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AN OUTBREAK OF ENCEPHALITIS IN NAGPUR IN 1958

A Report of Brief Investigation.

By

DR. S. C. SEAL,

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

The first recognized case of encephalitis, as reported, was brought to the Medical College Hospital, Nagpur on the 16th June, 1958. This case died 10 days later. The cases actually began to turn in from the 26th June, 1958 and continued till the 11th August, 1958 up to which the record was made available.* Hence this report may only be considered as an interim one.

The total number of cases admitted in the two hospitals in Nagpur, viz., the Medical College and Mayo Hospitals and clinically diagnosed as encephalitis was 141, including 4 cases of which the dates of onset and admission could not be obtained.

Extent of the area involved:

The city is divided into two sectors by the railway line. Each sector can be further apportioned into two halves dividing the city into four quadrants. The city has 42 wards of unequal sizes but with approximity equal number of population ranging between 10-12000. The total population is estimated to be about five lakhs.

The cases were scattered all over the city, only 4 out of the 42 wards having not sent any case to the hospital, namely 19, 20, 26 and 34 (see Map 1). It may be that these wards were also affected because as many as 13 cases could not be disbursed due to the absence of their addresses. The hospital cases also include 8 cases which were brought from the suburban places and towns.

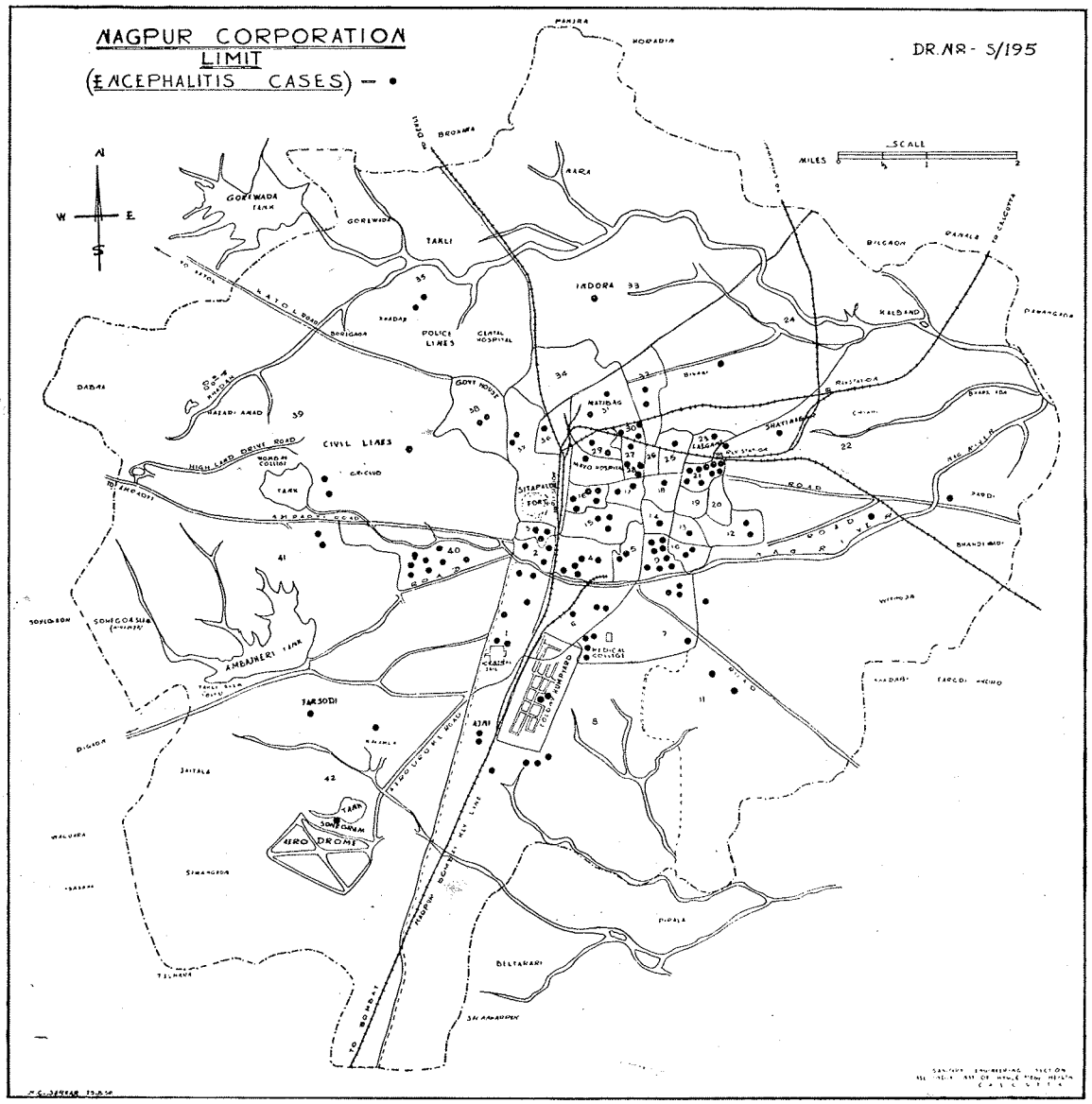
It appeared from a quick survey of the city that there were larger number of probable cases both among children as well as adults all over the city which were not severe enough to be removed to the hospital. Since the Corporation was mainly keeping records of hospital admissions and deaths it was not possible to know the other cases except by house to house survey. This point will be discussed again.

Table I.

Distribution of hospital admissions of encephalitis cases by wards.

Ward No.	Cases	Ward No.	Cases	Ward No.	Cases
1	6	15	3	29	3
2	3	16	5	30	3
3	3	17	2	31	2
4	5	18	1	32	2
5	2	19	—	33	1
6	3	20	—	34	—
7	8	21	9	35	2
8	8	22	2	36	1
9	8	23	1	37	2
10	2	24	1	38	2
11	5	25	1	39	3
12	2	26	—	40	8
13	1	27	1	41	2
14	1	28	3	42	3
Not known	9	Recorded as Nagpur	4	Outside Nagpur	8
				Total—141	

* Subsequent information indicates that some cases also occurred after an interval of a few days.



Outside cases:

Khapa	2
Old Sukrawari	1
Badipet	1
Dhamangaon	1
Nagjibhai Town	1
Ramtek	1
Kirmapura	1
	8

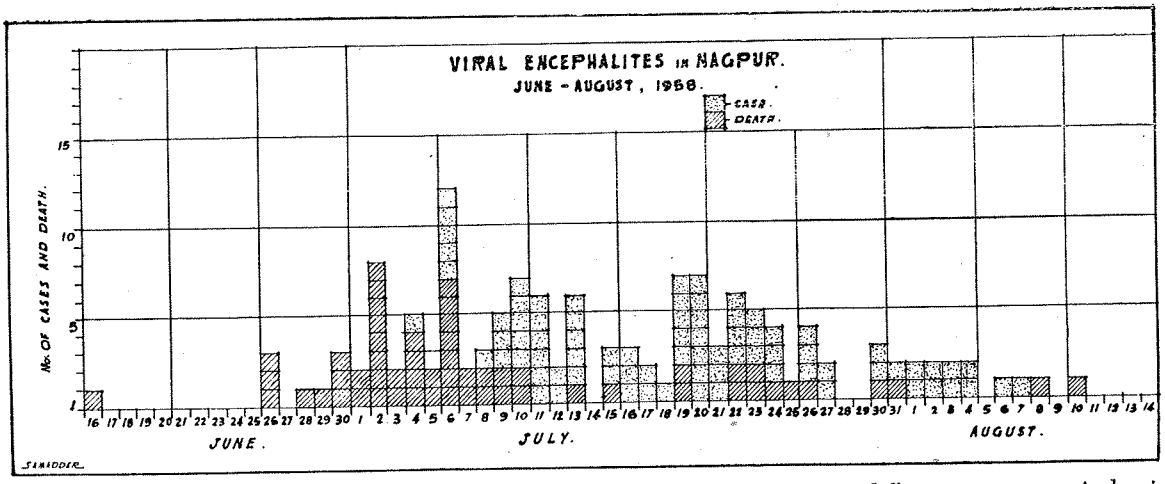
N.B.—It is not known whether all these places are actually inside the city or outside.

Chronological order of cases:

The chronological order of cases and deaths is shown in diagram I. It may be mentioned here that in a few cases the date of onset was not recorded. In such cases the date of admission had to be taken as the date of onset. In fact, in most of the cases the date of onset and date of admission were the same.

It will be seen from the diagram that starting from the 26th June the intensity rose gradually, reaching the maximum on the 6th July registering 12 cases among the total of 141. Only 2 of 29 cases registered upto 5th July survived. Thereafter the cases

Diagram 1.



came down gradually upto 18th, 17 becoming fatal out of 52 cases registered between the 6th and 18th July.

A second rise started from the 19th July registering 39 cases between 19th and 27th July with 9 deaths. During the remaining period of 14 days in this review, 17 cases were admitted with 4 deaths. In fact the serverity of the outbreak diminished considerably after 9th July, only 17 cases turning fatal out of 85 cases.

Age and sex distribution :

The distribution of cases by age and sex with fatalities at different age periods is given in Table II. Apparently the main targets were the infants, preschool and earlier school-age groups, anly three cases were admitted to the hospital from among persons above 15 years of age. Considering by age groups the largest number of cases occurred among the infants with 7 deaths (fatality—38.9%). There were 53 cases between 1 to 5 years with 20 deaths (fatality—37.7%) and 63 cases between 5 to 15 years with 27 deaths (fatality—42.8%).

The proportion of cases was higher among the males than among the females the distri-

Table II.

Incidence of encephalitis cases according to age and sex.

Age	Male	Female	Total cases	Deaths	Fatality rate
Infants	6 (1)	12 (6)	18	7	38.9
Less than 2 yrs. ...	7 (1)	10 (5)	17	6	35.3
,, 3 ,, ...	7 (3)	2 (0)	9	3	33.3
,, 4 ,, ...	8 (3)	8 (3)	6	6	37.5
,, 5 ,, ...	8 (3)	3 (2)	11	5	45.5
,, 6 ,, ...	12 (6)	3 (2)	15	8	53.3
,, 7 ,, ...	12 (7)	4 (2)	16	9	56.3
,, 8 ,, ...	3 (0)	4 (3)	7	3	42.9
,, 9 ,, ...	2 (1)	2 (2)	4	3	75.0
,, 10 ,, ...	6 (0)	3 (1)	9	1	11.1
,, 11 ,, ...	4 (0)	1 (1)	5	1	20.0
,, 12 ,, ...	3 (2)	1 (0)	4	2	50.0
,, 13 ,, ...	1 (0)	1 (0)	2	0	0.0
,, 14 ,, ...	1 (0)	0 (0)	1	0	0.0
,, 15 ,, ...	0 (0)	0 (0)	0	0	0.0
15 yrs. + ...	2 (1)*	1 (1)**	3	2	66.7
Unknown	3 (1)	1 (1)	4	2	50.0
Fatality rate ...	85 (29) 34.1%	56 (29) 51.8%	141	58 41.4%	

* 45 yrs. ** 18 yrs.

N.B.—The figures in parenthesis indicate the number of deaths.

bution being—males 85 cases and females—56 cases. The fatality rate however was higher in females (51.8%) than in male (34.1%). The number of cases became fewer with the increase of age and generally less fatal too.

Fatality and mortality :

The overall fatality rate was 41.4 per cent. But it should be mentioned here that the bird's eye survey of the city indicated that the number of cases was many times more than that admitted in the hospitals, and as such the fatality rates given above relate only to the hospital admissions. On the other hand, if those mild, atypical and non-fatal cases in the city as a whole are included the fatality rate will be considerably lowered. With 58 deaths attributable to encephalitis in the city the specific mortality rate on the basis of 5 million population comes to about 0.116 per 1000.

