Pub. Hlth. Rep.* 72: 317, 1957

Numerous modifications of the original Nelson and Mayer's method of TPI test have been adopted and the WHO report indicate little uniformity among the techniques employed. As the TPI test is affected by alteration of the complement concentration in the test, by an increase in the amount of thioglycolate in the survival medium or by failure to maintain an adequate and constant number of organisms in treponeme suspension used as the test antigen, the technique employed at the V.D.R. Laboratory during the period of this report used a conncentration of complement four times greater than that recommended in the original Nelson and Mayer procedure, a five-fold increase in the concentration of thioglycolate and a constant concentration of 15 organisms per high-dry field. This testing service was made available on a nationwide basis. One year's experience (1955) during which 2487 specimens were tested, is reported here. Certain criteria were formulated for the acceptance of the serum for testing.

For the serum specimens which produced valid TPI test results the percentage of positive findings (reactive plus weakly reactive) was lower for the female donors (41.7%) than for the male donors (52.4%). If TPI test negativity is taken as an index of false positive reactions in other tests for syphilis, then these findings indicate a higher percentage of biologic false positive reactors among female patients than was encountered among the male patients in this selected group. The patients in this study, however, represented diagnostic problem cases and the relationship observed between TPI test results and sex of the patient is not necessarily representative of random population group.

Of the 1772 serum specimens giving biologic false positive reactions 718 or 40.5% produced reactive or weekly reactive results in the TPI test. Only 38 per cent of the sera accompanied by the history of clinical data according to the criteria set up gave positive TPI test. Thus taking the TPI test as 100 per cent specific the Physicians current diagnosis of a biological false positive reactions would have been in error 38 per cent of the time. If on the other hand, the history of past syphilis is taken into consideration 72 per cent of such sera gave positive PTI tests as against 69 per cent of these with current diagnosis of syphilis. The overall correlation between the physicians' present clinical opinion and the TPI test was approximately 61 per cent.

CANNEFAX, G. R. & GARSON, W.—**Reiter Protein Complement fixation test for Syphilis.** —*Pub. Hlth. Rep.* 72: 335, 1957

Gaehtgens reported satisfactory sensitivity and specificity with a complement fixation test in which the suspension of Reiter's strain of *T. pallidum* was used as antigen. Other workers reported false positive reaction with the test. The authors has made a preliminary investigation of a Protein fraction of Reiter's organism (presumably free of lipid antigen reacting with reagen) which does not produce a high percentage of false positive reaction when compared with the TPI and TPCF TESTS. The preliminanry experimental data reported by the author—led to the following conclusions:

(1) The RCPF (Reiter Protein Complement Fixation) test has in this study a relative specificity of 98.86% in comparison with TPI (*P. Pallidum* Immobilisation) and TPCF (*T. Pal. lidum* Complement Fixation) tests.

(2) The RPCP and TPCF tests appear to have similar percentage of over all sensitivity TPCF test 86.80% : RPCF test 82.61%.

(3) The RPCF Test and the TPCF Test detected in this study, a higher per-

centage of primary and secondary syphilis cases than did the TPI Case.

FIELD TRIAL OF TYPHOID VACCINES

CVJETANOVIC, B. B.—**Field trial of Typhoid Vaccine**—*Am. J. Pub. Hlth.* 47 : 578, 1957

The author points out that although antityphoid vaccination is universally practiced its effectiveness has never been demonstrated by a controlled field trial in man, acceptable by modern standards, except in the British Army in India in the early years of this century for which the requirements imposed by modern concepts were not implemented. He, therefore, organised a strictly controlled field trial of typhoid vaccines in Yugoslavia in the town of Osijek with 50,000 inhabitants with grants from U.S., P.H.S., and W.H.O. The adjacent rural area comprising in total over 100,000 population were also chosen for the trial. The definite programme of actual set up was determined after a pilot study. The vaccine trial was designed to test the two most commonly used vaccines, namely, the alcohol-killed and preserved vaccine and the heat-killed phenol preserved vaccine. A Flexner H phenolized vaccine was used as a control. The system of random inoculation technique was adopted. The conclusions drawn are:

1. An antityphoid vaccine can be prepared which is effective against typhoid fever in man
2. Phenolized vaccine is superior to alcoholized and consequently it seems that Vi antigen may not play the major role in the protection against typhoid fever.
3. By serological tests on vaccinated persons the vaccines used could be differentiated from each other, the Vi titer being significantly higher following the alcoholized vaccine.
4. Laboratory potency tests of vaccines in animals as currently performed are not yet comparable with the results in the field.

The authors further conclude:—

Controlled field trials of prophylactics are the most exact, rapid, and often only way to the solution of many still unsolved problems in this field of prevention of communicable diseases. They represent without any doubt one of the most important steps in the progress of modern medicine.

LABORATORY DIAGNOSIS OF TYPHOID FEVER

KURIAN, P. V., BALASUBRAMANIA A., and CHANDRASEKHAR D. S.—**Laboratory Diagnosis of Enteric Fevers**—J.I.M.A., Vol. 28, May 1, (No. 9), 1957. p. 385).

The authors have found clot culture of the blood sent for Widal test, as a valuable method of isolation of the causative organism, especially in the absence of sentive blood culture. The main difficulty is the likelihood of contamination by other organisms. In a series of 514 specimens received for widal test 110 strains of *S. typhi* and 11 strains of *S. paratyphi A* were isolated by clot culture. Of these 18 strains were isolated from specimens wheet gan widal negative reaction. This the authors claim to have diagnosed 7 per cent more cases of this method. The advantage, according to them is due to the removal of the bulk of the antibodis with the serum.

STAPHYLOCOCCAL DIARRHŒA

COOK, J., ELLIOT, C., SMITH, A., FRISBY, B. R., and GARDNER, A. M. N. **Staphylococcal Diarrhoea**—Brit. Med. J. 1 : 542, 1957.

31 cases of diarrhoea are described with 14 deaths, 7 being from one surgical ward. 14 of this cases occurred after partial gastrectomy. Infection with *Staph. aureus* following antibiotic therapy was the chief cause of diarrhoea in this series. Of the 31 cases, 29 occurred in two short periods in 1954 and 1955 in the same hospital.

Staphylococcal diarrhoea is a common and often fatal post-operative complication when antibiotics are being used prophylactically as a routine. In the Radcliffe Infirmary it became the major cause of death after elective partial gastrectomy. In medical patients, too, prolonged courses of antibiotics—for example, in chronic respiratory infections—are fraught with danger, especially when given in hospital. We submit, therefore, that the routine prophylactic use of these antibiotics is not justified. The relatively insoluble sulphonamides provide adequate preparation for colonic surgery, and it is unnecessary, and even dangerous, to the antibiotics in order to prepare the patient for operation either on the stomach or on the unobstructed small bowel.

However, if post-operative complications ensure, or if definite indications are present at operation (for example, a grossly soiled

peritoneal cavity), the appropriate antibiotic should be used—all full strength and in short courses. Garrod (1955) outlined the principles for the correct use of antibiotics. Their abuse may lead to tragedy.

In conjunction with these measures, every effort must be made to reduce the numbers of Staph. aureus in the environment of the patient, not only to avoid surgical sepsis but to allow the safe and effective use of antibiotics when this is necessary.

CHILD HEALTH DATA IN MATERNAL HEALTH SERVICE

SCHLESINGER, E. R., and ALLAWAY, N. C.,—**Use of child loss data in evolving priorities in Maternal Health Services**—Am. J. Pub. Hlth., 47: 571, 1957.

The authors in an earlier study analysis of the changes in familial susceptibility to perinatal loss between 1936 and 1951 found an increasing concentration of fetal and neonatal deaths among women with a history of previous child loss. This analysis suggested the need for further research and for emphasis in public health services on the problems of this vulnerable group of women. The authors also point out that there were many other factors that influence the outcome of pregnancy and survival of the infant. Some of these were social and economic factors, climate, urban and rural setting, nationality and racial background and educational status of the patients. The present study is an analysis in the New York State of all resident mothers with single births, to help develop priorities in maternal health services. The results of this study shows that consideration should be given to the use of perinatal death rate in suggesting priorities in maternal health services. To study this an analysis was made of the relationships of perinatal death rates to a combination of factors: e.g. age of mother, number of previous children and previous child loss. Perinatal death rates among offspring of women with single deliveries of Upstate New York in 1951 were calculated for each five-year age group of mothers according to the number of previous children born to these mothers and the number of previous child losses they had suffered.

Perinatal death rates (for the three factors combined) were arranged in ascending order and divided into quartiles. The higher risk quartiles (three and four) were considered to have higher priorities for service. These higher risk groups, comprising only 8 per cent of all deliveries, were responsible for 18 per cent of the perinatal deaths.

MEASLES VIRUS

ENDERS, JOHN F., PUBLES, T. C., MCCARTHY, K., MILOVANOVIC, M., MITUS, ANN and HOLLEWAY, ANN—**Measles Virus—Isolation, Properties and Behaviour**—Am. J. Pub. Hlth. 47: 275, 1957.

Tissue culture results :

In an earlier study Enders and Peebles (1954) succeeded in growing measles virus in cultures of human postnatal tissues in roller tube from the whole blood and throat washings of a measles patient taken within 24 hurs of the appearance of exanthem. Cultivation also was successful in human renal or monkey renal and human amniotic cells. Cytopathogenic effect was noted in 10 to 16 days old cultures in the form of syncitium or multi-nucleated giant cells followed by gradual destruction of the cells. No cytopathogenic effects have however, been noted in cultures of bovine amnion cells chick amnion or choric-allantois tissues or in chick embryonic tissues to which the virus was added. An altered cytopathogenic effect has also been noted during passage. In the 14th amnion cell passage in addition to the presence of multinuclear giant cells, increasing number of refractile fusi-form or stallate cells were noted somewhat resembling fibroblasts. In stained preparations intranuclear inclusions were also found in these affected cells.

Cytopathogenic effect :

This cytopathogenic effect could be neutralised in a different dilutions of the convalscent sera controlled by sera collected from persons without any history of measles. The mean antibody of the convalescent phase sera was 1 : 260 with a range from 1 : 160 to 1 : 512 and the antibody emerges soon after the exanthem and attains moderate high level 7-10 days later.

Complement fixation test :

Fluids removed from the cultures of human renal or amnion cells, two or three weeks after inoculation with the virus can be utilized for complement fixation test. Convalescent phase sera give positive reactions at high dilutions but low dilution (1 : 4—1 : 8) positive result has been noted with sera sera obtained from persons without any history of measles.

Pathogenicity of virus for monkeys :

Cyanomologus monkeys have been found to be susceptible but give variable symptoms and signs. Certain monkeys, particularly in captivity develop antibody against this virus and give nagative pathogenicity for the virus.

Multiplication of virus in chick embryo :

Strains maintained in renal cell culture when inoculated into amniotic and yolk sacs and the chorio-allantoic membrane resulted in failure to obtain evidence of viral multiplication. When the inoculum consisted of virus from the 28th passage in human amnion cells possessing cytopathogenic properties was introduced into the amniotic sac of chick embryo and passages made after 9 days incubation at 35°C evidence of virus multiplication could be demonstrated.

The successful cultivation of measles virus particularly in the amniotic sac of the chick embryo and the study of its characteristics have opened up a large number of fields of further study and also of the possibility of preparation of a prophylactic vaccine as well as of testing the protective power of the gumma globulin samples. The results will be watched with interest.

SYNERMYCIN IN RESISTANT INFECTIONS

SHUBIN, H.—**Case studies on Synermycin** Antibiotic Medicine and Chemical Therapy —4; 174, 1957.

The author reports on the successful clinical trial with synermycin in a group of 90 cases, 50 of which failed to respond to other antibiotics.

In the group of 50 started with other antibiotics, there were 15 cases of pneumonia caused by pneumococci or staphylococci or both, seven cases of virus pneumonia and 25 of tonsillitis or severe sore throat caused by streptococci or staphylococci. Four in the same group suffered from lung abscesses three from acute rheumatic fever and six from multiple boils caused by resistant staphylococci.