Religion :

Of the 141 cases 131 (92.9%) were Hindus, 5 Muslims, 4 Christians and one Sikh. It appears that the Muslims suffered less than the Hindus as the number of cases among 50,000 Muslims was only 5 as against 131 cases among over 4 lakh Hindus.

Distribution of cases by hospitals :

Within the period under review 110 cases were admitted to the Medical College Hospital and 31 cases to the Mayo Hospital. The number of deaths in the respective hospitals was 45 and 13 giving a fatality rate of 40.9 and 41.9 per cent respectively.

Distribution of cases by density of population :

The distribution of cases by density of population in different wards is given in Table III.

As will appear from Table III the density of population per se. has no connection with the incidence rate of encephalitis so far as the hospital admission cases are concerned.

Clinical features :

The cases that were admitted in the earlier part of the outbreak namely from the 26th June to the 5th July 1958 in the Medical College Hospital had generally the following symptoms and signs.

Table III.

Distribution of cases by density of population in different wards.

Ward No.	Density of population per acre.	No. of cases	Ward No.	Density of population per acre	No. of cases
1	42.1	6	22	246.6	2
2	182.2	3	23	214.8	1
3	161.14	3	24	168.8	1
4	12.6	5	25	42.2	1
5	52.9	2	26	59.6	0
6	10.1	3	27	18.9	1
7	196.8	8	28	145.1	3
8	2.5	8	29	43.0	3
9	22.2	8	30	51.5	3
10	126.8	2	31	59.1	2
11	1.5	5	32	187.4	2
12	146.1	2	33	32.5	1
13	110.3	1	34	14.1	0
14	41.4	1	36	69.4	2
15	32.1	3	37	24.6	2
16	62.9	5	38	12.5	2
17	94.9	2	39	13.2	3
18	147.9	1	40	19.6	8
19	194.1	0	41	5.2	2
20	233.2	0	42	3.2	3
21	262.8	9			

(1) High temperature at onset, 104°F (one case recorded 109°F and died) with rigor or shivering and generally accompanied by 2, 3 or 4 vomits and one or two loose motions. At the time of admission the temperature had come down to even below 100°F in a few cases. The analysis of the first 20 cases as given by Dr. Berry, Professor of Medicine of the Medical College, was as follows:

Temperature

104°F	8 cases	Vomiting	15 cases
102°F—103.9°F	5 cases	Loose motions	7 cases
100°F—101.9°F	3 cases		
Below 100°F	2 cases		
Unknown	2 cases		

(2) Generalized neurological symptoms were also present in the majority of cases namely tremor, convulsion and terminal rigidity. These were present even in cases with lower temperature. Drowsiness, rigidity of neck and of back muscles were also present in some cases.

(3) Death was due to peripheral circulatory failure and coma. According to Dr. Berry death also occurred due to respiratory failure in cases with pulmonary oedema.

The neurological symptoms were not marked in cases admitted to the Mayo Hospital. These cases had high temperature with vomiting and loose motions and death was due to peripheral circulatory failure.

Relapse :

A certain number of cases which survived the first bout of attack had relapse with milder symptoms than the original within 2-4 days but none of these relapse cases died. A reference of this character will be made again. Very few cases died in the hands of the general practitioners as either the cases were mild or sent to the hospital, if severe. With one practitioner one patient out of 18 and with another one out of 24 patients died. A few cases according to some practitioners relapsed 2nd time.

The clinical severity deminished after the 9th July and deaths became fewer. The cases generally died within 24 hours after admission to the hospital except the first which died on the 10th day and another case on the 3rd day after admission.

Throat condition :

Some of the cases showed acute inflammation of their throat. In a few cases in the Medical College Hospital the Physician-in-charge showed even ulcer-like condition in the throat and in one case reddish patch with white spot in the centre (like the Koplik's spot).

Reflexes :

In serious cases knee jerks were lost. A weak extensor type of plantar reflex was also noted in a few cases. In cases of short duration, there was not much change in the reflexes. Kernig's was also noted in a few cases but back and neck rigidity was rather common among the earlier and serious cases admitted to the hospital. No local or general paralysis was seen.

Laboratory examinations :

(1) Blood picture—The total W.B.C. count ranged between 6000-7000 per c.m.m. and in a few cases upto 15000 per c.m.m. Both polymorphonuclear and lymphocytic rise was noted but in this particular outbreak the rise was mainly lymphocytic in the Medical College Hospital cases and polymorphonuclear type in the Mayo Hospital cases. In a few cases polymorphs were 80 per cent and the lymphocyte count generally ranged between 30-40 per cent. It must however be remembered that the victims who were brought to the hospital were infants and children of earlier age groups and clinically milder cases among either children or adults were not sent to the hospital.

(2) Cerebrospinal fluid—At the Medical College Hospital C.S. fluid was examined in more than thirty cases. None was found definitely pathognomonic except that it was under higher pressure and a few showed broader abnormalities in sugar and protein. The former was reduced in certain instances and the latter increased. Cells were not found increased.

(3) Other examinations—Blood, stool, C.S. fluid, throat swab and urine were examined bacteriologically but no pathogenic organism was isolated. One postmortem was done and the brain and the meninges showed intense congestion. Petechial haemorrhage and oedema were also present on the serous membranes. According to the statement of Dr. Berry hypoglycaemia was also noted in certain cases examined for the purpose. Attempts were made to isolate virus by Dr. Balsubrahmanyan in four types of tissue cells including monkey kidney and He La cells brought by him and also in 1-3 days' old young mice. The results as far as known was negative.

Incubation period :

The minimum incubation period seemed to be 4 days calculated from the following case :

Dr. D. V. Virkar, Deputy Director of Medical Services, Bombay, arrived at Nagpur with his family on the 1st July to take up his new assignment. His family consisted of his wife and three children—9 yrs., 8 yrs. and 2½ yrs. They lived in the college area (Ward 7 or 8) for 3 days temporarily without using any mosquito curtain. On the 4th he removed to the Civil Lines (Ward 39) where very few cases were recorded. On the 7th his eldest son showed

symptoms of loose motions followed by high temperature with rigor and headache throughout the night. The temperature came down within 24 hours and the relapse came after 48 hours but the temperature was off the next day and the child remained well thereafter upto 20th July. No other child developed symptoms.

Field investigation results :

On the 18th July cases were seen in both Medical College and Mayo Hospitals and the subject was discussed with Dr. Bhave, Regional Director of Health, Dean of the Medical College, Clinician in charge of the encephalities cases, Pathologist of the Hospital Dr. Subrahmanyan, Professor of Medicine and Superintendent in charge of Mayo Hospital, Chief Executive Officer and Assistant Health Officer Nagpur Corporation.

On the 19th July, the author visited all the sources of water supply viz., *Gorewada* tank, *Ambajheri* tank and *Kanan* River, and discussed the subject with Dr. Kewalarmani the Health Officer of the Corporation who was himself sick with symptoms resembling adult cases seen all round the city. This will be referred again later. The author also visited the Model Vital and Health Statistics unit for collection of certain data. On the 20th he visited different localities of the city and families, several bustees and interviewed some of the local medical practitioners and examined the general sanitary arrangements of the city with the help of Dr. Subrahmanyan, the Assistant Health Officer of the Corporation. The results of this field investigations are given below.

A visit to a series of families in the Giripet and Dharampet area revealed that in most houses there were cases of fever both among the adults as well as children. The latter usually had a high or moderate degree of temperature with headache one or two vomiting, loose motions, tremor and rigor. Temperature came down within 24 or 48 hours and then with 2-4 days gap there was a relapse with gradual or quick drop of temperature. This relapse was more marked in the adult population who had temperature with headache with or without vomiting and loose motions with remissions for 2-4 days before another little smaller rise. The history of some typical families was as follows:

House—Shyamji Narayan Chaul with 10 families—60 members including 25 children. Four cases occurred, all recovered. In another house of 15 families and 75 members, 3 children and one adult suffered and one child died. In another, a child had a relapse on 19-7-58 two days after he had his first bout of fever with headache, vomiting and diarrhoea. Two other children in another family were similarly affected. There was not much of neurological symptoms except backache, headache etc.

The surroundings of the houses were very insanitary. Children were defecating in and around the houses, flies were plentiful, and there were small collections of water after rains.

Interview with local medical practitioners :

A busy practitioner at Gokulpet (Dr. D.) was interviewed. He saw first case on the 20th June and a total of about 20 cases including 6 cases in adults till the date of interview. The temperature relapsed in 90% of the cases. He noted proportional increase of polymorphonuclear leucocytosis though not so much in total count. Only one case turned fatal, total count in this case being 11000 per c.m.m. In one family there were 3 cases one of whom died and one case relapsed second time. In one family both husband and wife suffered. Headache and neck pain were the common complaints. Acute pain in the chest at onset was also seen. Sore throat was not so common but there was always some throat congestion.

The private practitioners also reported that they had been seeing such cases from the beginning of June, if not earlier. These cases were characterised by sudden onset of hyperpyrexia, rigors, convulsions and vomiting and initial diarrhoea. The symptoms did not last longer than 24 hours. They had treated these cases with diaphoretic mixture, quinine and broad spectrum antibiotics. Nearly all of them recovered by the third day. Multiple cases were also seen in certain families, the largest number of cases, however, was in the earlier age groups. Some practitioners considered certain cases as modified flu.

Besides above, the general practitioners also told the author about their impression that they had come across such cases every year during the past few years in Nagpur at that particular period of the year though they admitted that the incidence, severity and fatality had been higher this year.

Imambara Bustee :

The Imambara bustee had 700 huts and 3000 population. No house had any latrine. Children were defaecating all round. There was an acute shortage of water supply for which there were only 3 open wells besides a few corporation water taps. The health officer said that roughly about 5 per cent of the population suffered from fever with vomiting and loose motions within the last one month and several cases were also sent to the hospital, some of whom died.

Adult cases :

It has already been mentioned that while going round the different wards of the city it was found that quite a good percentage of the adults suffered from fever with headache, loose motions and vomiting during the month of June and July. It was interesting to note that some of the staff in the medical college hospitals also suffered from the above symptoms including one Dr. Mukherji, who was in charge of the Pediatric ward in which the encephalitis cases were being admitted. Similar history was obtained from other institutions or offices. The health officer of the city himself was a victim and he had also a relapse during the time of author's visit.

Sources of water supply :

The city at the time of investigation were using three main water sources namely, the Kanan River, Gorewada and Ambajheri tanks (see maps). The water from the Ambajheri tank was directly pumped into a reservoir at a high level in the Government Houses and from there it was supplied by gravity. There was arrangement for chlorination but the machine was under repair at the time of author's visit. The water was frankly turbid. The Gorewada water supply was from a large tank with catchment area for water collection. It got dried this year during summer and there was great water scarcity. For sometime even muddy water was supplied. The Patterson type of water filtration plant was under operation but still the water that was being finally supplied was somewhat turbid.

The bigger water supply plant was however at Kamptee 12 miles out of town where a barrage was put up across the River Kanan for continuous supply. Here the largest water filtration plant has been installed and clear water is available after filtration. Water is chlorinated before pumping out to the city.

Besides the above reservoirs there was a large number of open masonry wells scattered over many parts of the city. Even with these scources it appears that the city suffers from scarcity of water particularly between April and July. This year there was severe shortage of water due to drought.