The other group of 40 parents suffered from the same kind of infections, and also included a case of gonorrhoea, a kidney infection and two osteomyelitis. Even though the disease germs were sensitive to other drugs, with synermycin results were much better.

LEPROSY

Brown, J. A. K.—**Susceptibility and Resistance in Leprosy** Leprosy Review. 1956, Oct., v. 27, No. 4, 147-51.

In this paper the possible reasons are considered why some persons who have been in contact with leprosy acquire the disease and others do not. An example is given of a boy who showed early hypopigmented macules when he was 8, although there was no known contact with infection. This later developed into lepromatous leprosy. His mother developed a tuberculoid lesion a year after his lesions first appeared. The questions are posed whether the boy infected his mother, whether both were infected from the same unknown source, or whether the mother's tuberculoid lesion infected the son.

From this the author goes on to elaborate a hypothesis of susceptibility depending upon the presence or absence of factor X. The susceptibility of the offspring will vary according to whether one, both or neither of the parents possess the X factor. Wheher a contact will develop the disease or not, and the form taken by the disease, will, according to this hypothesis, depend to a large extent on the amount, if any, of the X factor inherited.

DIAGNOSIS OF LEPROSY

Nerurkar, R. V. & Khanolkar, V. R.—**Fluorescence Microscopy in the Diagnosis of Leprosy.** Indian J. Med., Res., 1956. July, v. 44, No. 3, 397-402, 1 fig.

First a method of concentration of bacilli by the use of a pressure mincer is described. Biopsy material taken from the skin of a patient suspected of leprosy, or someone who has been in contact with leprosy infection, is soaked in 1 per cent. acetic acid for 3 or 4 hours and the epithelium is removed. The remaining tissue is cut into fine particles with scissors and then placed along with normal saline in the cylinder of the mincer, and the piston is screwed home. This process is repeated several times, the saline containing the bacilli being decanted each time. A mixture of petroleum ether and sulphuric ether is added to the saline and shaken vigorously causing levitation of the bacillic which later rise to the top of the tube. Smears are then examined either after staining by the usual Ziehl-Neelsen method or, preferably, by fluorescence microscopy with an objective of medium power. The latter technique is

described and recommended, as with a 40× objective it is possible to examine a field 5 minutes as large at one time, and detection of the few bacilli present is much quicker and easier.

MANTOUX AND MITSUDA REACTIONS IN LEPROSY

Convit, J.—An Investigation of Leprosy in the Germany Ethnic Group of Colonia Tovar in Venezuela. IV. **Clinical Findings and Variations in the Mantoux and Mitsuda Reactions observed during Five Years after B.C.G. Vaccination of Mitsuda-Negative Contacts.** Internat. J. Leprosy. New Orleans. 1956, Jan.-Mar., v. 24, No. 1, 38-44, 2 figs.

This paper deals with the 4th stage of an investigation into the clinical findings and changes in the Mantoux and Mitsuda reactions in 110 persons who were vaccinated with BCG in 1950. They all shared quarters with lepromatous patients, and thus were placed in great danger of infection. Before vaccination with BCG all gave negative Mitsuda reactions and 100 of them negative Mantoux reactions, but in none was there any sign of leprosy. Of the 106 examined 10 weeks after vaccination 93 had converted to positive Mitsuda reactions, 58 giving 1 plus, 21 giving 2 plus, and 14, 3 plus. The negatives and 1 plus reactors were revaccinated, some twice, and at the end of June 1955 all were Mitsuda positive. The person who failed to come for vaccination in 1950 and who remained unvaccinated showed macular lepromatous leprosy in 1953, and 3 others showed incipient tuberculoid lesions though their Mitsuda reactions were strongly positive. Since 1953 there has been no new case of leprosy in the group. In the Mantoux tests made in 1953 the number of positives had risen to 46, but in 1955 it had fallen to 31 (indicating that in that period of time the positive conversion after BCG vaccination is more stable with the Mitsuda than with the Mantoux text).

B.C.G. VACCINE

Hart, Lober J., Fadmer, C. B. L., P. and P. W. Muggleton, **British Freeze Dried BCG Vaccine: Preliminary Clinical Trial.** Tubercle (Lond.) 37, 187-194, June, 1956. 22 refs.

Since 1940 a Danish liquid BCG vaccine has been widely used in Great Britain, and although generally satisfactory, such liquid suspensions have certain disadvantages, which are discussed. The authors then reported the results of a clinical trial, carried out at the University of the Shefield, of a British Freze-dried B.C.G. vaccine. The primary objects of the trial were: (1) to ascertain the number of viable organisms required to cause satisfactory conversion of the tuberculin reaction in a vaccinated patient; (2) to establish the keeping properties of the vaccine during prolonged periods at room temperature; and (3) to compare the local lesions with those produced by fresh Danish vaccine and to establish the duration of allergy and presumed immunity after vaccination.

During a period of 12 weeks 276 newborn infants were vaccinated in the first 8 days of life with one or other of two batches of the new vaccine under carefully controlled conditions. After 6 weeks the local lesion was inspected and a tuberculin jelly test was carried out; if the result of this proved negative a Mantoux test with 1 in 1,000 old tuberculin was carried out. This procedure was repeated at 12 weeks in all infants giving a negative reaction to the first test or who had escaped it. Viable cell counts were also carried out on the vaccines weekly during the period of the trial and at 10 or 12 months after manufacture, while sensitization tests on guinea-pigs were performed at intervals up to 3 months after the date of manufacture. To provide a control series the results were compared with those in 106 new-born infants given the Danish liquid vaccine during the previous 2 years.

From the results obtained, the following conclusions are drawn. (1) The low viability of the vaccine did not cause any untoward reactions, and the local lesions were much smaller and milder than those produced by the liquid vaccine. (2) There was a delay in tuberculin conversion with the freeze-dried vaccine; thus, at 6 weeks after vaccination 80% of the babies were tuberculin-positive and at 12 weeks 94% whereas 105 out of the 106 children given the liquid vaccine were tuberculin-positive at 6 weeks. (3) Neither batches of the vaccine showed any deterioration in antigenic properties during the period of the trial nor, as judged by the guinea-pig tests, up to 3 months after manufacture showed a slight but insignificant diminution in viability.

The authors conclude that for mass vaccination the potential advantages of freeze-dried B.C.G., vaccine are considerable, but

as the number of viable organisms present in the batches tested was just below the number required to produce 100% conversion in a short period they would not be suitable for vaccination of contacts.

FREEZE-DRIED B.C.G. VACCINE

Ungar J., Farmer P. and Muggleton, P. W. **Freeze-dried B.C.G. Vaccine, Methods Adopted in Preparation of a Standard Product** Brit. Med. J. 2, 268-571. Sept. 8, 1956, 10 refs.

A method is described for the production of a freeze-dried B.C.G. vaccine by using dextran with glucose as a protein-free drying medium. The B.C.G., organisms for vaccine production can conveniently be grown in deep culture in Sauton's medium with 0.025% triton WR 1339—a non-ironic polyoxyethylene ether—without affecting their biological properties. The bacteria, uniformly dispersed, can be easily harvested in the centrifuge and the deposit resuspended in dextran-glucose solution.

A method is described for enumerating the viable cells with consistent results; the viable-cell content of different batches of vaccine can be accurately standardized. A study of the keeping properties of the dried vaccine has shown that it has a life of at least 12 months when stored below 20°C. The relationship between the viable-cell counts of various batches of the tuberculin conversion of guinea-pigs is shown. There is also a direct correlation between the viable-cell count and the size of local lesions in guinea-pigs after intradermal injection.

[*Abstracts prepared by S.C.S.*]

ANNOUNCEMENT

INDIAN COUNCIL OF MEDICAL RESEARCH

COLONEL AMIR CHAND TRUST PRIZES FOR MEDICAL RESEARCH

LIEUT.-COLONEL AMIR CHAND, ex-Principal, Lady Hardinge Medical College, New Delhi, has made a donation of Rs. 50,000/- to the Indian Council of Medical Research for the purpose of awarding prizes for the best published research work in the field of medical sciences. The Governing Body of the Council has constituted a Trust called the, "Colonel Amir Chand Trust" for the administration and management of the Fund

The prizes are awarded annually on an All-India basis for the best published research work in any subject pertaining to all fields of medical sciences in general including clinical research. The term, "Clinical research" will imply research into the mechanism and causation of disease, including its prevention and cure. It covers not only work in patients in hospitals, but also field studies in epidemiology and social medicine and observations in general practice.

It has been decided that in 1957 *four junior prizes* of the value of Rs. 300/- each be awarded to graduates of not more than ten years standing, counting from the date of graduation, for the best research papers in medical sciences published during 1956 (1st January to 31st December, 1956). These prizes will be known as 'Shakuntala Amir Chand Prize'.

THE COMPETITORS for the prizes may be MEDICAL OR NON-MEDICAL GRADUATES.

THE SELECTION of candidates for the award of the prizes will be made by a Selection Board.

IN A JOINT PUBLICATION the prize shall be divided between the joint workers in such proportion as the Selection Board may decide.

THE AWARD of the prizes will be announced at the annual meetings of the Scientific Advisory Board and the Advisory Committees of the Indian Council of Medical Research, to be held at Lucknow in November/December, 1957.

THE CANDIDATES are required to submit 10 REPRINTS of their papers published during 1956. These should be sent to the DIRECTOR, INDIAN COUNCIL OF MEDICAL RESEARCH, P.O. BOX 494, NEW DELHI, so as to reach him NOT LATER THAN THE 1ST AUGUST, 1957.

THE PAPERS should be accompanied by a short biographical sketch and two copies of PASSPORT SIZE PHOTOGRAPHS of the worker or workers concerned.

NOTES & NEWS

NOTES ON THE ASIATIC FLU

A widespread epidemic of Influenza has been sweeping across the Asiatic countries. Starting originally in China in January '57 it spread to Shanghai by February and to Canton by March. The Chinese virologist had identified the virus as a new strain. This important finding was not known to the rest of the world's flu experts until the virus having spread to Hongkong, with 500,000 cases and 44 deaths, reached Singapur in April. The new strain, a mutant of "A" virus was isolated at the world Influenza Centre in London. In the month of May, it reappeared in Japan and by the end of the month it affected about 40,000 persons, mostly children.

From Singapore it spread to other South East Asiatic countries and Australia and reached India also during the early part of May. It seems the virus also took another route of entry to India viz. through Gangtok in the Sikkim State where Influenza cases were recorded earlier than in Madras and Calcutta. In spite of the alertness and stricter quarantine measures the infection appeared in Madras, Bombay, Calcutta and Delhi and subsequently to many other cities, towns and even to the rural areas of India. Although the tempo has come down since about a fortnight last some cases are still recurring in the cities like Calcutta, Delhi and others. Towards the last week of June the reports from the WHO indicated that flu epidemic had ended in Brunei, Formosa, Combodia, Vietnam and was still spreading in Burma, Laos and Thailand. In South Malaya, Bombay, Delhi and Bangkok the number of cases was still high. Korea, Netherlands, New Guinea, Ceylon and East Pakistan did not so far experience any typical outbreak.

The number of Influenza cases as reported from different states in India to the Central Health Ministry up to the 1st week of July 1957 exceeded 16½ millions. Their state-wise distribution is as follows:

Andhra—1,04,970; Assam—60,731; Bihar—14,742; Bombay—3,35,724; Kerala—1.46,337; Madras—5,08,724; Mysore—2,17,763; West Bengal—72,775; Delhi—88,070; Orissa—26,314; Punjab—25,071; Rajasthan—18,002; U.P.—43,235; Kashmir—211; Himachal Pradesh—619; Tripura—482; Andaman and Nicobar Islands—18; total 16,72,252. (As the reporting is not expected to be in any way complete. all the above figures are under estimates; for instance, only one city like Calcutta had more than 6,00,000 cases).

On the Western side, the infection seems to have reached North America and Europe but no definite information has yet been published. According to the information reaching from WHO at Geneva, two new strains of influenza virus similar to the Asian strains had been isolated from the crews of the vessels of the U.S. Atlantic fleet. Neither of the two vessels involved nor their crews had had any contact with the Asia-epidemic areas; other vessels in the North Atlantic also reported outbreaks of respiratory disease but no virus had yet been isolated according to the report from the U.S., Walter Reed Army Research Institute.

In India, Influenza virus was isolated at the Coonoor Institute, South India and at the Haffkine Institute, Bombay and also at Madras, Trivendram and Delhi. It is also stated that the Coonoor Institute, Haffkine Institute and the Central Research Institute, Kasauli are engaged in the manufacture of Influenza vaccine from the newly isolated strain. Australia has also announced that she has prepared large quantities of vaccine from the Asiatic flu strain.

The World Influenza Centre in London, which received material from Singapore isolated a new strain of virus, a mutant of 'A' type and quickly prepared a vaccine in chicken embryos. The first priorities were given to Australia and South Africa, then entering on their winter flu season. Specimens were distributed to 46 centres, including Russia. It is now understood that the Russian biologists have developed a vaccine out of an attenuated living culture of the new strain which will produce the antibodies

in the human body by blowing the vaccine into the nose but without provoking the disease itself. It would be interesting to see whether the Russian method becomes successful with the new procedure instead of using the formal killed virus.

There is a strong suggestion that the present mutant is the effect of radiation from nuclear tests. However, a change being effected by the cyclic order cannot also be completely over-thrown. Dr. Mulder of Leyden (Holland) isolated this strain from a passenger arriving from Indonesia and he found the corresponding antibodies in the blood of the people of advanced age between 70 and 84 years, indicating a revival or reappearance of the strain which probably caused pandemic in 1889.

Clinical characteristics :

Onset was generally sudden with rise of temperature to 102°-103°F lasting initially for a period of 24 to 48 hours and then fluctuating for one to three days before complete remission. Some cases had malaise and headache before the onset of fever and a few cases had actual coryza. In exceptional cases very high temperature up to 106°F was also noted besides other types of temperature variations. The fever was generally accompanied by severe headache, bodyache, coryza, nausea and vomiting.

Unlike the normal symptoms of influenza in the majority of cases running from the nose or throat trouble was conspicuously absent at the initial stage but the throat symptoms and cough appeared at a later stage and often during convalescence. Some cases had even diarrhoea. A few cases had epistaxis, pain in the abdomen and haemorrhage from the bowels and those cases generally turned serious sometimes with fatal results.

Among the complications, bronchopneumonia and pneumonia were common and pleurisy was also seen. Certain cases had severe prostration and loss of weight. Attack of Influenza during menstrual period was accompanied by menorrhagia in some women. Convalescence was prolonged in many cases due to extreme prostration, some had persistent hacking and often chocking cough. A few persons including children showed great loss of appetite and even aversion for protein food particularly fish, meat, and milk.

A feeling of sleepiness besides weakness and prostration was another disturbing symptoms during convalescence. One thing which need emphasis here is that those persons who tried to continue to do their work during the attack suffered from prolonged convalescence as well as from complications such as sleepiness, extreme prostration or troublesome cough and often from relapse. Immediate bed rest after the appearance of symptoms and to postpone resumption of work till one is fully fit were the wisest thing to do.

The most redeeming feature, however, was the low rate of fatality compared to very high rate of morbidity.

A rough estimate after a survey in Calcutta shows that nearly one-third of the population must have suffered from some kind of attack of Influenza during the month of May and June. Fatality in the cities was generally confined to young age groups and the old. Calcutta is having a number of residual cases at the time of writing this note. There is also an apprehension that a second round attack may appear with greater severity in August and September as happened during the last pandemic in 1918-19 and the health authorities as well as the public have been asked to be alert for all eventualities.

SHRI KARMAKAR STRESSES ON PREVENTIVE WORK

Shri D. P. Karmakar, Union Health Minister, in his address to State Health Ministers' Conference held at New Delhi, on June 29, 1957 stressed the importance of preventive work, the value of which he said, had not only been established as a scientific proposition of universal applicability but its adoption was also made imperative for India by the existing economic, social and health conditions of the country.

The Minister drew attention to health problems in rural areas and referred to the target of 2,000 primary health centres. The programme of setting up these centres in the rural areas, he said, should be given every priority. No efforts should be spared in publishing the scheme through and working it successfully. The UNICEF had undertaken to participate and assist in this scheme by contributing considerable amount of equipment and material.

Another crying need of the rural population, he said was the safe and wholesome water supply and improvement of environmental sanitation. The progress in respect of the rural water supply schemes had been poor on the whole. He called upon the con-

ference to analyse the reasons for this and to suggest suitable remedies.

The national malaria control programme he said, had made considerable headway and it should be possible to have all the 200 projected units in position soon. The actual number functioning today was 164. Observations about development of resistance to insecticides had posed a problem and therefore, it was proposed to modify the control programme into one of eradication. Necessary proposals in this matter were under consideration.

Another important component of the plan, he added, was the family planning movement. A board had been set up at the Centre with a view to facilitate the expeditious framing and execution of a broad policy. The offer of appointment of whole-time administrative family planning officers in the States on full subsidy by the Centre had not been utilized as readily and widely as could be expected. Amongst the population at large, there was a growing understanding of the need or the application of control measures and the time was now ripe for technical guidance and facility being brought within easy reach of the people.

In the field of indigenous system of medicine, every encouragement was being given for their development and exposition on scientific lines. Research was being actively assisted by the Centre. Central subsidy would be given for teaching institutions that might be set up or upgraded in the States on the same basis as for medical colleges.

TOBACCO SMOKING AND CANCER

A seven-man study group was set up sometime ago by four American Organisations —the National Cancer Institute, National Heart Institute, American Cancer Society and the American Heart Association to study the relation between the lung cancer and the tobacco smoking. A report by this group has been published. According to them the smoking of tobacco, particularly in the form of cigarettes, is an important health hazard. The smoking has been found to be a main cause of lung cancer, the risk rising with the quantity smoked. On the average it is 5 to 15 times greater in moderate smokers (10 cigarettes a day or more) than in non-smokers. The figures are 27 times greater in heavy smokers (40 cigarettes or more a day).

Smoking is not, however, the sole cause of lung cancer. Air pollution is also a great hazard. In Liverpool (U.K.) deaths from lung cancer has been apportioned as follows: Smoking 50 per cent; air pollution 35 per cent; and other causes 15 per cent. No conclusive cause-effect relation has been established between smoking and heart disease. According to the authors the data available are sufficient for the initiation of public health measures and further research on the subject.

RISE OF SERUM GAMMA GLOBULIN IN CHILDHOOD TUBERCULOSIS

The authors from the study of serum globulin level in 18 children with various forms of tuberculosis find a rise in serum gamma globulin in active tuberculosis. They conclude that the children with low serum gamma globulin level initially for poor prognosis unless there is a subsequent rise and that improvement in the clinical condition is accompanied by a return to the normal value or a rise. They therefore recommend that the children with low serum gamma globulin level should receive a more intensive and antituberculous therapy possibly of tubeculosis or large doses of gamma globulin.

RADIATION HAZARDS IN TRAVANCORE AND BRAZIL

An expert of the John Hopkins University speaking on nuclear radiation hazards on April 22, said that there was extreme urgency for a study of populations in India and Brazil, who have been exposed to a far greater than usual amount of radiation.

This was supported by Dr. H. Bentley Glass, a member of the Genetics Committee of the National Academy of Sciences (N.A.S.) who urged that an analysis be made along the Coast of Travancore in India and in Brazilian coastal areas, where the fishing populations were living on monazite sands, one of the main sources of fissionable material. According to him, if the present estimates on the harmful effects of radiation were correct, approximately 30 to 40 per cent of the Travancore fishing population should show the effects of genetic changes on reproductive organs due to radiation.

He said that he believed such changes "would have been noticed even though no close stud of the situation has yet been made." According to him "A genetic

analysis is of extreme urgency in both Travancore and Brazil."

He said preliminary studies of the Travancore population showed that fishermen living in huts absorbed in the first thirty years of life a radiation does to the reproductive gonads of 50 Roentgens, while fishermen living on the beach receive up to a maximum of 177 Roentgens. This is from 5 to 17 times as much radiation as the National Academy of Sciences has recommended as a "permissible limit" for the general population of the United States. Even this "safe" amount of 10 Roentgens is now thought to be excessive by some scientists.

Dr. Glass also displayed great concern about the effect of peaceful atomic reactors in producing radioactive waste material.

According to a report from New Delhi, Dr. Homi J. Bhaba, Chairman of the Atomic Energy Commission, however, is of opinion that the extent of radiation on the coastal areas of Kerala is not alarming, though a detailed study is necessary.

CALCIUM IN DIET REDUCES DANGER OF RADIATION

According to Dr Harold Copp, a University of British Columbia physiologist, an increase of calcium in the diet could reduce the danger of exposure to radioactive strontium 90 which is released from hydrogen bomb explosions.

Dr. Copp and his associate, Dr. Carl Cramer, said they had found that "the best way to reduce the absorption and danger from radioactive strontium is to take plenty of calcium such as is found in dairy products."

His research was not connected with fall-out of strontium 90 from atomic clouds. Such fall-out had been so small it "would have to be increased more than 10,000,000 times to reach the level which produces bone cancer and death in experimental animals."

"The principal purpose of the research was to protect workers exposed to strontium 90 radiation in the atomic power plants of the future, and if possible to remove the element from persons accidentally exposed to dangerous amounts."

Dr. Cramer had shown that a small amount of phosphorus in the diet would increase the rate of removal of radioactive strontium from the body. But such a diet could not be continued for long because it robbed the bones of mineral content.

DRUG TO PROTECT AGAINST RADIATION SICKNESS

Scientists at the British Medical Research Council's laboratories at Harwell have confirmed American results with a drug compound which appears to protect against radiation sickness.

The chemical, called AET (Aminoethylisothorium), was developed in the United States where experiments have been made on mice and monkeys exposed to fatal doses of radiation. After injections with AET the animals recovered from radiation sickness.

British scientists repeated the American experiment with mice.

Dr. Loutit, head of the British research team, said there was no question yet of using the substance clinically. Its main value now was to help scientists understand the mechanism of radiation sickness.

SYNTHETIC PENICILLIN

The chemical synthesis of penicillin, which for years has been one of the most baffling problems in chemistry, has been accomplished at Massachusets Institute of Technology by John C. Shreehan, professor of chemistry, and K. R. Henery-Longan, research associate. Ten new kinds of the synthetic penicillin are now being tested for possible medical use. While the new chemical method probably will not be economical enough to compete with the established fermentation process by which penicillin is derived from molds, it is hoped that the new forms will prove effective against disease organisms now resistant to natural–penicillin and against a wider variety of infections. New penicillins might also have less tendency to produce allergic reactions.

Sheehan undertook the task in 1948, and, with the help of graduate and postdoctoral students, continued the laboratory work for nearly 9 years. Final results have been announced in the 11 March issue of the Journal of the American Chemical Society.

COONOOR ISOLATES INFLUENZA VIRUS

The influenza centre at Coonoor (South India) has succeeded in isolating the influenza virus from local as well as from imported cases. The Pasteur Institute at Coonoor has been asked to give the highest priority to the promotion of vaccine from the isolated virus of the epidemic, says a Press note.

A number of inquiries have been received as to the most suitable measures which could be adopted for prevention of influenza. Opinion in regard to local treatment of throat and nasal passages as a prophylactic measure against influenza has been divided but it has been found, the press note adds, that application of Mandl's throat paint twice a day, once in the morning after cleaning the mouth and once before retiring to bed, and/or spraying of the nose and throat with suitable iodine preparations, has prevented occurrence of influenza in persons so treated. While no firm claims can be made for the efficacy of this local application, it is consiered worth a trial.

AUSTRALIA PREPARES FLU VACCINE

Australian scientists have evolved a vaccine to combat the influenza virus, which is sweeping Asia and it is now in mass production.