Disposal of night soil :

According to the Health Officer nearly three-fourth of the houses in the city have no latrine. Though unexpected in modern times for a city to have no latrines in a large majority of the houses, it was found true at least so far as the bustees were concerned. The people could do without a latrine as the city wards except for the congested parts, are fairly widely dispersed with open lands in between that can be used for defascation in a primitive way. All drains in the city are open and stinks badly in many places. These pass into several open channels that pass through different parts of the city and finally open into a bigger channel called Nag River. These are the places which are freely used by the people for defaecation and without sufficient water supply it is easily imaginable the condition arising during the dry months. This year it deteriorated seriously due to prolonged drought. Hundreds of small water pockets are created to facilitate mosquito breeding particularly the culex variety. On enquiry the public complained of increase of mosquitoes after small showers in the earlier part of June. A little heavier showers, however, actually started from 20th June. Most of the people do not use any mosquito curtain. Perhaps high temperature during May and June does not also permit the use of mosquito curtains and the question does not arise at all in case of the poorer section of the population.

Consequent on this bad sanitation the fly breeding was found very high. On the whole it appeared that the situation was propitious for any gastro-intestinal or insect-borne epidemic.

In view of the medical practitioners' above statement and from the experience gained during present field work the following issues required further investigation.

(1) What is the nature of the disease and if infectious, what is the nature of the infection ?

(2) Whether the first clinically diagnosed encephalitis case was the actual first case or there were cases occuring earlier but not recognized as such.

(3) Whether both children and adults were involved or only children were involved ?

(4) Is the metrerological conditions involved in any way in this outbreak ?

(5) Is any of the environmental factors like the water supply, insects, (mosquitoes, flies) overcrowding, disposal of night soil etc. involved ?

(6) Whether this year is the first time that such cases have occurred or the disease had been already present there ? If so, what are the causes of rise this year ?

(7) Probable hypothesis on the etiology of the disease and suggestion of methods of prevention and control.

The above issues are discussed below:

(1) *Possible nature of the disease :*

The signs and symptoms particularly of the earlier cases of the epidemic resembled largely those of encephalitis cases seen in other towns like Lucknow, Delhi, and Jamshedpur, though some amount of difference cannot be denied. For instance, in certain number of cases in Nagpur vomiting and diarrhoea were prominent symptoms and unlike at Jamshedpur where death was due to respiratory failure, the deaths here were due to peripheral circulatory failure. The neurological symptoms were also less manifested than the cases at Jamshedpur. Leucocytosis—was also not a marked feature. C. S. fluid was under pressure and certain reduction in sugar and slight increase in protein were noted, hypoglycaemia was noted in certain cases in which the blood was examined for it. Even so, certain cases were typical of encephalitis as described by Dr. Berry and, as expected, no drug was found effective and no causative germ was detected by the routine examination of the various clinical material. The fatality rate was high among the infants and children who were the main victims. From these it may be fairly concluded that the disease is a form of encephalitis possibly of viral origin. The epidemic curve is also typical of an infective disease but since multiple cases were not too common and person to person transmission was not ordinarily detected, the transmission may be either through an intermediary host or from a common generalized source.

(2) *Time of commencement of the present epidemic :*

Although the first clinically diagnosed case of encephalitis was the one admitted on the 16th June, there are reasons to believe that cases started occuring much earlier for the following reasons.

(a) The private Medical Practitioners stated that they were treating such cases at least from the beginning of June.

(b) This year there was an unusual number of cases recorded as death from heat stroke since May 1958, the majority of whom were infants, toddlers and children of lower age group and a good number were adults.

The annual incidence of such deaths since 1954 is given in Table IV below:

Table IV.

Annual incidence of deaths from heat stroke, 1954-1958.

Year	Period	Number of deaths
1954	21-5-54 to 7-6-54	7
1955	15-6-55	1
1956	6-5-56 to 25-5-56	5
1957	7-5-57 to 31-5-57	2
1958	25-4-58 to 30-6-58	53

The age distribution of the 53 deaths recorded as due to heat stroke is given in Table V by dates.

Table V.

Age distribution of the 53 deaths recorded as due to heat stroke in Nagpur between 25th April and 30th June, 1958.

Dates	Infants	1-5 yrs.	5-10 yrs.	10-15 yrs.	Above 15 yrs.	Total
25-4-58	—	—	—	—	2 (24, 32)	2
26-4-58	—	1	—	—	—	1
27-4-58	1	1	—	—	—	1
30-4-58	—	1	—	—	—	2
10-5-58	1	—	—	—	1 (50)	2
11-5-58	1	1	—	—	1 (75)	3
12-5-58	1	1	—	—	1 (60)	3
13-5-58	—	2	—	—	—	2
14-5-58	2	—	—	—	1 (83)	3
15-5-58	—	3	—	—	—	3
16-5-58	—	1	—	—	—	1
17-5-58	—	—	—	—	2 (32, 45)	2
19-5-58	—	—	1	—	—	1
24-5-58	—	—	—	—	1 (48)	1
25-5-58	—	—	—	—	1 (60)	1
29-5-58	1	—	—	—	—	1
30-5-58	1	—	—	—	—	1
31-5-58	—	1	—	—	—	1
2-6-58	2	—	—	—	—	1
4-6-58	2	—	—	—	—	1
5-6-58	3	—	—	—	—	1
6-6-58	1	—	—	—	—	1
9-6-58	—	—	2	—	—	2
10-6-58	—	—	—	—	—	2
11-6-58	1	—	—	—	—	2
12-6-58	1	—	—	—	—	2
13-6-58	1	—	—	—	—	2
14-6-58	1	—	—	—	—	3
23-6-58	—	—	1	—	2 (20, 28)	3
30-6-58	1	—	1	—	1 (40)	2
	22	13	5	—	13	53

N.B.—The figures in parenthesis indicate the number of deaths.

From the data given in Table V it is a question whether so many deaths in infants and pre-school, children could be due to heat stroke or any other factor involved in it. According to Dr. Subrahmanyam, Asstt. Health Officer, some of the cases which he saw, diagnosed as heat stroke had the same kinds of symptoms as in cases later diagnosed as encephalitis. Besides, compared to other years (see Table IV) the number is unusually high, e.g., 53 against 1 to 7 in other years. Again 53 cases being deaths, the actual number of cases must have been much higher than 53. Of the latter as high as 40 occured under 10 years including 22 infants and 13 of pre-school age.

(c) From what was observed during the field investigation it could be easily conceived that these milder and non-fatal fever cases should have reflected not only in the increase of chamber cases of the private medical practitioners but also in the dispensary attendances during the months of May, June and July as compared to those of previous years during the same months. The data have been requisitioned from the Vital Statistics Section of the Nagpur corporation. However, the figures already collected during the field investigation (see Table VI) tend to show the above contention. The total number of cases of all categories of severity on a strict estimate of only 1 per cent involvement of population is likely to be about 5000 during the period under review.

Table VI.

Deaths from fever cases including encephalitis, gastro-enteritis with or without fever during 1957 and 1st May to 14th July 1958 (for age group upto 12 yrs.).

Age group	Fever cases including encephalitis		Gastro-enteritis	With or without fever
	1957	1958	1957	1958
Infants	137	171	27	24
1-5 years	157	216	10	16
5-12 years	31	65	1	2
Total	325	452	38	42

It will be seen from the above table that the total number of fever deaths including those from encephalitis during the 3 months of May, June and July, 1958 much exceeded the figure of 1957. Including the heat stroke cases the figure comes to 505 as against 325 cases of 1957, whereas there has not been any appreciable increase in the gastro-enteritis cases with or without fever.

(3) *Age distribution of cases:*

Very few adult cases were admitted to the hospital as typical encephalitis case. There are only three cases in the reported series aged 18, 25 and 45 respectively of which the first and the third cases died. If we recall the Jamshedpur outbreak the local clinicians had the same idea that cases were only occuring among children group. But on closer enquiry by the author it was found that there were more than 25 cases admitted to the hospital with undiagnosed fever on a

particular day. These cases were later found related to the encephalitis outbreak and many such cases were detected among the local population. In the hospital itself more than 200 such adult cases were admitted during the epidemic period. One of the characteristics of these cases was the sudden rise of fever with headache, muscular pain and rigor or shivering with or without vomiting and nervous symptoms which went off in a day or two followed 2-4 days later with a relapse in majority of cases. Practically all were non-fatal, the fatality being confined to younger age groups. Similar phenomenon has been noted in Nagpur also, a large number of non-fatal and milder cases having occurred simultaneously among the adults and at least 2 deaths having been recorded among them as due to encephalitis and another group of 14 deaths recorded as heat stroke during the months of May and June. The possible relationship of these relapse cases to encephalitis is also supported by the fact that some of the encephalitis cases among children admitted in the hospital but survived, had also relapsed as the adults.

(4) *Role of the meteorological conditions, if any:*

It is known to everybody that this year's summer was characterised by exceptionally high temperature, drought and very late rains, almost all throughout India. The city of Nagpur was especially affected as will be seen from the records of rainfall given in Table VII and of temperature and humidity given in Table VIII.

Table VII.

Rainfall in Nagpur between April and July of the last 5 years 1954-1958.

Month	1954	1955	1956	1957	1958
April ...	0.16	1.21	0.02	3.47	0.57
May ...	0.00	0.30	2.60	0.57	0.04
June ...	9.12	12.28	8.88	3.33	5.10
July ...	18.49	12.99	14.13	13.25	10.20
	27.77	26.78	25.63	20.62	15.91

* (Only 0.02 inches upto 8th June).

It will be seen that the rainfall upto 18th June was only 0.63 inches which means no rain. Even in July there was much shortage of rain. In fact the drought was so

Table VIII.

Weekly Humidity and Temperature Data of Nagpur in the Months of April, May, June, July and August during the years 1954 to 1958.

Temperature :

Week-ending	1954		1955		1956		1957		1958	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
April 7 ...	106	66	103	63	108	69	98.6	64.4	107.6	71.6
„ 14 ...	106	66	105	66	105	71	102.2	69.8	107.6	71.6
„ 21 ...	111	74	103	65	110	74	104.0	71.6	107.6	71.6
„ 28 ...	111	76	108	65	110	78	105.8	69.8	113.0	75.2
May 5 ...	111	75	109	71	112	80.9	108.5	75.2	109.4	77.0
„ 12 ...	112	82	112	73	115	87	109.2	76.3	115.8	77.0
„ 19 ...	114	81	109	75	113	76.7	109.4	77.0	115.8	77.0
„ 26 ...	118	92	111	82	113	79	105.8	69.8	113.0	80.6
June 2 ...	115	84	113	82	101	73	109.4	80.6	113.0	78.8
„ 9 ...	113	77	113	77	102	81	107.6	77.0	115.8	80.6
„ 16 ...	105	84	105	75	104	73	109.4	78.8	111.2	84.0
„ 23 ...	103	74	99	71	96	71	107.6	73.4	113.0	73.4
„ 30 ...	102	73	95	71	90	71	95.0	73.8	102.2	75.2
July 7 ...	95	75	92	73	91	74	95	71.6	98.6	73.4
„ 14 ...	87	72	91	71	87	73	87.8	73.4	95	73.4
„ 21 ...	89	72	91	73	91	73	89.6	73.4	87.8	73.4
„ 28 ...	93	73	93	73	89	74	89.6	73.4	93.2	73.4
Aug. 4 ...	92	73	89	74	92	73	91.4	74.1	—	—
„ 11 ...	92	74	90	72	87	73	89.6	73.4	—	—

Humidity % 1st Hour.