The director of the Commonwealth Serum Laboratories in Melbourne, Dr. P. L. Bazeley, said on 6-6-57 that the first issue of several thousand doses of the new vaccine is expected to be available for general use in seven days. It would be made available first to people most susceptible to infection, such as quarantine officers, airport officials and hospital staffs. Later, it would be released to the public.

Mr. Bazeley said Australia's first responsibility was to supply the vaccine to essential service groups but applications from overseas would be considered on their merits.

A new strain of influenza called virus "A" has been discovered in samples received in London from Singapore where an estimated 10 per cent of the population were affected.

The samples of the virus thought to be responsible for epidemic reported from Hongkong and other areas in the Far East have been analysed at the world influenza centre in London.

MEDICAL SALT FOR MALARIA CONTROL

Ordinary table salt combined with two tested antimalaria drugs may be the most effective means yet developed to rid the world of malaria on a permanent basis. It consist of ordinary table salt fortified with *daraprim* and *choloroquine*, two drugs which widespread experience has shown to be virtually 100 per cent effective in eradicating malaria and when used continuously, in keeping patients free from a recurrence of the disease.

Now, it is reported that the World Health Organisation of the United Nations may test the anti-malarial salt on a world-wide scale in all malaria-ridden areas.

The medicated salt was developed by the United States Public Health Service. The tests conducted by the Service have shown that human volunteers, purposely exposed to multiple bitings by malaria-bearing mosquitoes, escaped malaria sickness as long as they used the medicated salt and for a comfortably safe period after they stopped using the salt. The amount of the medicated salt needed to control malaria is no more than the average amount of regular salt which a person uses daily in preparing and eating his food.

When used by inhabitants of malarial areas the medicated salt would simply be substituted for plain table salt, its daily use in this manner, the testing programme has demonstrated, should keep the users permanently free of malaria sickness, no matter how many times in the past they have been bitten by malaria-carrying mosquitoes or how many times they may again be bitten.

FAMILY PLANNING INSTITUTE IN MADRAS

The Government of Madras have decided to set up a family planning institute which will serve a threefold purpose of being a model clinic for instructing mothers who attend the Government maternity hospitals, a training school to turn out personnel required to man the family planning clinics and information centres in the State and a programme evaluation organisation to keep the working of the programme under continuous review and supervision, to evaluate the effectiveness of family planning methods, and to bring about continuous improvement in the efficiency of execution of the programme.

The above decision has been taken by the Government with a view to reorganising the entire scheme of family planning, and to properly co-ordinate the work done by the Government and Corporation agencies in the City, so as to provide more effective service to the public.

The Director of the Upgraded Institute of Obstetrics and Gynaecology, Women and Children Hospital, Egmore, will be respon-

sible for the overall supervision and direction of the work of the family planning institute.

The training centre will be located in the Government Hospital for Women and Children, Egmore, with separate wings for the training of men and women, and will provide a fortnight's course in both theoretical instruction and practical training in the model clinic organisation, in the technique of teaching. About 10 candidates will be trained at a time. Care also will be taken to convey the right emphasis and the proper perspective as between non-appliance, appliance, and surgical methods.

TRAINING FOR FAMILY PLANNING

In Bombay a Family Planning Training Centre has been established for imparting training in family planning to doctors, health visitors and medico-social workers. Five grants for opening and maintenance of family planning clinics and two grants for research schemes on family planning were made by the Government of India in March and April.

A grant of Rs. 14,040 has been offered to the Government of Madras for opening and maintenance of family planning clinics. For the same purpose grants of Rs. 1,000, Rs. 5,190 and Rs. 5,500 have been sanctioned to the Bombay Municipality, the Family Planning Association of India, Bengal branch, Calcutta, and the Philadelphia Hospital, Ambala, respectively.

For the study of fertility and sterility problems, the Madras Government, under research schemes, have received a grant of Rs. 8,276 for the study of fertility and sterility problems, while the Lady Hardinge Medical College and Hospital, New Delhi, received a grant of Rs. 6,000 for collection of data relating to cases of sterility.

Of the total provision of Rs. 497 lakhs made in the 2nd 5-Year Plan, Rs. 400 lakhs were provided in the Central plan and the rest in the State plans. A detailed scheme for promoting family planning had been drawn up for the whole country, which consists of the opening of Government-aided family planning clinics, specially in rural areas, carrying on publicity for family planning through audio-visual aids, training of medical and auxiliary personnel in family planning, laying down the standards for contraceptives and undertaking of demographical, medical and biological research studies.

REGIONAL PUBLIC HEALTH LABORATORY SERVICES

The Government of India has approved the establishment of regional laboratories in Madras, Kerala and Bihar under the scheme for the development of public health laboratory services formulated by the State Governments.

The Centre has approved the establishment of two regional laboratories in Madras State, one in Tirunelveli District and another in North Arcot District; one in Bihar at Patna, which will serve as a pattern for 16 regional laboratories to be established in other districts.

The State Government have been requested to implement their respective schemes as expeditiously as possible.

Under the scheme, scholarships and fellowships will be awarded to trainees on a recurring basis subject to a maximum of Rs. 500 per annum. The expenditure on scholarships will be shared by the Government of India and the State Governments on a 50-50 basis.

For financing the State schemes, the Central Ministry of Health has made initial contribution of Rs. 12,500 for the Madras scheme, Rs. 8,000 for the Kerala scheme and Rs. 4,500 for Bihar in respect of the principal laboratory and 4 regional laboratories to be established during 1957-58.

Further grants-in-aid will be given to the State Governments on the receipt of progress reports indicating complete details of the actual expenditure incurred during the first six months of 1957-58 and the estimates of expenditure likely to be incurred during the remaining six months of the year.

FLYING DOCTOR SERVICE IN AUSTRALIA

Flying Doctor Service has been established in Australia for sometime past. The story is one of an interrelated service between most up-to-date radio bases, skilled doctors and nurses, efficient aeroplanes and a type of air pilot of great competence and courage. To-day this service is so firmly established as to win the figure of the great inland that life in the country's wide outback spaces would be impossible without it.

Flying Doctor bases have been established at Cloncurry and Charleville in the State of Queensland; Broken Hill in New South Wales; Alice Springs in the Northern Terri-

tory, and at Kalgoorlie, Port Headland, Meckatharra and Wyndham in Western Australia. During the past year over 1,000 fights were made from these eight bases covering some 275,000 miles.

The Service functions in three ways:—

Firstly, in flying doctor or nurse to serious cases at lonely outposts within the quickest possible time and transporting the patients to the nearest hospital.

Secondly, in less serious cases, instructions are transmitted for the treatment of patients with the help of special medical kit. Practically all remote homes own a medical chest, which is replenished from time to time by the Service.

Thirdly, Flying Doctor bases receive and transmit telegrams on behalf of all users of transceivers, relaying them in turn to the nearest telegraphic offices. As many as 170,000 such telegrams have been dealt within a year by this means—the inland's only link with the outside world.

Patients are not charged for these medical flights, the cost of which sometimes amount to Rs. 800. However, patients make grateful donations to the Service in nearly all cases. The Flying Doctor Service of Australia is financed by grants from the Commonwealth and State Governments, charitable trusts, bequests and donations and subscriptions from private citizens. Some revenue is also earned by handling telegrams on behalf of outback transceiveer users.

DOCTORS TO QUIT HEALTH SERVICE

Plans for "a progressive withdrawal" of doctors from Britain's National Health Service beginning on October 2, 1957 and an alternative system of treating patients were announced on March 22, 1957.

The proposals, outlined at a Press conference at the headquarters of the British Medical Association, were the result of a simmering pay dispute between 40,000 national health doctors and the British Government.

The doctors have been demanding a pay rise—their first since 1951—of 24 per cent which they say they are willing to put to arbitration. The Government has refused their claim and arbitration plea, and appointed a Royal Commission to investigate their demand instead.

During October former national health patients would be treated privately but no fees would be demanded from them. Later there would be a fee for each visit.

The doctors' wage demand would add another £20 million to the annual cost of the health service, which is in the region of £600 million.

The average general practioner in the health service has an income of £2,200 a year plus expenses.

PUBLIC HEALTH IN MYSORE

Mr. R. M. Patil, Minister for Health, Government of Mysore, outlined at a Press conference on 25-5-57 the Public Health that the State has planned to concert during the Second Plan period. He explained that the best form of rendering preventive and curative services in rural areas was by establishing health units where those two services could be combined. With this end in view 102 primary health units of the Mysore pattern were proposed to be started under the Second Five Year Plan, 28 in the Bombay-Karnatak area, 28 in the Hyderabad-Karnatak area and 34 in the old Mysore area.

The Government had accepted the plan of operations as drafted by the WHO and the UNICEF, whereby those two organisations would spare the services of two experts in maternity and child welfare centres in the State. The two experts had already reported themselves and were engaged in a survey of maternal child health services, including paediatrics available in Mysore State. Nursing facilities were also being surveyed. The WHO and the UNICEF had already supplied equipment to the tune of Rs. 7.3 lakhs. Under this scheme, it was contemplated to open two laboratories for chemical and food analysis. These laboratories would serve not only medical and public health departments but also were open to medical practitioners in the area to facilitate early diagnosis and proper treatment.

The Minister next explained that the bed strength in the existing health unit dispensaries was proposed to be increased by 250 beds. Five more district laboratories to undertake bacteriological pathological and chemical examinations were proposed to be established at Mysore, Chickmagalur, Chitaldrug, Kolar and Tumkur.

ALL INDIA INSTITUTE OF MEDICAL SCIENCES, DELHI

Dotted across 150 acres of land with multistoreyed buildings in grey and pink, many

nearing completion, India's future biggest medical research centre, which will cost over Rs. 6 crores, is taking shape in Safdarjung Hospital on Mehrauli Road, Delhi.

The costs will be borne by the New Zealand Government which has promised to give one million pounds under the Colombo Plan, in consumption with the Government of India and private donations.

The Institute equipped with a 700-bed hospital, a medical school for 120 postgraduates and 50 undergraduate students, a dental college, a nursing college for 400 nurses and providing facilities for postgraduate study in various branches of medicine and surgery will be completed by 1960. Already 50 undergraduates and 2 postgraduate students are working in the building which will eventually house the nurses training school.

PUBLIC HEALTH ENGINEERING RESEARCH UNIT AT THE ALL INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH, CALCUTTA

The Scientific Advisory Board of the Indian Council of Medical Research recommended establishment of a 'public health engineering research unit' at the All India Institute of Hygiene & Public Health, Calcutta which in addition to continuing its investigation on the disposal of industrial waste in Bengal, Bihar and U.P., and the preventive of stream pollution would accompany the research in the Industrial Hygiene in different parts of India.

DIPLOMA IN CLINICAL PATHOLOGY

The one year's course of instruction for the Diploma in Clinical Pathology under the Faculty of Tropical Medicine and Hygiene, West Bengal will begin at the School of Tropical Medicine, Calcutta on the 1st July 1957 This course is open to medical graduates or candidates possessing equivalent qualifications with at least one year's experience as House Medical Officer or Pathologist in a recognised institution.

MEN STUDENTS IN THE LADY HARDINGE MEDICAL COLLEGE, DELHI

The Lady Hardinge Medical College in New Delhi will undergo a certain metamorphosis from the next academic year commencing in July The College will have the Irwin Hospital as one of the teaching institutions as recommended by the Indian Medical Council and will take in 40 men students, in addition to the 60 women, on its rolls at present. The element of coeducation will be regulated in so far as the men students will be separately housed near the Irwin Hospital and will have no access to the Lady Hardinge Medical College and Hospital premises except under normal existing rules. Teaching facilities in the Lady Hardinge Hospital will be exclusively for the women students. The women students will however, enjoy the benefit of teaching facilities in the Irwin Hospital which takes men patients.

The teaching of preclinical subjects will, in future, be at the Irwin Hospital premises where the necessary facilities will be arranged.

The existing batches of Lady Hardinge students will continue under the present arrangements.