Week-ending	1954 Max.	1954 Min.	1955 Max.	1955 Min.	1956 Max.	1956 Min.	1957 Max.	1957 Min.	1958 Max.	1958 Min.
April 7 ...	67	16	72	12	35	22	90	60	70	35
„ 14 ...	42	11	59	20	47	16	75	55	65	38
„ 21 ...	24	11	33	7	33	21	75	35	85	33
„ 28 ...	53	20	47	19	25	11	65	30	60	17
May 5 ...	37	18	60	15	55	22	55	24	63	37
„ 12 ...	21	15	51	19	30	14	40	15	55	37
„ 19 ...	36	15	47	29	34	13	33	25	70	40
„ 26 ...	35	11	62	20	50	24	60	37	70	27
June 2 ...	40	23	25	15	91	60	49	35	75	15
„ 9 ...	67	26	61	26	65	49	55	35	30	13
„ 16 ...	54	39	87	46	68	43	55	33	40	30
„ 23 ...	87	63	95	78	97	76	80	40	85	47
„ 30 ...	85	55	95	87	98	76	90	75	90	63
July 7 ...	93	79	87	71	97	61	95	70	90	75
„ 14 ...	97	78	98	85	97	82	91	80	95	90
„ 21 ...	94	82	98	71	91	79	90	80	95	85
„ 28 ...	100	79	87	74	87	76	95	80	95	75
Aug. 4 ...	89	80	91	83	94	82	95	75	—	—
„ 11 ...	94	84	98	82	100	74	100	79	—	—

severe that the water reservoirs had dried up and there was great scarcity of water, so much so that large number of cattle died of hunger cachexia as a sort of epidemic among the cattle. (This information was obtained from the Veterinary Surgeon).

Looking at the temperature and humidity chart in Table VIII it becomes quite apparent that the high temperature was maintained for much longer period than in other years i.e., all throughuot the months of April, May and June.

It has been noted in many countries, as well as in India during the last few years that encephalitis cases appear in epidemic form following particularly severe drought. It happened in 1954 after such a drought though it was not so severe as this year. The doctor in charge of encephalitis investigation in Southern U.S.A. happened to pass through India just at the time when the Nagpur epidemic was going on and he also narrated the same experience in U.S.A. (personal discussion).

(5) *Possible relationship with existing environmental conditions:*

(a) *Water supply*:—The distribution of cases all thoughout the city apparently arouse suspicion on water supply. But on closer enquiry, epidemiological evidences so far obtained do not support such possibility for the following reasons:

(*i*) Multiple sources are used including a large number of mansonry wells. It is not possible to assure that all the three main sources were simultaneously contaminated.

(*ii*) The possibility of human faecal contamination in any of the city water supply could not be established.

(*iii*) Cases were admitted to the hospital from areas which are not supplied by any of these sources. (This point requires further verification).

(*iv*) There was no increase of gastro-enteritis with or without fever (See Table VI) although no chlorination was done particularly in one source which is supposed to have supplied muddy water at a certain time.

(*v*) Cases were also reported from areas where only well water was being used (requires further verification).

(b) *Overcrowding*:—It has been shown in Table III that there was no relationship between the density of population and number of cases reported to hospitals, but the position cannot be judged properly un-

less house to house investigation is done. Secondly, multiple cases according to house to house survey revealed more frequent incidence of multiple cases than previously thought of. The experience in Jamshedpur was also similar, even though case to case transmission could not be established.

(c) *Disposal of night soil*:—It has been already mentioned that nearly three-fourths of the houses and bustees in the city have no latrines and people take recourse to open fields and spaces, drains and channels for defaecation and children were found to defaecate in open spaces near the houses. The field for gastro-intestinal outbreak is indeed very propitious.

(d) *Insects*:—No authentic data could be obtained in regard to the insect population particularly of mosquitoes. Only a general statement was obtained from the entomologist that culex mosquito was prevalent in the city with fairly high density. The general public of the area visited, stated that they noticed an increase of the mosquito population within a few days of the first few small showers in June. Due to heat conditions the vast majority of the people were not using any mosquito curtain. The entomologist has been requested to prepare a note on the varieties of culex mosquitoes present in the city.

One piece of information which seems important is that the city is completely neglected from the point of view of malaria control, and the culex breeding also goes on unhampered. Innumerable pockets are created every year in the drainage channels (Nag River and others) during the dry season, stagnation of flow as well as small collection of water due to shortage of water for adequate flow, and also following the first few showers mosquito breeds profusely. A detailed investigation on this point is definitely indicated.

Flies:

With bad sanitation, service privies, open drains and open defaecation the amount of fly breeding can be easily imagined. In actual fact, flies were found plentiful in almost all areas. How far they were associated with the present outbreak is not known.

(6) *Possibility of this disease being present in the preceeding years:*

From the data so far available there is not much doubt that this disease had been present there for a pretty long time. The evidences are as follows:

(a) Adults are faily resistant to the infection. Like poliomyelitis and ohter viral infections of endemic nature the disease affected mainly the infant and younger age groups which remained susceptible.

(b) The private practitioners also were of the opinion that they had seen such cases in other years but this year the number had suddenly increased.

The infection is therefore most probably endemic in the area and the rise of the number of cases may be due to the excessive drought, shortage of water, high temperature and possibility the increase of the appropriate vectors. Although the epidemic appears to be sudden in onset, in actual fact it may not be so as the earlier cases had been missed.

(7) *Probable hypothesis on the etiology of the disease and suggestion of methods for prevention and control:*

On the basis of the observations made above it appears that the disease is endemic in the area and the human beings are the probable reservoirs. As to the mechanism of rise in epidemic form the following hypothesis may be advanced:

The audults due to the severe meteorological conditions, relapsed first resulting in temporary viraemia. Simultaneous presence or rise of vector epecies of insect or any other possible transmitting agents (a point for investigation) the infection spreads into the most susceptible group i.e. the infants and children. From the results of investigation so far made no bacteria has been found involved, and hence virus has been suspected. Encephalitis of viral origin occurring in epidemic form in other countries has been associated with the culex variety of mosquitoes as the transmitting agent and the virus has been isolated from the vector as well as the human cases and their relationship has been correlated. Unfortunately, no infecting agent has been discovered so

far and this position has made the rest of the epidemiological investigation difficult.

Measures of control:

For the reasons stated above no definite control measures can be recommended except to rely on the environmental sanitation, be it for mosquitoes, flies or water (this last does not appear to be possible transmitting vehicle in Nagpur).

For treatment no drug has been found effective although chloramephenicol is claimed by some clinicians as somewhat effective. Since, however adults are fairly resistant, their blood or gumma globulin may be tried, though in virus infection tissue immunity is stronger than humoral immunity. In hypoglycaemic cases administration of glucose intravenously should be of definite help. It might be adopted as a routine procedure.

If the infecting virus is ever isolated attempts may be made to prepare the vaccine which is likely to be of more deflnite value.

While all attempts should be made to isolate the virus, collection of paired sera from the convalescent cases and serological or neutralisation tests against the known encephalitic viruses may throw the necessary light.

The simultaneous rise of heat stroke cases also made us athinking Chloride estimation of blood and urine in every suspected case of encephalitis may be done to exclude heat stroke cases.

The virological infections now appear to be on the rise in the country. A question naturally arises why it is occuring now. Among the various explanations the following may be advanced.

(1) Uncontrolled use of sulfa drugs and antibiotics particularly in the towns and cities has disturbed the normal balance between virological, bacteriological and protozoal infections in man. Often the wholesale destruction of bacterial flora in human subject may lead to the rise of infections by viruses which generally remain unaffected by the antibiotics and sulfadrugs.

(2) Control of malaria, a protozoal disease, might have affected the balance stated above. Also, many encephalitis cases were probably missed before or diagnosed as cerebral malaria cases.

(3) A general change in the meterological conditions is now seen in India. This has been attributed by some scientists to the frequent atomic explosions. The condition of drought has been associated by others with virological rise. In fact, the recent Asiatic flu virus according to some is supposed to have emerged as a result of radio-isotopic influence.

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FIELD SURVEY OF INSECTICIDE SUSCEPTIBILITY OF DISEASE VECTORS

Part IA. Anopheles Culicifacies in Poona

By

MAJ. D. NARASIMHAN,

COL. N. D. P. KARANI

AND

MR. P. KRISHNASWAMI

(Armed Forces Medical College, Poona)

Service units of the Armed Forces of India, located in areas endemic for malaria, are carrying out regularly since 1946 a strict DDT indoor-spraying programme in their own areas. Any cantonment in the country may be taken to be affected, totally or subtotally, by such spray practice as a vast bulk of its area is occupied by units and families of the Services. On the other hand, anti-malaria operations carried out by the States are of more recent origin and less comprehensive, besides differing in certain other respects; so that in many stations, each comprising a cantonment and city area, two different types of DDT pressure have been operating side by side. It would be, therefore, interesting to find out, if possible, whether the local vector exhibits, at any one time, different susceptibilities in the two localities of the same station. But owing to present-day scarcity of the vector in most of these stations this may not always be possible to determine. With this object in view, in general terms, the Armed Forces Medical College, Poona, is undertaking a series of field surveys in a number of military stations in order to determine the present susceptibilities of the local malaria vectors to DDT and Dieldrin. The present article relates to a study on the susceptibility levels of the female adults of *Anopheles culicifacies* in Poona area, which lasted from 13 to 31 August, 1958.

Aim and Scope of Present Survey

The aim was to test the *culicifacies* encountered in Poona Cantonment. But owing to paucity of *A. culicifacies* in the Poona Cantonment area, the latter became unsuitable for the survey. The aim thus became shifted to the nearest village, about 4 miles away, where the test mosquito was sufficiently available. Though it is realised that the tests are better carried out at the place of collection of the test insect, they could be done only at the College. The range of concentrations provided in the WHO Test Kit permitted the LC_{50} of DDT to be derived; but not of Dieldrin.

Materials and Methods

The methodology of the study was in compliance with that described by The Expert Committee on Insecticides[8]. The current WHO Test Kit was used. Certain modifications, however, became indispensable for successful performance of the tests. These are described and discussed in detail elsewhere by one of us (D.N.)[3,4]. Only salient features of the modifications in the technique are mentioned here.

The test insect used in the study was recently blood-fed *A. culicifacies* adult female. As it was not sufficiently in evidence in the Poona Cantonment area, and immediate surrounds, the survey was necessarily carried out in the nearest village, where alone it was available in adequate numbers. This happened to be in the outskrits of Hadapsar about 4 miles from Poona Cantonment. Here also, daytime catches were paltry. But night catches were revealing. Consequently, the mosquito was collected in abundance each night, from 21.30 to 23.00 hours, during the survey; on an average, the nightly catch of *A. culicifacies* was 300+ per 5 man-hours of collection. Owing to the susceptibilities of the local inhabitants the test mosquito was taken from cattle sheds only, and not human dwellings.

Each night's catch was transported to the College in 10-15 minutes and the test carried out forthwith at night.

As already stated, the test technique differed from the prescribed one[8] in certain essential details: the exposure chamber was lined all around with the test insecticide/control paper; the interspace between the obverse side of the slide and the lower rim of the screw cap of the slide unit was totally occluded by means of cotton wool pressure packs applied from below the slide, in order to counter the attempted escape of *A. culicifacies* from the confines, under observation, of the recovery tube; the slide surface of the recovery tube was lined with mimeograph paper strip, as otherwise the mosquitos are likely to get stuck up to the bare surface of the slide and die.

The exposure periods employed were (a) the preliminary standard 1 hour period, (b) an exploratory period for 30 minutes, (c) and a derived period for 15 minutes. The probable values for LC_{50} and LC_{90} of p-p' DDT and pure Dieldrin (HEOD) were derived/extrapolated from the dosage-mortality regression lines based on the data of 4 replicates of the 15-minute exposure.

The recovery tubes were kept, for the 24-hour observation, inside a richly humidified, 2 ft. cube mosquito breeding cage housed in an air-conditioned room. The maximum and minimum temperatures and relative humidity obtaining inside the cage were recorded daily. The readings are given in Annex 1. It is noteworthy that the cage was remarkably thermostatic, or very nearly so, at the recorded temperatures, which are well within the prescribed limit[8].

The cattle sheds, which were the source of our test strain, have the same spray history as the entire hamlet. The latter is sprayed regularly with DDT since 1953. The hamlet is situated in an endemic part of Poona District, and is operated under the NMCP of India/MEPI. Till 1957 the area was given 2 'rounds' of DDT annually. The last spray was in July, 1958. The spray technique aims at an initial deposit of 112 mg. DDT/sq. ft. (1.12 g DDT/sq. m.).

RESULTS

Exposures to DDT:

The results of exposure of *A. culicifacies* for the standard 1 hour period, to DDT are set out in Table I.

Table I

Table showing mortalities of A. culicifacies recorded 24 hours after exposure for 1 hour to 6 graded concentrations of p-p' DDT.

Concentration of p-p' DDT in %	A. culicifacies Number of Alive	Dead	Total	Mortality in %
0.25	13	9	22	40.9
0.5	3	19	22	86.4
1.0	1	20	21	95.2
2.0	0	20	20	100.0
4.0	1	21	22	95.5
8.0	0	20	20	100.0
0.00 (control)	19	1	20	5.0

This indicated a high general level of susceptibility of the test strain to p-p' DDT. As 5 out of the 6 figures are crowded near and above 90% mortality it became necessary to test with a lower exposure period in order to determine the LC_{50} value. Accordingly, a 30-minute exposure was tried. The results are tabulated in Table II.

Table II.

Table showing mortalities of A. culicifacies recorded 24 hours after exposure for 30 minutes to 6 graded concentrations of p-p' DDT.

Concentration of p-p' DDT in %	Number of A. culicifacies Alive	Dead	Total	Mortality in %, adjusted by Abbott's formula 2
0.25	10	10	20	37.5
0.5	2	19	21	88.1
1.0	0	21	21	100.0
2.0	0	21	21	100.0
4.0	2	18	20	87.5
8.0	0	20	20	100.0
0.00 (control)	16	4	20	20.0

It was obvious that the test strain is highly sensitive to DDT, there being no material difference in the mortality pattern and levels resulting from the 1 hour and 30 minutes' exposures. The exposure period called for a still further reduction. Consequently, a brief exposure for 15 minutes was given. The results were encouraging for determination of the probable value for LC_{50}. The exposure was repeated 3 times and the results of the 4 replicates are tabulated in Table III.

Table III.

Table showing mortalities of A. culicifacies recorded 24 hours after exposure for 15 minutes to 6 graded concentrations of p-p' DDT.

Concentration of p-p' DDT in %	Replicate No.	A. culicifacies Number of Alive	Dead	Total	Mortality in %, adjusted by Abbott's formula 2
0.25	1	11	9	20	31.3
	2	11	9	20	31.3
	3	11	9	20	31.3
	4	14	6	20	30.0
0.5	1	7	13	20	56.3
	2	11	9	20	31.3
	3	9	11	20	43.8
	4	9	11	20	55.0
1.0	1	9	11	20	43.8
	2	4	17	21	76.2
	3	6	14	20	62.5
	4	5	15	20	75.0
2.0	1	2	18	20	87.5
	2	4	16	20	75.0
	3	3	17	20	81.3
	4	4	16	20	80.0
4.0	1	1	19	20	93.8
	2	2	18	20	87.5
	3	2	18	20	87.5
	4	2	18	20	90.0
8.0	1	1	19	20	93.8
	2	1	19	20	93.8
	3	1	19	20	93.8
	4	0	20	20	100.0
0.00 (control)	1	16	4	20	20.0
	2	16	4	20	20.0
	3	16	4	20	20.0
	4	20	0	20	0.0

The probable values for LC_{50} and LC_{90} of p-p' DDT for the 15-minute exposure of the test strain were then derived. The overall mortality % for each concentration was calculated from summation of the data for the 4 replicates of the 15-minute exposure, as set out in Table IV.

Table IV

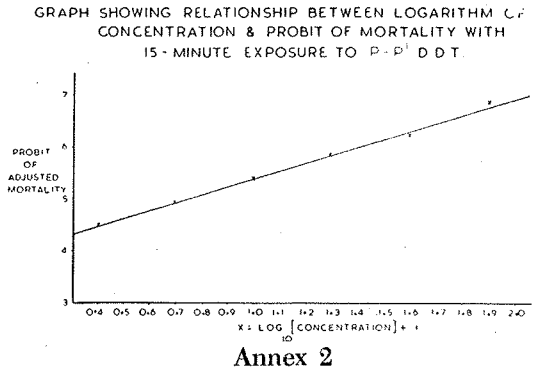
Table showing overall mortality % of A. culicifacies for each DDT concentration, for the 4 replicates of the 15-minute exposure.

Concentration of p-p' DDT in %	Aggregate number of A. culicifacies Alive	Dead	Total	Overall Mortality in %, adjusted by Abbott's formula 2
0.25	47	33	80	30.9
0.5	36	44	80	47.1
1.0	24	57	81	65.1
2.0	13	67	80	80.9
4.0	7	73	80	89.7
8.0	3	77	80	95.6
0.00 (control)	68	12	80	15.0

The overall values for mortality were plotted on the log-probability paper, against the concentrations of DDT. The remarkably linear nature of the plottings struck the eye. A straight line to match them visually was then drawn tentatively as the regression line. It represented a close and reasonably good visual fit for the values. The probable values for LC_{50} and LC_{90} of p-p' DDT were derived tentatively from this line as 0.55% and 4.2%. The data were then examined statistically. The DDT concentrations were converted to logarithmic scale, to base 10, the adjusted mortalities based on the overall values of the 4 replicates were converted to probits, and a straight line was fitted to the transformed data, on the lines suggested by Finney[2]. The regression equation arrived at was

$$y = 1.504\ x + 3.890$$

where 'y' is the probit of the adjusted mortality and 'x' is $\log_{10}$ (concentration) + 1. The standard error of the regression co-efficient was 0.165. The LC_{50} value was worked in terms of 'x' and was converted back to the original units; it came to 0.55% p-p' DDT, with 95% fiducial limits of 0.40% to 0.70%. Similarly the LC_{90} value came to 3.89% p-p' DDT, with 95% fiducial limits of 2.87% to 5.98%. The correspondence between the probable values derived by the two methods, visual and statistical, is worthy of note; the approximation being remarkably close for the LC_{50}. The regression line is presented in Annex 2.



Annex 2

Exposures to Dieldrin :

As to DDT, so also to Dieldrin the standard 1 hour exposure, and the one for 30 minutes, indicated a high sensitivity of the test strain, necessitating the 15-minute exposure for derivation of the LC_{50} and LC_{90} values. The results of exposures for the 3 periods are set out respectively in Table V, VI and VII.

Table V.

Table showing mortalities of A. culicifacies recorded 24 hours after exposure for 1 hour to 6 graded concentrations of pure Dieldrin (HEOD).

Concentration of pure Dieldrin in %	A. culicifacies Number of Alive	Dead	Total	Mortality in %, adjusted by Abbott's formula 2
0.05	8	12	20	46.7
0.1	1	19	20	93.3
0.2	1	19	20	93.3
0.4	1	19	20	93.3
0.8	1	19	20	93.3
1.6	0	20	20	100.0
0.00 (control)	15	5	20	25.0

Table VI

Table showing mortalities of A. culicifacies 24 hours after exposure for 30-minutes to 6 graded concentrations of pure Dieldrin (HEOD).

Concentration of pure Dieldrin (HEOD) in %	Number of A. culicifacies Alive	Dead	Total	Mortality in %, adjusted by Abbott's formula 2
0.05	3	17	20	81.3
0.1	2	18	20	87.5
0.2	2	18	20	87.5
0.4	0	20	20	100.0
0.8	1	19	20	93.8
1.6	0	20	20	100.0
0.00 (control)	16	4	20	20.0

Table VII

Table showing mortalities of A. culicifacies recorded 24 hours after exposure for 15-minutes to 6 graded concentrations of pure Dieldrin (HEOD).

Concentration of pure Dieldrin (HEOD) in %	Replicate No.	Number of A. culicifacies Alive	Dead	Total	Mortality in %, adjusted by Abbott's formula 2
0.05	1	8	12	20	50.0
	2	5	15	20	66.7
	3	4	16	20	73.3
	4	7	13	20	56.3
0.1	1	5	15	20	68.8
	2	3	17	20	80.0
	3	1	19	20	93.3
	4	4	16	20	75.0
0.2	1	3	17	20	81.3
	2	2	18	20	86.7
	3	0	20	20	100.0
	4	4	16	20	75.0
0.4	1	2	18	20	87.5
	2	1	19	20	93.3
	3	1	19	20	93.3
	4	0	20	20	100.0
0.8	1	1	19	20	93.8
	2	1	19	20	93.3
	3	0	20	20	100.0
	4	0	20	20	100.0
1.6	1	0	20	20	100.0
	2	0	20	20	100.0
	3	0	20	20	100.0
	4	0	20	20	100.0
0.00 (control)	1	16	4	20	20.0
	2	15	5	20	25.0
	3	15	5	20	25.0
	4	16	4	20	20.0

Derivation of the probable values for LC_{50} and LC_{90} of Dieldrin was based on the same procedure as for DDT. The overall mortality % for each concentration of Dieldrin for the 4 replicates of the 15-minute exposure is given in Table VIII.

Table VIII

Table showing the overall mortality of A. culicifacies for each concentration of pure Dieldrin (HEOD), for the 4 replicates of the 15-minute exposure.

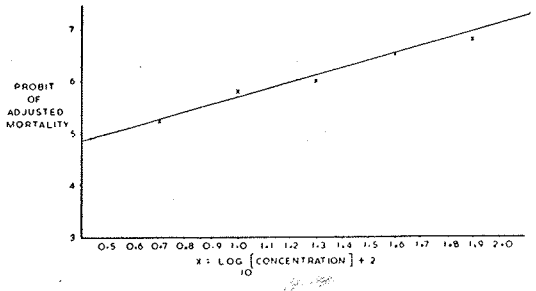
Concentration of pure Dieldrin (HEOD) in %	Aggregate number of A. culicifacies Alive	Dead	Total	Overall Mortality in %, adjusted by Abbott's formula 2
0.05	24	56	80	61.3
0.1	13	67	80	79.1
0.2	9	71	80	85.5
0.4	4	76	80	93.5
0.8	2	78	80	96.8
1.6	0	80	80	100.0
0.00 (control)	62	18	80	22.5

It is worthy of note that *none* of the mortality values is less than 50%; it is borne out by Table VII also. This contrasts with the DDT results. From the visually adjusted dosage-mortality regression line the probable value for LC_{90} was derived as 0.28% pure Dieldrin (HEOD); whereas that for LC_{50} could only be extrapolated and taken as 0.0315%. The regression line was next worked out statistically. The transferred variable 'x' corresponding to concentration was, in the working, $\log_{10}$ (concentration) + 2. The regression equation was derived as

$$y = 1.406\ x + 4.307$$

'y' and 'x' having denotations similar to those equation for DDT. The standard error of the regression co-efficient was 0.235. The LC_{50} worked to 0.031% pure Dieldrin (HEOD), with 95% fiducial limits of 0.012% to 0.058%; the LC_{90} worked to 0.25%, with 95% fiiducial limits of 0.18% to 0.41%. As in the case of DDT, so also here there is a reasonably good correspondence between the visually estimated and statistically derived values for LC_{50} and LC_{90}; the approximation being even closer for the LC_{50}. The regression line is presented in Annex 3.