The new proposals are understood to be generally acceptable and every effort has been made by the Government to meet objections raised by feminist interests.

MEDICAL COLLEGE IN HUBLI

A new Medical College has been proposed by Mr. R. M. Patil, Public Health Minister of the Mysore State. This will mean introduction of medical education in North Karnataka area, formerly a part of the Bombay State, for the first time. The College, is it stated, will be one of the finest in the country. The scheme is estimated to cost Rs. 1.50 crores and will include the starting of an up-to-date hospital attached to the college, staff quarters and hostels. The question of attaching the T.B. Sanatorium at Gadag to the Hubli college is being considere by the Government.

THE WORLD MEDICAL ASSOCIATION

The Council of the World Medical Association during its recent session in Geneva on May 7, 1957 discussed the topic on the Role of Hospitals in the Public Health problems.

In this connection the Council Committee prepared a paper on its finding on the subject entitled "The Practising Doctor's Evaluation of the Role of the Hospital in the Public Health Programme", which was transmitted to the World Health Organization.

This document stresses the following points:—

"Health care is an undertaking requiring a team approach,—the team to be composed of doctors, dentists and their ancillary personnel as well as certain agencies such as professional organisations, voluntary and official health agencies, social welfare agencies and government. The prime consideration in the whole programme is, or should be the public.

The general practitioner is the doctor best qualified to offer continuity of health care. He should have free access to the hospital to continue the patient's health care and to provide him with the opportunities of continuing medical education provided through hospital meetings and research.

A hospital is an institution and cannot replace an individual or group of individuals without medical care becoming depersonalised and mechanical.

The hospital achieves and holds its reputation almost exclusively by virtue of the reputation of its staff. Hospitals cannot function without doctors. Doctors cannot practise modern scientific medicine without hospitals.

One of the first questions to be answered is: Who is to determine how medicine is to be practised both in hospitals and elsewhere?

The moment that full reliance for individual and family responsibility is placed on government an essential element in "mental and social well-being" is undermined.

NAPT COMMONWEALTH CHEST CONFERENCE

The NAPT Commonwealth Chest Conference will be held on 1-4 July 1958. The conference is open to all interested in preventive medicine, including the medical and nursing professions, research workers, commercial and industrial executives, social workers, health administrators, members of local authorities and regional hospital boards.

The subjects will include:

The World Antituberculosis Campaign: Is it Succeeding? The Management of Asthma in Childhood. Ambulatory Management of the Tuberculous Patient. Tuberculosis and Leprosy. Thoracic Surgery in Respiratory Tuberculosis. Tuberculosis and the Psychiatrist. Lung Cancer: Prevention and Treatment. The Family and the Patient with Chest Disease: How best can We Help them to Help themselves? Dust Diseases in Miners. Tuberculosis Medical and Social Services in British Overseas Territories.

The full membership fee is £5 5s. 0d. (16 dollars) or 15s. 0d. per session if registration fee is received by 31st May, 1958.

ALL-INDIA CONFERENCE OF INDUSTRIAL MEDICINE

At the All-India Conference of Industrial Medicine, held its three-day session in Calcutta commencing 12-4-57, the speakers stressed the need to build positive health programme for the industrial workers which should include socio-economic, psychological and moral aspects.

Lt.-Gen. D. N. Chakravarti, Director of Health Services, West Bengal, opened the conference held at the All-India Institute of Hygiene and Public Health. Dr. P. K. Ghosh presided. An exhibition was opened by Mr. S. C. Roy, the Sheriff. Dr. H. P. Dastur, delivering the Sir Ardeshir Dalal Memorial Lecture, spoke on the concepts of industrial medicine.

The exhibition organised by the Industrial Health Research Unit of the Institute for the benefit of industrialists and doctors depicted through instruments and charts, the role science could play in guarding workers' health. The action of heat, light, dust, chemical processes, fatigue and radiation on workers was explained by means of statistics. Methods by which experts in industrial hygiene evaluated the effects of such action on workers' health and controlled them by engineering and medical skill were shown. One section stressed the need for proper disposal of industrial waste in order to avoid pollution of public drinking water supplies while another dwelt on industrial tension and on improvement of human relations in industries for better production.

According to the Unit's findings, the incidence of lung disease was higher in foundries than in jute mills or safety match factories because of the presence of silica dust.

An interesting feature was the "Radiation Hazards" section, where appliances used by the Unit to study the dangers to which x-ray operators were exposed were on view. Apparatus to check radiation exposure to these operators and meters to detect radioactivity in the surrounding atmosphere where they worked were also exhibited.

1,000 BEDDED T.B. HOSPITAL FOR WEST BENGAL

Dr. B. C. Roy, Chief Minister of West Bengal laid the foundation stone of a 1,000-bed T.B. hospital at Dhubulia in Nadia district, 75 miles from Calcutta on the 14th July 1957.

According to the plan, the accommodation for patients will be provided in Nissen huts with 8′ high side walls of bricks and 17′ high ceilings. These huts will be divided into 10 blocks of 100 beds each. The special feature of this hospital is that there will be arrangements for an occupational training Centre to provide convalescent T.B. patients with an opportunity to learn trade. With 1,000 patients, and 3,000 staff, a figure which includes their families, the centre, it is hoped, will grow into a township which will provide many with adequate means of livelihood. The total cost of the scheme which will be completed within the Second Plan period, is estimated at 8 million of rupees. The total area of this hospital is 180 acres.

At present Dhubulia is a village of 21,000 refugees.

In his speech at the function, Dr. Roy said that a T.B. hospital symbolized a collective challenge against the evils that confronted development of the country. West Bengal's problem was to eliminate diseases. To set up a hospital, although necessary, was a negative approach. The real solution lay in providing more food and nourishment for the people; hence the need to plan for development.

Proceedings of the Eleventh Bengal Pharmaceutical Conference held on 20th July, 1957.

The eleventh session of the Bengal Pharmaceutical Conference was held on 20th July, 1957 at the 'Philip Club Hall' at 2, Heysham Road, Calcutta. The same was inaugurated by the State Health Minister, Dr. Anathbandhu Roy and presided over by Dr. N. Jungalwalla, Director, All India Institute of Hygiene and Public Health, Calcutta.

In his inaugural address, Dr. A. B. Roy pointed out that India abounds in all sorts of plants and herbs from which useful drugs can be prepared and he recommended their liberal use in the practice of medicine in our country. Just as the substandard practitioners of medicine have been disallowed, so the compounder's training which was also not up to the standard has been replaced by the licentiate course. "Graduate Course in Pharmacy should also be opened by Universities. These will help to achieve a real ethical standard for the pharmacists. The Minister then regretfully mentioned that the spurious drugs have not yet disappeared from the market, and that more trained persons are required to help to eradicate this evil."

Dr. N. Jungalwalla, in his presidential address welcomed the trend of closer co-operation between the Public Health Personnel on the one hand and the pharmacists on the other particularly in the mass control programme to eradicate diseases like malaria, tuberculosis and leprosy. While narrating some of the public health problems facing the country, he said that unlike others engaged at other parts of the world with cancer, diabetes, etc. our main problems are tetanus, malaria, worms, kala-azar and the various nutritional deficiencies. Besides these, the newer diseases like encephalitis, poliomyelitis, and yellow fever are also worrying us. Our children are still getting the communicable diseases like diphtheria and whooping cough.

"The medical practitioners", continued Dr. Jungalwalla, "got worried at the repercussions on medical practice that the infinite number of combinations of medicines of every variety from the various drug houses, was having on the young general practitioners." His comments on this aspect of the situation was: "The finer points of clinical diagnosis, the judicious use of laboratory aids to such diagnosis, and the selection of specific drugs for the causative oganism, are giving place to the blunderbuss therapy that is possible and encouraged by such a profusion of combinations."

The hospital administrator and the man in-charge of medical stores, he said, "are required to spend much time in working out their own formulæ or finding the equivalents of drugs prescribed by their colleagues and the new graduate very soon tends to succumb to such temptation of the advertisement campaign and prescribed lavishly but not too well." He suggested that medical-men and pharmacists should jointly work them out.

"Equally worrying", Dr. Jungalwalla pointed out, "is the appearence in the market of new "discoveries" whose claims are widely advertised but whose evaluation before marketing leaves much to be desired.

"Pharmacists could contribute to the efforts, now being made, towards self-suffi-

ciency in vaccines and drugs needed to fight the old as well as more modern diseases", he concluded.

At the outset, Sri S. N. Bal, Vice-President of the Bengal Pharmaceutical Association (Bengal Branch of the Indian Pharmaceutical Association), in his welcome address to the delegates present, regretted that for training of technologists in pharmacy who shouldered more complex responsibilities there was no institution in the Eastern Zone of India. He urged to take early steps to open training facilities for technologists in Pharmacy.

A symposium, 'On the Development of the Profession of Pharmacy' was the main feature of the conference, in which several speakers including Mr. A. McGee, Sri J. K. Das, Sri K. Bose, Sri S. N. Banerji and Dr. P. L. Seth took part.

[Notes & News prepared by—S.C.S.]

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.

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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 publication and page.

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REPORTS & REVIEWS

TUBERCULOSIS AND ENVIRONMENT

Bad housing is supposed to increase the risk of general respiratory disease. Yet it is by no means easy to find unequivocal evidence that such conditions make for increased incidence of tuberculosis. Familial contact rather than numerical crowding has been found to be the factor of importance. However, Lilie Stein's careful analysis of well-defined localities in Edinburgh (1950) and in Glasgow (1952), each of which was comparable in respect of overcrowding, type of tenant and economic situation, showed a close association between overcrowding and respiratory tuberculosis.

Similar enquiries made in U.S.A., generally resulted in conflicting evidence except and the foremost place given to familial infection. One of the most recent of these investigations was conducted by A. M. Lowell[2] in New York City covering the years 1949 to 1951. In 1880's J. S. Billings[3] noted high mortality rates in the crowded areas of the city, the death rate for Pthisis being 776 per 100,000 population in down town as against 49 per 100,000 in the residential areas. In the first half of the present century similar findings have been consistently reported. At the 1950 census the city of New York had just under 8 million residents (6,900,000 white and 730,000 Negro and 250,000 Peurto Rican) but since then the population has increased by several thousands. The non-white population and the Pemto-Ricans lend at first to concentrate in certain neighbourhood. The following data for the three year period 1949-1951 are useful as a guide:

Rate	White	Non-white	Total
Deaths per 1000	9.5	9.1	9.5
Births per 1000	17.9	28.9	18.9
Infant death per 100 live birth	22.0	38.1	24.4
Deaths from tuberculosis per 100,000 population	20	91	27

One of the most interesting features of this study is that the index used is the total annual tuberculosis *prevalence* rate for three years—1949 to 1951. This is the yearly average of the known tuberculosis cases —namely, the active cases already known on the first day of the year, the new cases reported during the year, and the small number of former cases resumed (thus excluding the arrested or known during the year 100,000 population).

In New York City tuberculosis rate, in 10 health areas with highest prevalence rates located in the Borough of Manhuttam ranged from 1087 to 2392 per 100,000 population and the family income from $1778 to $2637. Dwelling Units reported to be dilapidated or with inadequate plumbing i.e. poor housing rose from 19.1% in one health area to 57.5% in another, ovtrcrowding (more than 1'51 persons per room) was present in from 5.8% to 17.5% of the dwelling and the proportion of white population rose from 0.3% to 92.1%. At another end of the scale, in 10 health areas with the lowest tuberculosis prevalence rates located in the Borough of Brooklyn, the rates ranged from 59 to 113 per 100,000 population. The family income was substantially higher ($3701 to 4798). The percentage of poor housing was much lower (0.8% to 2.4%) than the city average. The percentage of overcrowded dwellings in nine areas ranged from 2.4 to 4.2, but in the 10th area (Sheepshead Bay) the percentage was 15.7. The white residents made up 99% of the population. The age difference between the two small but the distribution of occupation was as follows:

PERCENTAGE OF POPULATION BY OCCUPATION

Occupation group	High Tuberculosis Area	Low Tuberculosis Area
Professional etc.	7.6	32.1
Clerical	11.9	32.0
Skilled workers	37.9	28.6
Unskilled	42.6	7.3

There are, however, other anomalies which require special investigation. In lower east Manhattan, for example, there are two areas of modern housing development—Stuyvesant Town and Cooper village with only 0.2 per cent dwelling unit as unfit yet the high tuberculosis rate of 790 seemed to contradict the general experience. But on closer investigation it was found that of the 216 new cases reported in this health area only 18 were in the past occupied by the new estate and of the 50 new cases found in 1954 Stuyvesant Town contributed 5 and Cooper village only one. Thus some adjustment would have to be made for an area of this kind.