GRAPH SHOWING RELATIONSHIP BETWEEN LOGARITHM OF CONCENTRATION & PROBIT OF MORTALITY WITH 15-MINUTE EXPOSURE TO PURE DIELDRIN [HEOD]



Annex 3

DISCUSSION

Rao and Bhatia[6], reporting on the susceptibility of *A. culicifacies* in some parts of Bombay State, had their specimens collected in daytime from 08.00 to 17.00 hours. This is of particular relevance as Manjri, sampled by them, is only 3 miles from Hadapsar outskrits, the source of our test strain. Also, the season of their Manjri study is closely comparable; it is, therefore, interesting that in the nearby outskrits of Hadapsar *A. culicifacies* was available in abundance at night; the greater requirements of the present study were obtained in a much shorter time than that recorded, presumably, for Manjri by Rao and Bhatia[6]. Paucity of *A. culicifacies* was noticeable in the outskrits of Hadapsar also, during daytime. Even so, the profusion of night catches is revealing. It, therefore, appears reasonable to conclude that night catches are far more likely, than the ones in daytime, to be productive of *A. culicifacies*, a considerable number of which is required for any one battery of exposures by the current WHO Test method[8]. Sharma *et al.*[7] who reported on *culicifacies*-susceptibility in Udaipur and Arthala District, do not state if their collections were made in daytime or at night. Catches of *A. culicifacies* in Mandya District, tested by Rao *et al.*[5], were made between 07.00 and 10.00 hours. But the requirements of the test species were, in all these cases, far less than in the present study. The authors are not aware of any published report on the utilization of night catches of *A. culicifacies* for the study of its susceptibility to insecticides.

The night catches being so promising in the study of the subject matter, they are likely to offer a fruitful solution to the rather refractory problem "What should be done to ensure the testing of susceptibility levels where the mosquitos are (a) exceptionally few...',, that was raised in a recent Seminar arranged by WHO/Pan American Sanitary Bureau[10]. But the question may arise as to whether the night collections would be representative of the general population. Here again, it would appear that night catches are more advantageous than daytime catches, at least in the case of *A. culicifacies*. The enormity of the catches made night after night is far more likely to render the collections representative of the general population, owing to the much larger size of the 'sample'. It would, therefore, appear that night catches of *A. culicifacies* are superior in a number of ways, under conditions of day time scarcity.

To the knowledge of the authors there is no published report on susceptibility tests on the Indian malaria vectors, performed in the manner prescribed by The Export Committee on Insecticides[8]. The techniques followed by workers discussed hereunder

were, therefore, substantially different from that of the present study, and appear to be based on the recommendation of The Expert Committee on Malaria[9]. Furthermore, the values for LC^{50} recorded by these workers are based on an exposure period of 1 hour, in contrast to the 15-minute exposure employed in the present survey. Therefore, comparison of the present findings with those of other workers on *A. culicifacies* is not possible *sensu stricto*. Nevertheless, a broad-based is made where permissible, with the above proviso.

The results of exposures for 1 hour and 30 minutes make it abundantly clear that the test strain is highly susceptible to DDT. Available values for LC^{50} of DDT for *A. culicifacies* recorded in India are tabulated in Table IX.

Table IX

Table showing LC_{50} values of DDT recorded in different parts of India, A. culicifacies.

Locality surveyed	Sprayed or not, with DDT	Exposure time in minutes	LC_{50} of p-p' DDT	LC_{50} of Technical DDT	Bibliographical reference
Manjri (Poona)	Sprayed	60	0.453%	0.536%	6
"Other parts of Bombay State"	,,	60	0.410% to 0.535%	—	6
"Other parts unsprayed of Bombay State"	Unsprayed	60	0.240% to 0.379%	—	6
Udaipur (Rajasthan)	,,	60	—	0.19%	7
Arthala District	,,	60	—	0.43%	7
Mandya (Mysore)	,,	60	—	0.25%	5
Hadapsar (Poona)	Sprayed	15	0.55%	—	Present article

Of particular relevance to the present survey are the observations on the Manjri *culicifacies* by Rao and Bhatia[6]. Manjri is only 3 miles from, and comparable to, Hadapsar outskirts. Therefore, one would naturally expect the susceptibility of *A. culicifacies* to be alike at the two places. And Table IX reveals that it is so. The two values for LC^{50} of p-p' DDT belong to the same 'universe'. A near equality of the values is not necessary for the argument and, indeed, is not to be expected; considering that the methodologies are different in the two cases. The expectation of variations, within limits, in the susceptibility of one and the same test species, is pointed out by Busvine[1]. And it is not at all unlikely that our test strain shares with the Manjri *culicifacies* in the retention of susceptibility, over the years, to DDT that has been noted by Rao and Bhatia[6].

The probable value for LC_{90} of p-p' DDT was derived from the regression equation as 3.89%. For comparison, no reference is traceable in literature on LC_{90} for *A. culicifacies*.

As to DDT, so also to Dieldrin the test strain of *A. culicifacies* showed a high level of general susceptibility. The 15-minute exposure yielded mortality values well above 50% with the 6 concentrations of Dieldrin. One would have wished to be able to operate an even smaller exposure period; but it was not possible, especially when dealing with a battery of concentrations. As an alternative, concentrations lower than 0.05% would be a welcome addition to those provided. In this respect the test for larvae[8] is more manoeuvrable as intermediate and lower concentrations can be made at will. The probable value for LC_{90} may be easily derived from the regression

equation; whereas that for LC_{50} may not be so derived. For, 50% mortality lies well outside the range of observations. However, the fairly linear nature of the plotted values suggests that the probable value for LC_{50} may not be so derived. For, 50% mortality lies well outside the range of observations. However, the fairly linear nature of the plotted values suggests that the probable value for LC_{50} may reasonably be extrapolated.

The only published report of the LC_{50} of Dieldrin for *A. culicifacies* in India, to the knowledge of the authors, is that of Sharma *et al*[7]. Their findings, based on the technique recommended by The Expert Committee on Malaria, are cited alongside that of the present survey.

Locality surveyed	LC_{50} of Pure Dieldrin (HEOD)	LC_{50} of Technical Dieldrin	Bibliographical reference
Udaipur* (Rajasthan)	—	0.037%	7
Arthala District*	—	0.035%	7
Hadapsar** (Poona)	0.031%		Present article

* "Unsprayed" area. ** Area sprayed with DDT.

It is to be noted that the exposure period employed by Sharma *et al*[7] was 1 hour, in contrast to the 15-minute exposure of the present study.

There do not appear to be any reported values for LC_{90} of Dieldrin for *A. culicifacies.*

It is only reasonable to expect that a highly susceptible strain should be homogeneous. This is well borne out by statistical findings also. With the 15-minute exposures to DDT and Dieldrin the values of Chi-square obtained were not indicative of any significant heterogeneity.

As suggested by Busvine[1] the LC_{90} : LC_{50} ratio may be taken as a reasonably good index of test-sensitivity. The values for this ratio in the present study are:

Insecticide	Probable value of LC_{50}	Probable value of LC_{90}	LC_{90} : LC_{50} ratio
p-p' DDT	0.55%	3.89%	7.1
Pure Dieldrin (HEOD)	0.031%	0.25%	8.1

The sensitivity of the current Test method, as judged from the above ratio, does not compare favourably with that of the Busvine and Nash method[1]. Even so, it is considered that comparison of one method with the other for sensitivity should be reserved till more reports become available on the use of the current WHO Test method. Furthermore, the ratios quoted by Busvine[1] are based on 1 hour exposures, whereas those based on the present survey relate to 15-minute exposures. A true comparison may not, therefore, be possible.

The control mortalities in the present survey are, admittedly, not low. Other workers investigating the same species have claimed considerably lower figures, which are tabulated in Table X for comparison.

Table X

Table showing control mortalities of A. culicifacies in insecticide-susceptibility tests, recorded in India.

Investigator(s)	Control mortality in %	Bibliographical reference
Rao and Bhatia	0 to 19	6
Rao et al	8.3 to 11.1	5
Sharma et al	"never more than six per cent."	7
Narasimhan	0 to 25	Present article.

Whereas every effort was made to neutralize factors likely to be adverse to the survival of the test strain, the reported control mortalities could not be bettered under the prevailing conditions. It may be pointed out here that 4 controls carried out at the spot of collection recorded as low mortalities as 0, 5, 5 and 0 per cent. This was done purely to test the merits of an on-the-spot study; the figures were not utilized in any of the reported tests. It is indisputable that

there is so much to commend the conduct of the tests in the field itself, at the place of collection.

SUMMARY

A field survey is described, undertaken to determine the susceptibility of *A. culicifacies* to DDT and Dieldrin, in a DDT-sprayed rural areas about 4 miles from Poona Cantonment.

The current WHO Test Kit and technique were used, with certain essential modifications.

The superiority of night catches of *A. culicifacies* is stressed.

The test strain of *A. culicifacies* was found to be highly susceptible to p-p′ DDT and pure Dieldrin (HEOD). A 15-minute exposure had to be employed for both to derive the probable values for thier LC_{50} and LC_{90}. Based on the regression equations these values are respectively 0.55% and 3.89% for DDT; that for LC_{90} of Dieldrin was derived as 0.25%, whereas the one for LC_{50} was extrapolated as 0.31%. These findings are discussed in relation to those of other workers on *A. culicifacies*.

The regression lines, for DDT and Dieldrin, fitted by visual adjustment remarkably approximated to those based on the statistical method.

An extension of the study to a number of military stations in India is indicated.

ACKNOWLEDGEMENT

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Annex 1

Maximum and minimum temperatures and relative humidities recorded inside the cage for the period 13 to 31 August, 1958, during which the reparted tests were performed.

Date : August, 1958	Serial No. of test	Insecticide tested; exposure period; and replicate No.	Temperature				Relative humidity in %
			Maximum		Minimum		
			°F	°C	°F	°C	
13	6	DDT : 1 hour	80	26.7	80	26.7	87
14	7	,, : ½ ,,	78	25.6	78	25.6	87
15	8	DDT : 15 minutes 1st replicate	79	26.1	74	23.3	87
16	9	DDT : 15 minutes 2nd replicate	78	25.6	78	25.6	87
17	10	DDT : 15 minutes 3rd replicate	78	25.6	78	25.6	87
18	11	DDT : 15 minutes 4th replicate	76	24.4	76	24.4	87
19	12	Dieldrin : 1 hour	74	23.3	74	23.3	91
20	13	,, : ½ ,,	76	24.4	76	24.4	92
21	14	,, : 15 minutes 1st replicate	76	24.4	76	24.4	92
22	—	—	76	24.4	76	24.4	92
28	15	Dieldrin : 15 minutes 2nd replicate	78	25.6	78	25.6	91
29	16	Dieldrin : 15 minutes 3rd replicate	78	25.6	78	25.6	87
30	17	Dieldrin : 15 minutes 4th replicate	72	22.2	72	22.2	92
31	—	—	78	25.6	72	22.2	87

Note :—The readings were taken at 08.30 hours on the dates shown.

"HÆMATOLOGICAL STUDIES IN HEALTHY ADULTS"

By

SRI D. P. BHATNAGAR, M.Sc.,

DR. K. K. GOVIL, D.P.H., D.T.M., C.N., P.H.S.,

and

DR. B. G. PRASAD, M.D., D.P.H., D.T.M.,

Provincial Hygiene Institute, Lucknow.

The assessment of nutritional state is a diagnosis and like clinical diagnosis uses various disciplines, including clinical dietary, biochemical, functional and somato-metric methods. It is a detailed undertaking for a team of workers experienced in different disciplines. To determine it by adopting one method or the other is a difficult problem. Biochemical methods have been used for measuring the levels of specific nutrients like protein, iron, calcium and vitamins etc. in bodily tissues and fluids and for detecting metabolic abnormalities which occus when the supply of these nutrients is inadequate. In the evaluation of protein nutrition in population groups, the only clinical test which has been widely applied has been the determination of total serum or plasma protein and albumin and globulin fractions. The recorded data on the subject in India compiled in Table I shows that little attention has been paid to haematological studies in healthy adults from rural areas where about 80 percent of the population of India resides.