The above report examines the problem of housing and tuberculosis in great detail both historically and as it is seen to-day. Mr. Lowell quotes Mr. J. P. McMurray, Commissioner of housing in the State of New York, as saying that these tenements "were designed to permit the most concentrated use of land with a minimum regard for tenant convenience and sanitation. Availability of any sort of interior sanitary facilities were luxurious to many of the tenants, to the turn of the century new standards were prescribed by the Tenement House Law and the construction of 'ready-made slums' ended yet the total number of units that would need to be built would approach half a million."

There is a notable uniformity on the studies of the inverse correction of economic states with tuberculosis mortality on both sides of the Atlantic, in Canada as well as the United States. The New York report adds its strong confirmation in both white and non-white populations, of the association of tuberculosis with poor housing and inadequate income, and concludes that "if optimum benefits are to be realized in mastering tuberculosis, progress in medicine and public health must be accompanied by comparable and parallel socio-economic improvements in living conditions". While both are essen-

tial approaches most epidemiologists would stress the importance of Topley and Wilson's argument[4] "The spread of tuberculosis in the community is in great part the result of slowly progressive household epidemics which often lead to the transmission of the disease by contagion from one generation to another generation during the last 20 years" which lends force to the advice given by Wade Frost in 1937:

"The soundest principle to follow seems to me that, as the cases become fewer and fewer, preventive measures should be centred more and more upon the open cases; that the protection thrown around these infective cases and their immediate contacts be not relaxed, but steadily and progressively increased. As the prevalence of the tubercle bacillus in the general environment is diminished, infection and disease will be more distinctly focalized."

[1] Stein, Lilie—Brit. J. Soc. Med. 1950, 4, 143, and 1952, 6.1.

[2] Lowell, A. M.—Socio-economi conditions and tuberculosis prevalence—New York City, 1949-1956, New York Tuberculosis and Health Association.

[3] Billings, J. S.—Vital statistics of New York City and Brooklyn, Six Years ending May 31, 1890, 1894, Washington D.C.

[4] Topley, W. W. C. and Wilson, G. S.—The Principles of Bacteriology and Immunity, 1946, London, Vol. 2, p. 1291.

[5] Frost, W. H.—Papers of Wade H. Frost edited by K. F. Maxy, 1941, London, p. 612.

[Editorial, B.M.J., i., 633, 1957.]

MEDICAL AND HEALTH SERVICES IN U.S.S.R.

Prevention of disease—a combination of prophylactics and treatment—is the basis of Soviet medicine, which is reflected in the fact that hospitals, polyclinics, clinics for out-patients and dispensaries are generally called "medical and prophylactic institutions."

The Soviet "Dispensary", incidentally, bears no resemblance to a dispensary in the English sense of the word. Soviet medicine has worked out a method of prophylactic medical observation ("dispensarisation"), which provides not only for out-patient and hospital treatment, but also for spotting people who do not feel ill (and may indeed be well) but whose health for some reason requires careful observation.

Such prophylactic examinations are, for instance, given to workers engaged in conditions harmful to health, to those who do intensive mental work, to expectant mothers, children, war invalids and people who are in close contact with infectious patients.

Workers in the "dispensaries" study the environmen—the working and living conditions—of those who undergo prophylactic examinations, in order to eliminate any possible causes of disease. The timely sending of people who are able to work but whose health needs improving to one-day sanatoriums, arranging for them to eat at dining-rooms which provide special diets, or sending them to places where various kinds of prophylactic physiotherapy treatment are given; the holidays spent by physically weak children at special summer camps where they receive prophylactic medical treatment, or at forest schools—all these are steps which help in the prevention of diseases among Soviet citizens of all ages.

Most medical institutions in the Soviet Union base their work on prophylactic treatment. All institutions form one integrated system with the Ministry of Public Health of the U.S.S.R. at its head. Each Republic has its Ministry of Public Health, and in the regions and districts there are public health departments under the control of the executive committees of local Soviets.

Wherever a Soviet citizen may live—in a city, in a village, in a mountain "aul" or the expenses of the virgin lands—he knows that there is some kind of a medical institution which will give him medical treatment free of charge and is responsible for looking after his health. It may be a district or a factory clinic for out-patients, a village hospital, or a medical or maternity centre.

If it is not possible for a doctor to reach the patient by car, train or boat, or if the distance is too great, the widely used flying-doctor service comes to the rescue. Sometimes, it happens that a patient cannot be easily reached even by plane, and in such cases radio is used. Radio consultations have saved the life of many a polar explorer.

No patient in the Soviet Union, regardless of who he is—a worker, a member of a worker's family, an employee or a pensioner—has to worry about the question of whether he can afford to call a doctor. He has no misgivings as to the cost of treatment and whether the family budget can afford it. Treatment will be free—so there is no reason not to call the doctor in time or even in order to stave off illness.

In 1955 out-patient treatment was given on 804,295,500 occasions, the total population of the being 200,200,000. In the course of the same year doctors' assistants in the countryside received patients on 150,000,000 occasions.

Such close contacts between medical workers and the population are only possible due to the widespread network of medical institutions and the wide-scale training of specialists. While before World War I the number of doctors in Russia was 23,143, by 1956 it had risen to 310,186, and the number of medical institutions has now reached 150,000.

The wide scope of medical and prophylactic aid to the population is one of the factors which has made it possible for the Soviet medical service not only to reduce the sick rate but also to completely eliminate such diseases as cholera, plague and smallpox, which ravaged pre-revolutionary Russia. By 1955 the over-all mortality rates in the U.S.S.R. had dropped to about 27 per cent of the 1913 figure, and the average life span, which in 1913 was 32, had doubled reaching 64. These successes testify to the effectiveness of the Soviet health service.

Specialists Services

Medical institutions are not only growing in number but are also steadily improving. There are more and more specialists in various branches of medicine working in remote countryside hospitals, and the hospitals are being equipped with X-ray and physiotherapy rooms.

If, however, local doctors are in doubt about either diagnosis or treatment, they can send their patient to a medical institution run by regional or republican authorities, and, in case of need, to the centre of the Soviet medical world—Moscow. In such cases treatment and transportation of the patient are carried out at the expense of the state.

The scope of scientific work in medicine is extremely large. The country has 228 scientific medical research institutes, and 76 higher medical schools in which scientific work is also carried out. The great army of scientists are connected in the closest way possible with practical treatment and willingly help medical workers in any problems that

may arise. It is characteristic that the highest scientific medical institution—the Academy of Medical Sciences of the U.S.S.R.—regularly holds sessions in various cities of the country. In such cases the scientists introduce local doctors and the population to the latest achievements of medical science.

Medical Institutions in Tajik Collective Forms

Medical centres, which include a polyclinic, hospital, maternity home, diagnostic laboratory, X-ray and treatment offices, are being set up by collective farms in rural districts of Tajikistan in addition to the state hospitals and medical centres. The collective farms construst the building with their own funds, they buy the equipment, maintain the premises and provide food for the patients. The state, on the other hand, pays all the salaries to the medical personnel.

Nine such medical centres, in addition to the state rural health institutions, are now functioning in collective farms of North Tajikistan.

Snake poison used for Medical Purposes

The staff of the Stalinabad Medical Institute (Tajikistan) have been tackling for five years the problem of using snake poison for treatment. The Institute staff conducted experiments with the 'gurza' snake which is frequently encountered in Central Asia. After repeated attempts they succeeded in cleaning its poison of bacterial products. The preparation, which was termed "gurzatoxin", has recently been applied for medical purpose at the clinic of the Altai Medical Institute. Experiments have proved that the preparation is highly effffective in treating diseases attended with profuse haemorrhage.

Combating Malaria in the U. S. S. R.

When Soviet malaria specialists are asked whether malaria has really been entirely eliminated in the U.S.S.R., their answer is; "No, only mass infection has been eliminated. There are some malarial centres still, in Tajikistan and Azerbaijan, for instance. But malaria will be eliminated in the nearest future."

The following combined measures are applied in the U.S.S.R. against malaria: (1) registration and treatment of malarial patients and (2) destruction of the mosquitoes that are malaria carriers.

The U.S.S.R. has a great number of anti-malaria establishments. In 1952 the number of anti-malaria stations was 2,150. The plan of measures against malaria is worked out for every inhabited locality, district, territory and region and finally, for the whole republic. The data sent in by the republics are examined in the U.S.S.R. Ministry of Public Health, where the general plan of measures against malaria is made up for the whole country. A whole army of physicians specializing in malaria, sided by medical workers, are formed into entomological parties that go every spring to the malarial districts. After the malaria centre has been destroyed in one republic, the physicians who have worked there go, if necessary, to another republic.

All malarial patients must be registered at the malaria stations. In practice this is done as follows: as soon as a party of physicians have arrived in a new locality, they begin their work by making a round of all the houses and questioning all the inhabitants. During these rounds the physicians make a medical examination of all the inhabitants. Those suffering from malaria are registered and kept under constant medical observation. The patients are treated gratis and members of the staff of the malarial station are appointed to visit them daily, at certain hours, to bring them drugs that are supplied gratis and see that they take them in time.

The fact that Soviet medical anti-malaria establishments dispose of effective preparations, such as *bihumal* and *quinocide*, is of the utmost importance. *Bihumal* kills the malarial plasmodia in the patient's blood and *quinocide* destroys the pathogene of the three days form of malaria while it is in the stage of development in the tissues. Thus the two preparations achieve a radical cure of this form of malaria.

Another measure, besides the treatment of patients, is disinsectiozation, which is conducted in the same locality on a broad scale. It consists, first of all, of the use of strong insecticides in all the buildings (mainly the well-known DDT). An important prophylactic measure is the destruction of mosquito breeding centres: draining bogged lands, disinfection of water reservoirs, etc. This is done by several means. Water reservoirs are disinfected by means of chemical toxins innocuous to man and their surface sprayed with naphtha, gambusia—a rapidly multiplying species of fish that feeds on the larvae of malarial mosquitoes, is bred in the water reservoir, etc.

Soviet malaria specialists are particularly careful in disinsectizing buildings and literally every corner in them. Domestic animals should also be treated with insecticides. This is particularly important in the districts where silk worm breeding is conducted on a big scale and the use of DDT in buildings is very difficult, because that poison is deadly for the silk worm, as well as the mosquito.

The following data will give an idea of the results obtained by the combined methods against malaria. The Ukraine was considered to be one of the regular large centres of malaria. There are now no more malarial centres in the Ukraine. Armenia, where only recently the number of malarial patients was very great, now has hardly any.

New progress in combating malaria is achieved every year in the U.S.S.R. The number of marks, representing malarial centres on the country's map, is steadily diminishing. The time will soon come when none are left.

[*Contributed*]

VITAL STATISTICAL RATES IN INDIA

Out of 30,18 towns in the country 318 have a population of more than 30,000 each. Reports received from 228 such towns showed that during the first week of March, 1957 the birth rate was of the order of 27 per 1,000 population and death rate was of the order of 13 per 1,000 population. Birth and death reports were available from 224, 234, 247 and 235 towns during the 2nd, 3rd, 4th and last week of March, 1957 and the corresponding birth rate were of the order of 26, 26, 29 and 29 death rate was of the order 13, during all the weeks of the month. It is estimated that the birth and death rates in large towns and cities of the country in the month of March, 1957 were 27 and 13 i.e. not different from those in February, 1957. During March, 1956 the birth and death rates were of the order of 28 and 12 respectively. Thus during this

month the birth rate was lower than that during March, 1956 and also slightly lower than the five yearly average rate (27.5) for the month. The death rate was higher than in March, 1956 but it was lower than the five yearly average (13.7) for the month.