The object of the present enquiry, therefore, was to assess the protein levels, its fractions, haemoglobin percentage and blood cell counts along with other methods of nutrition surveys in normal adult males drawn from rural areas in Uttar Pradesh.

METHOD.

Venous blood was collected taking all the necessary precautions as suggested by Napier and Das Gupta (1942) in oxalated bottles, to which Potassium Oxalate, 2 mgm. per c.c. had been added as an anticoagulant from 36 healthy male adults belonging to rural families, coming from various places in the State of Uttar Pradesh and receiving training of Village-Level-Workers at Extension-Cum-Training Centre, Bakshi-ka-Talab, District Lucknow.

The subjects were clinically examined prior to the collection of blood and findings recorded in schedules suggested by the Nutrition Advisory Committee of the Indian Council of Medical Research for routine nutrition surveys. They are given in table II. All the village level workers were having a common mess. Their dietary intake, was also surveyed. The findings are given in Tables III and IV. Clinical nutrition survey and dietary survey were carried out according to the methods reported previously by Govil (1952) and Govil *et. al* (1953). The subjects chosen were enjoying normal health at the time of enquiry and had not suffered from any serious infection of recent origin and were receiving diets which though could not be classed as optimum yet was such as could be termed adequate to their individual needs within their economic means.

Blood was normally collected in the morning after the breakfast and before meals and brought to the nutrition laboratory in an ice container and various tests undertaken within one hour of receipt of the sample, in the laboratory. Five to six samples were usually collected in one day for reasons of convenience and handling. The enquiry extended from June 1956 to February, 1957.

The haemoglobin percentage was determined by Sahli's method and has been reported in Gm. percentage. The packed cell volume has been determined by centrifuging in Wintrobe tubes, for 30 minutes. As potassium oxalate alone was used as an anticoagulant instead of an isotonic mixture of potassium nad ammonium oxalates, to avoid shrinkage in R.B.C. (Wintrobe and Landsberg 1935) a correction factor suggested by Napier and Das Gupta (1936) value X 1.09 has been used and the results of P.C.V. show only the corrected values.

Table I.

Haematological data by Indian Authors.

Author and date	No. of cases	Type of groups	Method applied	Total protein	Albumin G/%	Fibrinogen G/%	Globulin G/%	A/G. ratio
1	2	3	4	5	6	7	8	9
Lloyd & Paul (1934)	10	Normal Indian Calcutta.	Refractometer (serum)	7.52	4.49	—	2.93	—
Chopra et. al (1934)	11	—do.—	—do.—	7.44	4.61	—	2.83	—
Bose, De & Mukherjee (1946)	20	—	Kjeldahl (serum)	6.7	4.5	—	2.2	—
Datta & Chakarvarty (1947)	45 (males) 25 (females)	Medical Student & Med. staff, Bombay	Micro-kjeldahl (Plasma) Howe's method.	7.51 ±0.23 7.49 ±0.27	4.93 ± 0.20 4.87 ± 0.21	0.25 0.26	2.58 ± 0.16 2.66 ± 0.18	2.21
Gokhle & Chitre (1950)	40	Medical Student	Micro-kjeldahl with Howe's method (serum)	6.93	4.70	0.18	2.08	2.26
Chakarvarty, H. (1951)	75	Med. Student & Tropical School of Medicine at Calcutta.	Copper-sulphate & Biuret (plasma).	7.1 ±0.52 —	4.5 ± 0.37 —	— —	2.6 ± 0.29 —	1.8 ± 0.23 —
Satoskar & Lewis (1954)	100	Medical Student, Bombay	Electrophoretic (serum) —do.—	7.76 Blood donors 7.08 Doctors 7.79	4.53	—	3.24	—
Kumar et. al (1957)	72	Doctors, Med. Students & Blood donors of Lucknow City.	Average	7.27 ±0.57	4.58		2.69	1.70 ± 0.65
This series	36	Village Level Workers recruited from villages under training.	Micro-kjeldahl with modified Howe's method by Majoor (1947) & Milne (1947)	7.72 ±0.33	4.77 ± 0.33	0.33 ±0.09	2.62 ± 0.39	1.81 ± 0.61

The total R.B.C., W.B.C. and differential W.B.C. have been determined according to techniques given in Kolmer and Borner (1953). The corpuscular values, viz. mean corpuscular volume (MCV), mean corcuscular haemoglobin (MCH) and he mean corcuscular Haemoglobin concentration (MCHC) have been calculated from the data collected, of total R.B.C., Haemoglobin expressed in gms. percent and the packed cell volume.

Several methods (1, 3, 6, 15 and 16) have been described for determination of plasma proteins. The method universally recognised as standard for determination of plasma proteins is the Kjeldahl nitrogen determination. For separate determinations of albumin and globulin the Tisselius (1937) electrophoretic method is the accepted standard. Fractionation of albumin by precipitation with concentrated solutions of $Na_2 SO_4$ have been compared with the above standard by Majoor (1957) and Milne (1947) and the results have been found to tally well.

Total plasma proteins have been determined by micro-Kjeldahl method taking 0.2 o.c. of separated plasma, digesting it with conc. $H_2 SO_4$, using hydrogen per oxide as oxidising agent. Usual reagent blanks were run side by side with the estimations. Total nitrogen so determined contains both proteinous as well as non-protein nitrogen. The non-protein nitrogen has been reported to usually range from 15.17 to 21.92 mgm. (Gokhle 1939) with an average of 18.43 mgm. The N.P.N. figure (.01843 gm) is so small as compared to protein nitrogen, that this only introduces a very small error of 0.11 gm. percent in the calculated figure of total plasma proteins from the total N. Only in cases of gross nitrogen retention is the correction of non-protein nitrogen of much significance (Greenberg , 1948). Therefore the total Nitrogen X 6.25 has only been given as the total plasma proteins in the results, as it was the object of this study to adopt, in estimation of total plasma proteins and its fractionation, only such techniques as would give quick results.

For estimation of albumin, the globulins were precipitated with 26.8% $Na_2 SO_4$ as recommended by Majoor (1947) and Milne (1947) in modification of Howe's method (1925). The albumin in the filtrate was estimated by micro-Kjeldahl procedure. Fibrinogen was determined by techniques given by King (1951)—'Micro-analysis in medical biochemistry'. Globulin has been reported by deducting figures of albumin and fibrinogen from total plasma proteins.

Standard deviation of the individual results have been determined by conventional statistical methods.

Table II.

Criteria upon which features assessed—Clinical features.	Found affected Actual No.	Percentage.
1	2	3
1. Appearance :		
Good 23		
Fair 12		
Poor 1		
Very poor 0		
2. Eyes :		
(a) Conjunctiva		
i. Xerosis. Slight, dry on exposure for ½ mts.	5	13.9
ii. Pigmentation. Slight discolouration	6	
Moderate browning in patches	2	25.0
Severe earthy discolouration	1	
iii. Discharge	0	0.0
(b) Cornea		
i. Xerosis	0	0.0
ii. Vascularisation	1	2.7
(c) Lids		
i. Excoriation	1	2.7
ii. Folliculosis	0	0.0
iii. Ang. Conj.	0	0.0
(d) Functional		
i. Night blindness	0	0.0
3. Mouth: Lips Condition (Ang. Stomatitis)	0	0.0
4. Tongue		
i. Colour	0	0.0
ii. Surface	0	0.0
5. Gums : Condition		
i. Ginjivitis	4	13.9
ii. Pyorrhoea	1	

Criteria upon which features assessed—Clinical features.	Found affected	
	Actual No.	Percentage.
1	2	3
6. Teeth :Caries Slight	4	11.1
7. Hair : Condition		
i. Loss of lustre	1	5.5
ii. Discoloured and Dry	1	
8. Skin : Appearance Elasticity. suborbital pigmentation		
10. Adipose Tissue		
11. Oedema	0	0.0
12. Bones : Condition		
13. Appetite		
14. Stools		
15. Calf Tenderness		

Table III.

Average daily intake of food stuffs in ounces per consumption unit in the mess.

Cereals—		
Rice		8.5
Wheat		16.8
Juwar		
Bajra	Cheap grains	0.2
Ragi		
Maize		
Others		
Pulses		5.2
Green-leafy vegetables		0.6
Non-leafy vegetables		4.1
Roots and Tubers		5.0
Fruits		Negligible
Ghee		0.7
V. Oil		0.45
Milk and Milk products		9.6
Meat and Fish		—
Eggs		—
Sugar and Jaggery		0.3
Prepared articles of foods		0.32

TABLE IV

Average daily intake of nutrients per consumption unit.

Calories (Gross)	3,700
Protein	
Animal (G.)	9.6
Vegetable (G.)	109.9
Total (G.)	119.5
Fats (G.)	62.0
Carbohydrate (G.)	762.0
Calcium (mg.)	985.0
Iron (mg.)	59.0
Vitamin A I.U.	1,784
Thiamin (mg.)	3.0
Riboflavin (mg.)	1.7
Nicotinic acid (mg.)	30.0
Ascorbic acid (mg.)	40.0

Note to Table IV—Calculated on foodstuffs as purchased and no allowance has been made for destruction of nutrients during cooking.

General information about age, height and weight of group studied

	Age in years	Height in inches	Weight in pounds
Range	19-26	5'-1"—5'-9½"	91.0 to 153.0
Mean	21.7	5'-3¾"	119.4
S. D.	± 1.8	—	±13.7

Table VI.

Haematological findings in the blood of 36 healthy male adults.

	Haemo-globin gm. %	Total R.B.C. per C.M.M.	P.C.V. %	Total W.B.C. per C.M.M.	Differ-ential W.B.C.	M.C.V. Cu. M.	M.C.H.	M.C.H.C. %
Range	14.6 to 18.4	4.17 to 6.08	40.3 to 53.4	4,500 to 9,850	Average	82.7 to 104.0	30.0 to 35.9	31.3 to 36.9
Mean	16.7	5.10	47.8	7,380	Poly. 63 Lympho. 26 Eosino. 8 Mono. 3	94.0	32.9	34.7
S.D.	±1.6	±0.99	±2.5	±1,435	—	±5.7	±1.65	±2.66

Table VII.

Total plasma proteins and distribution of its different protein fractions in 36 healthy male adults.

	Plasma Proteins gm. %	Albumin gm. %	Fibrinogen gm. %	Globulin gm. %	A.G. Ratio
Range	7.17 to 8.31	4.20 to 5.74	0.20 to 0.53	2.05 to 3.55	1.36 to 2.71
Mean	7.72	4.77	0.33	2.62	1.89
S.D.	±0.33	±0 33	±0.09	±0.39	±0.61

RESULTS.

The enquiry lasted from June, 1956 to February, 1957. Twenty blood samples were collected in summer, eleven in winter and five in rainy season, everage of total plasma proteins in winter comes to 7.91 gm. %, that in summer 7.68 gm. % and 7.44 gm. % in rainy season. Though slight variation is apparent in the figures of total plasma proteins in the three seasons, effect of season cannot be definitely guaged by the results in view of small number of samples done in each season and also these differences are not statistically significant. General information about age, height, weight of the individuals studied is given in Table V. There is no significant correlation between height, weight and total plasma protein or its different component fractions.

The results of haematological findings are given in Table VI. M.C.V., M.C.H. and M.C.H.C. figures have been calculated in each individual case. The figures of R.B.C., W.B.C. and P.C.V. agree well with the reported figures by the other workers compiled by Patwardhan (1952).