SWASTH HIND

POPULATION IN REORGANISED STATES OF INDIA

	States	Area (Sq. miles)	Population	Density per sq. mile
1.	U.P. ...	113495	63215742	557
2.	Bombay ...	190690	48265174	253
3.	Bihar ...	67163	38776860	577
4.	Andhra ...	110250	32200000	292
5.	Madras ...	50170	30000000	598
6.	West Bengal ...	33279	26160000	786
7.	M.P. ...	171200	26100000	152
8.	Mysore ...	72730	19000000	261
9.	Rajasthan ...	132300	16000000	121
10.	Orissa ...	60130	14645946	244
11.	Kerala ...	14980	13600000	908
12.	Assam ...	84924	9043702	106
13	Kashmir ...	61854	3200000	53
	CENTRALLY ADMINISTERED AREAS			
	Himachal ...	11053	1117003	101
	Manipur ...	8628	577635	67
	Tripura ...	4116	639029	155
	Andaman (19 islands) ...	635	12009	19
	Delhi ...	578	1744072	3017
	Laccadives (14 islands)	200	21195	106

ACUTE POLIOMYELITIS: INCIDENCE AND MORTALITY, 1950-55

Cases of acute poliomyelitis increased in most countries of the world during the period 1950-55, but this increase was very uneven and deaths caused by this disease, although more numerous than previously, did not follow the same upward trend, according to a statistical report of the World Health Organization (WHO).

Nearly everywhere in Europe and America, 1952 was a record year for poliomyelities, the report shows, and during the whole 5 year period the disease killed relatively more men than women.

In Europe (excluding the Eastern countries) there were important outbreaks, and although fewer cases of polio occurred than in the United States (with only half the population of the 23 European countries concerned) mortality was considerably higher.

	EUROPE			U.S.A.		
Year	Cases	Deaths	Deaths per cent of cases	Cases	Deaths	Deaths per cent of cases
1950 ...	23908	2229	9.3	33300	1904	5.7
1951 ...	15708	1459	9.3	28386	1551	5.5
1952 ...	30808	2275	7.4	57879	3145	5.4
1953 ...	26408	1911	7.2	35592	1450	4.1
1954 ...	18318	1296	7.1	38476	1368	3.6
1955 ...	21098	993	4.7	28985	1043	3.6

Most severely hit in *1950* were Norway and Sweden (with mortality rates per 100,000 inhabitants of 303 and 224) in *1951* Norway again (mortality rate 628) and Switzerland (mortality rate 183), *in 1952* Denmark (with a record mortality rate of 607), in *1953* again Norway (mortality rate 324), in *1954* Switzerland (mortality rate 227).

The lowest mortality rates were recorded in *1950* in Belgium (28 per 100,000), in *1951* in Denmark (2 per 100,000). in *1952* in Scotland (23) and in *1953* and *1954* in the Netherlands (8 and 3 per 100.000).

Figures for 1955 are incomplete and *indiicate a* decrease in some countries and a slight increase in others.

In *America,* serious outbreaks also occurred during the period under review, particularly in Canada in *1952* (4755 cases, 311 deaths, with a death per cent of cases of 6.5) and in *1953,* which was a record year for that country (8888 cases 481 deaths, i.e. death per cent 5.4).

In the United States, *1952* was the worst year, with 57,879 cases and 3145 deaths (death per cent 5.4), double that of the previous year; case notifications reached the highest level ever observed in that country since they were made compulsory.

In a total of 11 American countries (Argentina, Brazil, Canada, Chile, Columbia, Mexico, Peru, Puerto Rico, Uruguay, U.S.A. and Venezuela) the following figures were recorded:

Year	Cases	Deaths
1950 ...	36,730	2,284
1951 ...	34,605	2,210
1952 ...	65,408	3,899
1953 ...	50,985	2,577
1954 ...	44,120	1,927
1955 ...	34,578	(incomplete data)

There were large outbreaks with many cases, but happily a smaller proportion of deaths, in *1950* in Chile and Mexico, in *1953* in Argentina, Brazil and Mexico, in *1955* in Mexico, Peru, Porto Rico and Uruguay.

Year	Cases	Deaths	Death per cent of cases
1950 ...	2,308	115	5.0
1951 ...	4,779	348	7.3
1952 ...	2,789	180	6.5
1953 ...	2,135	143	6.7
1954 ...	2,165	81	3.7
1955 ...	1,995	64	3.2

In *Oceania*, Australia, New Zealand and Hawaii experienced a great increase in morbidity from poliomyelitis in 1951.

In the 61 countries and territories from which WHO obtained statistical data, the total number of cases and deaths were:

Year	1950	1951	1952	1953	1954	1955
Cases notified ...	69,870	63,199	105,092	85,719	72,549	63,253[1]
Deaths	5,822	5,039	7,301	5,511	4,272	2,709[1]

[1] Incomplete figures.

The WHO report stresses that in polio, as in other diseases, cases reported to the health authorities usually represent only a fraction of the cases actually existing. Death statistics are considered to be more complete and consequently more exactly comparable as between countries.

For further information, please refer to *WHO Epidemiological and Vital Statistics Report*, Vol. 10, No. 3, 1957.

DEATHS FROM ACUTE POLIOMYELITIS (1950-1955)
Actual numbers of deaths (N.) and rates per 1,000,000 population (P.)

Country	1950 N.	1950 P.	1951 N.	1951 P.	1952 N.	1952 P.	1953 N.	1953 P.	1954 N.	1954 P.	1955 N.	1955 P.
AFRICA												
Egypt (Local with health bur.)	12	1.5	8	0.9	24	2.7	36	3.8	28	2.9	...	...
Union of S. Afr. Eur. po.	12	4.6	25	9.4	8	3.0	24	8.7	40	14.3	...	...
AMERICA												
Canada (Excl. Yukon & N. W. Terr.) ...	41	3.0	162	11.6	311	21.6	481	32.6	157	10.4	36	2.3
Un. States	1904	12.6	1551	10.1	3145	20.2	1450	9.2	1368	8.5	*930	*5.7
ASIA												
Ceylon	66	8.7	67	8.7	81	10.2	70	8.6	54	6.4	64	7.2
Israel (Jew. population)	202	183.1	177	133.7	163	114.0	130	88.6	89	59.3	51	32.7
Japan	775	9.3	570	6.7	508	6.0	441	5.1	442	5.0	*331	*3.7
EUROPE												
Germany (Fed. Republic)	[1]284	6.0	1159	3.3	729	15.0	187	3.8	230	4.6	243	4.9
West Berlin ...	16	2.8	114	6.5	16	7.4	8	3.6	5	2.3	11	5.0
Saarland	...	...	...	4	4	4.1	9	9.2	5	5.1	4	4.9
Austria	[1]29	4.2	166	9.5	39	5.6	56	8.0	103	14.8	102	14.6
Belgium	[1]24	2.8	124	2.8	134	3.9	119	2.2	24	2.7	...	...
Denmark	[1]36	8.5	1	0.2	263	60.7	86	19.7	4	0.9	...	...
Finland	36	9.0	22	5.4	19	4.6	23	5.6	30	7.2	29	6.8
France	292	7.0	201	4.8	223	5.2	240		146	3.4	188	4.3
Hungary	...	...	...	...	...	...	...	...	64	6.6	33	3.4
Ireland	30	10.1	15	5.1	12	4.1	31	10.5	14	4.8	3	1.0
Italy	[1]203	4.4	233	5.0	246	5.2	375	7.8	256	5.3	...	...
Norway	[1]99	30.3	207	62.8	69	20.7	109	32.4	39	11.5	...	...
Netherlands ...	8	0.8	32	3.1	72	6.9	8	0.8	3	0.3	30	2.8
Portugal	[1]32	3.8	125	2.9	23	2.7	28	3.2	21	2.4	14	1.6
United Kingdom Eng. & Wales	734	16.7	191	4.4	275	5.3	320	7.3	112	2.5	241	5.4
Scotland	64	12.4	24	4.7	12	2.3	13	2.5	21	4.1	22	4.3
Nor. Ireland ...	25	18.3	10	7.3	7	5.1	15	10.8	4	2.9	...	...
Sweden	[1]157	22.4	48	3.8	56	7.9	216	30.1	42	5.8	...	...
Switzerland ...	[1]44	9.3	87	18.3	51	10.6	58	11.9	112	22.7	...	...
OCEANIA												
Australia (Ex. full blood aborig.)		13.8	346	41.0			115		80	8.9	30	3.3
New Zealand (Ex. Maoris)	2	1.1	1	0.5			26		...	...	...	...

[1] Base 1938: international list, theoretically including the late effects.
* Incomplete or approximate data.

W H O,

CRUDE DEATH RATES AND SPECIFIC DEATH RATES DUE TO PRINCIPAL DISEASES PER MILLE DURING THE YEAR 1955, IN CERTAIN PRINCIPAL CITIES OF INDIA

Name of the cities	Estimated mid-year population	Death rates per mille due to all causes	Specific death rates (annual) per mille due to					Death rates due to all other causes
			1 Cholera	2 Smallpox	3 Plague	4 Fever	5 Dysentery & Diarrhoea	6 Respiratory diseases	
1. Bombay (Greater)	33,35000	10.20	0.00	0.01	0.00	0.05	0.47	1.75	7.92
2. Calcutta ...	29,31000	10.96	0.35	0.02	0.00	0.79	1.10	2.46	6.24
3. Madras ...	15,95000	20.78	0.00	0.02	0.00	2.12	3.18	5.45	10.01
4. Delhi City ...	10,46000	8.61	0.00	0.00	0.00	3.32	0.37	1.61	3.31
5. Bangalore City ...	9,36000	11.45	0.00	0.00	0.00	0.44	2.28	3.66	5.07
6. Ahmedabad ...	8,70000	18.55	0.00	0.06	0.00	0.96	0.87	4.69	11.97
7. Kanpur ...	7,16000	20.40	0.00	0.05	0.00	7.54	1.18	2.89	8.74
8. Poona ...	5,84000	12.22	0.00	0.01	0.00	0.19	0.59	2.62	8.81
9. Nagpur ...	5,13000	8.31	0.00	0.01	0.00	2.61	0.43	1.01	4.25
10. Lucknow ...	4,85000	12.21	0.00	0.40	0.00	2.87	0.91	3.42	4.61
11. Howrah ...	4,71000	13.44	0.59	0.15	0.00	0.65	1.67	3.95	6.43
12. Agra ...	3,67000	16.02	0.00	0.04	0.00	0.34	0.71	8.00	6.93
13. Allahabad ...	3,42000	9.17	0.00	0.05	0.00	0.37	0.22	4.01	4.52
14. Jaipur ...	3,41000	10.46	0.00	0.03	0.00	2.93	0.52	2.56	4.42
15. New Delhi ...	3,37000	10.48	0.00	0.00(3)	0.00	0.76	0.25	1.21	8.26
16. Amritsar ...	3,35000	12.86	0.00	0.00(3)	0.00	0.11	0.94	4.48	7.33
17. Patna Corporation	3,21000	7.39	0.07	0.12	0.00	1.07	0.20	0.24	5.69
18. Jamshedpur ...	2,41000	3.63	0.00(4)	0.02	0.00	0.21	0.29	0.53	2.58
19. Trivandrum City	2,13000	8.03	0.00	0.00(4)	0.00	0.92	0.47	0.68	5.96
20. Rajkot ...	1,61000	13.68	0.00	0.00	0.00	4.78	1.11	1.67	6.12
21. Visakhapatnam ...	1,24000	18.25	0.01	0.04	0.00	2.43	0.69	2.72	12.36
22. Cuttack ...	1,14000	19.93	0.00	0.00	0.00	2.91	1.60	2.61	12.81
23. Patiala City ...	1,08000	14.70	0.00	0.06	0.00	4.76	0.38	1.90	7.60
24. Gauhati ...	50000	16.18	0.14	0.00	0.00	5.46	1.84	0.00	8.74

* All calculations have been based on the figures obtained from the weekly bulletins published by the Registrar General, India, bearing the heading "Births and Deaths from principal diseases in towns with a population over 30,000 in India."

[A. L. S. & D. K. B.]

Presidential Address by Dr. N. Jungalwalla, Director, All-India Institute of Hygiene & Public Health, Calcutta, at the Eleventh Bengal Pharmaceutical Conference, 1957.

GENTLEMEN:

I thank you for the privilege of being present among you today. It is not only a privilege for me, but for public health as a whole. Looking back on the distinguished group who have, in the past, been invited by you, I was glad to note a number among them who served in the Institute which I now have the honour of directing. And that led me to wonder what association there could possibly be between our two interests. for, until recently, the public health worker, unlike his colleagues in hospitals, was not concerned with therapeutics and medicaments, but mainly with vaccines. But today the trends of public health have changed. And I would say that you have contributed very largely to this change. Where would it have been possible to control malaria without the discovery of D.D.T.? How coud we ever dream of its eradication, had we not efficient residual insecticides and effective chemotherapeutic agents, acting even on the Exo-erythrocytic stages of the parasite? How else would it have been possible to plan and execute the "Mass control" programmes on yaws, leprosy, tuberculosis, filariasis and trachoma, which are going on in India and many other Asian countries, without the modern drugs which you have helped in evolving? And the quantities of those which will be required to undertake programmes on the massive-scale that are now possible, will be truly colossal. And so the public health worker is not only closely interested and involved in your products, he is probably now one of your best customers.

You will note that I speak of control of disease and its spread through treatment, and not by prevention through use of vaccines, or by environmental control. This in itself is a radical change. But we have learnt that by finding and rendering a sufficient number of persons non-infective through treatment, we do effectively stop spread of the disease. And for the first time, treatment of large numbers of people is being used as a public health approach to the control of disease.

No longer are drugs being used under hospital conditions. They are now used in the field. And under such conditions it is vital that toxic effects be kept to a minimum, if not eliminated altogether. To be effective, we must use them in areas far removed from modern facilities, and administered not only by doctors, but by other medical personnel. For the diseases that affect large numbers of our people, not only in India but in those of our neighbours, are usually found "at the end of the road". And we just cannot wait before bringing these facilities to them. For the presence of "pockets" of infected people are not only unnecessary today, they constitute a danger to other communities, because of the chance of reinfection. And not only do we need larger quantities of safer drugs, but they must be cheap. Had it not been for the colossal reduction in price made possible by research, and better business management, it would not have been possible for these programmes to have been undertaken. All this places a heavy responsibility on your shoulders. And I know that, as in the past, you will rise to this challenge, and make it possible for attacks on our well entrenched enemies. Nor are the mass control programmes alone in bringing relief to our rural people. In all parts of India, within Community Development Schemes, as well as through State-sponsored programmes, a chain of rural health centres are being established. And these will also create a demand for drugs in the rural areas, and will offer many opportunities for exploitation of these people by the unscrupulous vendor of pharmaceuticals. And this brings me to another point. The diseases that affect our people are those now practically eliminated from the better developed countries. Whereas we hear of their pre-occupation with cancer, diabetes, cardiac illness, accidents, industrial pollution and the special problems of old age, we still have our problems which have been with us for generations. The dysenteries and pneumonia play havoc with our children. Our babies still die of tetanus; cholera, smallpox, plague, typhoid are with us, even in our larger cities. Leprosy, malaria, tuberculosis, worms and other intestinal parasites still affect millions. And, in addition, we have special problems such as kala-azar, kwashiorkor and other forms of nutritional deficiencies which are widely prevalent. Remedies for some of these were known to our forefathers, and Bengal especially has a proud tradition of contributing to the revival of the study of indigenous drugs, and the addition of their specific ingredients to the modern pharmacoepia. Recently, with the re-discovery of rauwolfia, and I say *re-discovery* intentionally, interest from the outside world has increased in our indigenous resources, and I am told that there are many enquiries and requests for specimens and for information from many parts of the world. I would urge that we also continue and intensify our research in this field, as well as the search for specific agents against our own special group of diseases, in which you have such a fine tradition already. The Bhatia Committee stressed the need for a co-ordinated programme of research, and outlined the wide scope in India for such work. In the U.K. recently concern has been expressed that few of the new drugs were discovered in Britain, and suggestions have been made for further collaborative effort. One of your learned Presidents indicated to you that the centre of activities had shifted from Calcutta to elsewhere in India. But I would humbly say that we in India as a whole must face the fact that our own contributions need to be enhanced, otherwise our trained workers will find more stimulating facilities for their work in other countries. You are well aware of the efforts that are being made in other countries to attract the skilled research worker and a number of our young scientists have obtained lucrative appointments outside India. And we cannot afford to lose them, for the tasks ahead are truly great. Through the I.C.M.R., C.S.I.R. and Government support, much is already being done. I hope your efforts will add to this also. For in spite of your pre-occupation with improving and maintaining the quality of our products, we have to keep abreast with progress, and to make our own contribution.

A word too about our traditional methods of prevention through use of vaccines. There is still a great need to develop their production in India. We still need large quantities of vaccine against the common ailments of our children, diphtheria and whooping cough. Already production on a limited scale of this vaccine is being undertaken, but in-

creasing quantities and cheaper vaccines will be required to protect the large and ever-growing school age population. Again, virus diseases are assuming importance in some cities and in certain parts of our country. India has had its share of the recent influenza epidemic. Infective hepatitis appeared recently in an epidemic form almost unparalleled in history. Poliomyelitis is assuming increasing importance in our cities. An epidemic of encephalitis of unknown etiology swept through parts of India recently, and was vigorously investigated. The shadow of yellow fever is always over us, and assumes increasing importance because of the speed of our communications. So while we concern ourselves with our old enemies, let us be aware of the need for constant protection against the more recent ones. Our need for self-sufficiency in vaccines against these also is of importance, and the field is still open for those of yours who wish to take up this exciting speciality. Our Government have been aware of this, and have done much in this field already.

There is another matter which merits our concern. When one looks at a stock of medicines in a chemists shop today, or at the literature which is sent to us in ever-increasing quantities, we are struck by the infinite number of combinations of every variety. Sometimes I wonder whether we have really advanced, or whether we are back to the days when the witches in Macbeth added such tit bits like the "eye of newt and toe of frog" to their brew. For my medical colleagues who are concerned with the practice of medicine are worried at the repurcussions on medical practice that the vast and tempting array of ready and attractively made up medicines from the various drug houses is having on the young general practitioners. The finer points of clinnical diagnosis, the judicious use of laboratory aids to such diagnosis, and the selection of specific drugs for the causative organism, is giving place to the blunderbuss therapy that is possible. and encouraged by such a profusion of combinations. The hospital administrator and the man-in-charge of medical stores is requirtd to spend much time in working out their own formulas, or finding the equivalents of drugs prescribed by their colleagues, and the new graduate very soon tends to succumb to the temptation of the advertisement campaign, and prescribe lavishly but not too well. I believe that our two professions should get together and work this matter out. Equally worrying is the appearance in the market of new "discoveries" whose claims are widely advertised but whose evaluation before marketing leave much to be desired. We have all seen this and our attention has been drawn to this matter by both the *Chopra* and the *Bhatia* Committees.

I have noted the intense interest of your Association in the training and welfare of members of your profession. When the *Bhore* Committee first surveyed the existing medical man-power of India, your profession was the one that had the greatest handicap, for they noted that there were only 75 qualified pharmacists, a ratio of 1 to 4 million of the population. And they estimated that the number required would be 62,000 by 1971. What progress has been made towards this target? I understand from Dr. Sanyal that there are now roughly about 1,000 graduates pharmacists, of whom about 100 have post-graduate qualifications, and about 50,000 have registered as non-graduate pharmacists. I have already indicated that with the opening of rural health units, the demand for more people will be greatly increased, both by State institutions and for private enterprise, in our rural areas. Like in other fields of medicine, in this too, we have a big leeway to make up. However, much has already been done in many respects. Active research is going on, and our centres are becoming known over the world. Representatives from India have been members of W.H.O. Expert Committees. The Indian Pharmacopoeia has been finalised. Vigorous action is being taken to follow up the recommendations of the Pharmaceutical Enquiry Committee. And larger numbers of people are being trained. And for all this, your Association must share the credit because of the active interest you have taken.

The World Health Organisation once commented that a country "cannot ride to economic development on the backs of unhealthy people". And your profession has an important contribution to make towards the health of the people of India. I know that you will continue to follow in the fine tradition that you have inherited, and wish you success.

I thank you.

ASSOCIATION NEWS

1. OPENING OF STATE BRANCHES:

Information has been received by the General Secretary that some States have already formed Public Health Associations as a preliminary to open State branches of the Indian Public Health Association in their respective States. It may however be noted that the rules and regulations relating to the formation of State Branches are still awaiting finalisation by the Central Council. Until such time the necessary directions regarding the procedures of forming of State Branches can not be communicated. However for the precedent condition forming a State Branch, the attention of the members of the State is drawn to clause 14 of the Rules and Regulations of the I.P.H.A. as published in the Indian Journal of Public Health on page 154 in April '57 issue which runs as follows:—

"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."

Thus only regular members of the I.P.H.A. residing in a State may join together to form a State Branch in their State. The essential qualification of regular membership is that a member should not be defaulting in paying his annual subscription in time.

ELECTION OF MEMBERS AND ANNUAL GENERAL MEETING:

The annual general meeting of the I.P.H.A. is going to be held some times in December next and election of the Office-bearers should be completed according to rules before the annual general meeting. Members' particular attention is drawn to the rule, that no defaulting member can either stand for election or is eligible to vote. The defaulting members are therefore requested to remit their annual subscription of Rs. 12/- to the Registered Office of the I.P.H.A. without any further delay. It is likely that no Journal nor any notice of the ensuing Annual General Meeting and of the Annual Election of the Office-bearers shall be sent to the defaulting members.

MEMBERSHIP OF THE VETERINARIANS:

The Secretary of the I.P.H.A. had the opportunity of meeting a group of veterinarians at Mukteswar and Izatnagar during his recent visit to those places. He discussed with them about the close association and affinity of the two sister sciences and of the large number of collaborative activities in the public health field in which both the medical and the veterinarians are to work in close association for human welfare. He has impressed upon these groups of workers that they should form a part and parcel of the I.P.H.A. The Secretary is glad to report that they have agreed to become our members. It is suggested that veterinarians like the Health Officers might form a section of the Indian Public Health Association.

AN APPEAL TO MEMBERS

DEAR MEMBERS,

You will appreciate that the Journal Committee has been able to maintain a high standard in the publication of the Association Journal since its inception. It is also receiving recognition from the other sister Associations and professional members of the world. It is you, dear member, who can help in maintaining this standard by contributing articles of good quality for publication in the Journal. Public Health Workers had no forum either for giving publicity to their experiences and achievements which might be valuable to other workers in the field nor they could discuss their problems which need solutions. An immense opportunity awaits you for such publication through this Journal. Would you not like to take advantage of your own Journal to give others the benefits of your experiences and achievements? All articles, notes, reviews and comments written by our members will be thankfully received by the Editor and will certainly get due preference for publication.

Yours faithfully,

S. C. SEAL,

Hony. General Secretary-cum-Managing Editor.

N.B.—Members are requested to consult with " NOTICE TO CONTRIBUTORS " published in this Journal.

READ—

HEALTH OF INDIA

ILLUSTRATED SOUVENIR PUBLISHED DURING
THE INAUGURAL CEREMONY OF

THE INDIAN PUBLIC HEALTH ASSOCIATION

IN SEPTEMBER, 1956

Edited by DR. S. C. SEAL

IN COLLABORATION WITH

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