Average figure of haemoglobin determined by Sahli's method of the studied group in our case comes to 16.7 gm. % which is higher than those reported by other workers. There is great divergence in the reported haemoglobin values between different workers partly due to different methods adopted of estimation and possibly due to different nutritional status of the group covered in the studies. The group covered under the present study consisted of village level workers, and were selected for the

training after preliminary medical test. The individuals are given 4 to 5 hours strenuous open air exercise daily in the form of agricultural and other manual work. They are living in open country in healthy and hygienic surroundings. They are subjected to various physical fitness tests and were, therefore, enjoying normally good health. These conditions would explain higher values than those reported by other workers for haemoglobin.

They were also taking diet in a supervised common mess and most of the members were supplementing their diet by extra milk and milk products individually. Their diet has been analysed for nutrients per consumption unit and shows that the diet meets the minimum daily requirements except in vitamins A and C, (if 50% of vitamin C is destroyed during cooking). The diets were purely vegetarian, and vey little fruits were consumed for lack of availability and economic reasons.

Findings given in routine clinical assessment Schedule (Table II) corroborates that the group was enjoying good health but for minor defects like, xerosis of conjunctiva, vascularisation and lid excoriation in few cases, and unhealthy gums in 5. Normally a wide spread deficiency of vitamin A and C has been observed in the dietetic survey in the U.P. State (Govil, 1953). This goes to show the normalcy of the group studied in their nutritional status.

Results obtained from estimations of total plasma proteins and fractionation of different proteins fraction have been summarised in Table VII. The value of total plasma proteins range from 7.17 gm. to 8.31 gm. with a mean of 7.72 ± 3.33 gm. and that of albumin from 4.20 gms. to 5.74 gms. with a mean of 4.77 ± 0.33. Values of globulin range from 2.05 gm. to 3.55 gm. with a mean of 2.62 ± 0.39. These values of total plasma proteins, albumin and globulin, agree very closely with those reported by both old and recent workers, vide Table I. It does not, therefore, appear necessary to make N.P.N. correction in the routine estimation of total plasma proteins. Also the findings of Majoor (1947) and Milne (1947) that the values of albumin obtained by salting out procedures tallies closely with results obtained by electrophoresis is corroborated by comparing the results of the present series with those done by electrophoresis by recent workers 15 and 20. The values of globulin obtained by deducting fibrinogen and albumin from the total plasma proteins also agree closely with the values obtained by different workers (Chakrabarty, 1951; Gokhale *et al*, 1958; Kumar *et al*, 1957) except those of Satosker (1954) in which a high value 3.24 gm. % has been obtained by them, the difference with Kumar *et al* and these workers, is that the latter have discarded arbitrary globulin correction factor in the estimation of globulin from paper electrophoresis.

The values of fibrinogen in our estimations range from 0.20 to 0.53 gm. % with a mean of 0.33 ± 0.09. Very few values of fibrinogen are reported both by old and new workers vide Table I, the values found by us are slightly higher than those of Dutta dn Chakarvarty (1947) but not significantly different. Values of A. G. ratio range from 1.36 to 2.71 with a mean of 1.89 ± 0.61, which correspond to the figures reported by recent workers 15 and 20.

DISCUSSION.

The subject of plasma proteins has increasingly gained importance in the field of nutrition and clinical medicine. Upset of plasma protein content is a common accompaniment of disease. Kagan (1943 a) has given a list of diseases in which hypoproteinemia or hyperproteinemia may occur.

Determination of the total plasma proteins can be made more readily than that of the different protein components. In the majority of instances, the changes taking place in the circulatory system can be readily deduced from the alterations in the total serum protein concentration. Particularly in controlling plasma and fluid transfusion, in massive haemorrhage, shock, burns, post operative management and in all conditions in which there may be reason to suspect dehydration haemoconcentration or plasma protein depletion, estimation of plasma protein serves a useful guide.

But in many pathological states there is an increase of globulin with a diminution in the level of albumin, so that in such cases

the total protein though remains normal, its component moieties are abnormal. It is true, as Kumar et. al. (1957) have remarked that normal serum protein level cannot be taken a measure of the nutritional status of any individual. It it, therefore, essential that separate analysis of the different proteins fractions may be done side by side, with the estimation of total plasma protein, to get a correct picture of the nutritional state of a person as well as to detect any pathological state existing in the individual.

Out of all the moieties of plasma protein, albumin, globulin and fibrinogen, what should be taken as a measure of nutritional status of a person, is a question of importance to the nutritionists.

It is well known that the albumin fraction is the one, of considerable importance as its proper concentration maintains the normal osmotic pressure of the blood plasma which in turn regulates the fluid balance between the tissues and the blood of the body.

Hypoproteinemia is more common than hyperproteinemia and study of hyperproteinemia is a study of hyperglobulinemia as stated by Kagan (1943 b) as an increase in the concentration of albumin is seldom encountered. Cases of hypoproteinemia are invariably due to hypoalbuminemia. Hypoalbuminemia is common in persons showing evidence of malnutrition and diseases of kidney, liver, intestinal tract (Prolonged diarrhoea), so that if these involvements of disease are not present, albumin level appears to be significant in judging nutritional status of a person.

A decrease in total protein values below 5.5 gm. per 100 c.c. favours the formation of oedema (Goodale, 1954) a sign present in cases of gross malnutrition, so that between the range of 5.5 gm.—7.0 gm. will lie cases of hypoproteinemia in which albumin values will be significant more in determining nutritional status of a person than the total plasma proteins.

SUMMARY.

1. Total plasma protein values have been estimated in a group of 36 male healthy adults drawn from different areas of U.P. State by micro-Kjeldahl method. The values ranged from 7.17 gm. % — 8.31 gm %.
2. The subjects were clinically examined with record of age, height and weight; a dietary survey of the group was also made, the findings were recorded in schedules suggested by Indian Council of Medical Research for such surveys. The individuals were enjoying good health except for minor defects in few cases. The dietary intake was adequate in all respects except in vitamin A and C which is a normal observation in the case of rural dieteic survey.
3. Different plasma protein moieties have also been estimated simultaneously. Albumin values range from 4.2 gm. % — 5.74 gm. %, Fibrinogen from 0.2 gm. % to 0.53 gm. %, globulin from 2.05 gm. % to 3.55 gm. % and A. G. ratio from 1.36 to 2.71, in the group.
4. Haematological studies made are Haemoglobin, Total R.B.C., Total W.B.C., P.C.V., Differential W.B.C. and calculated values of M.C.V., M.C.H. and M.C.H.C.
5. The significance of total plasma protein values and its different fractions in assessing the nutritional status of a person, have been discussed.

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ISOLATION OF SALMONELLA SPECIES FROM FOWLS*

By

R. C. Pathak and C. M. Singh

Department of Pathology & Bacteriology
U.P. College of Veterinary Science and
Animal Husbandry, Mathura.
U.P. (INDIA)

Salmonellosis is a disease of both men and animals, and methods for prevention and control form a common ground for investigation and co-operation between the veterinary and medical professions, and other concerned with public health, (Hinshaw, 1949). While it has been well established that man may contract infection from animal sources, the sanitary importance of avian paratyphoid infections lies in the fact that birds now known to be a natural reservoir of paratyphoid organisms are an important source of human food products.

Our knowledge about food poisoning due to salmonella is still inadequate and so about the source and origin of these infections. The origin of many salmonella infections in men and animals is the infected carrier animal or food products derived from such animals. The animals which successfully combat infection may remain symptomless carriers for varying periods, during which their faeces will be infected intermittently with salmonella. The majority of such animals develop no clinical signs of infection. They form the main source of infection for other animals and are the most difficult to detect by bacteriological or serological methods. The extent to which different species act as carriers or reservoirs of infection varies, and our knowledge of the relative importance of each species depends upon the extent and number of surveys which have been made. At the present time, domesticated poultry constitute the greatest host-reservoir for salmonella in the animal kingdom (Buxton 1957).

The variety of serotypes already isolated is extensive especially from poultry from which about 80 salmonella serotypes have been reported from all over the world. But in India the problem of avian salmonellosis is scarcely touched. Rao (1956) referring to a list given by Shirlaw *et al* about a few salmonella, viz., *S. gallinarum* from chickens and *S. enteritidis* from pigeons, has mentioned about Shirlaw's statement regarding the dearth of trained workers to take up salmonella work in India.

Rao (1946) associated *S. anatum* to the mortality among ducks in the Army Development Farm in India in World War II. Iyer *et al* (1950) reported an outbreak of the disease in chickens due to *S. typhimurium;* Dixit (1951) isolated *S. anatum* in baby chicks in Bombay Province, and again in (1952) he isolated *S. anatum* and *S. typhimurium* from chicks. Rao (1952-53) isolated *S. typhimurium* from chickens and one more serotype which he typed in 1956 as *S. litchfield;* Pande *et al* (1953) isolated *S. bovismorbificans* from baby chicks; Das *et al* (1955) isolated *S. alachua* from an acute outbreak of poultry.

This note is about the isolation of two members of the Salmonella group viz., *S. dublin* and *S. enteritidis* from fowls of White Leghorn breed, received in this department for routine post mortem examination from the Poultry farm attached to the College.

Technique employed

Pieces of liver spleen and gall bladder were collected, from those carcases which did not show post mortem changes, with aseptic precautions, in test tubes containing about 15 ml. of tetrathionate broth containing 1 in 1,00,000 brilliant green or selenite broth whichever was available. Approximately 1 gm. of intestinal scrapings or faecal material was also collected in any of the enrichment medium. These were incubated at 37°C for 18-24 hours and then streaked

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on desoxycholate citrate agar plates. These plates were incubated at 37°C for 24-48 hours at the end of which isolated colonies were picked up and sub-cultured on nutrient agar slants separately.

From this single colony isolated culture, biochemical characteristics were studied by sowing the sugar media, viz. glucose, lactose, sucrose, salicin, maltose, dulcitol, adonitol, inositol, arabinose, rhamnose, xylose, sorbitol and mannitol. Indol, M.R., V.P. and Citrate tests were also done. Urease production was also studied which was very helpful in eliminating the cultures of proteus species.

When polyvalent group 'C' Salmonella antisera was available the slide agglutination was studied with single colony isolated cultures.

Those cultures which behaved like Salmonella group typically in biochemical characters and gave positive slide agglutination test were sent to Armed Forces Medical College, Poona for final typing. A few cultures were also sent to Salmonella Reference Laboratory Collindale Ave. London for typing.

Result and Discussion

There are numerous reports on the isolation of S. *dublin* from bovine source, but the isolation of S. *dublin* from fowls is very rare. Hansen (1942) and Edwards & Brunner (1943) reported the isolation of S. *dublin* from poultry (probably turkeys and canaries). In this investigation S. *dublin* was isolated on several occasions from the organs and faeces of fowls. Edwards (1959) has also identified cultures of S. *dublin* which were isolated from chickens. The isolation of S. *dublin* shows a most unusual infection of fowls (Taylor 1959). It is suspected that they had contracted this infection from cattle because cattle sheds are not far away from the Poultry Farm.

S. *enteritidis* primer infects men but the isolation of this organism from fowls has been reported by a number of workers from many countries. From India also it has been isolated from pigeons but not from fowls. During this investigation it was also isolated from the intestines of fowl.

S. *dublin* and S. *enteritidis* have public health importance being the causative agents of gastro-enteritis when present as contaminant in the food material. The contamination of the food material can take place in various ways. Usually the food and water can be contaminated by the faeces of the carrier animal. In addition, flies, other insects, and ticks may act as intermediate carriers. They become infected from animal faeces and mechanically carry infection (Buxton 1957).

A few outbreaks of human food poisoning have also been ascribed to hens eggs (Wilson 1950), because egg shells may also become contaminated by faeces and thus constitute a danger in handling food products. Large amount of eggs are used in bakery and confectionary products (dried or frozen), some of which may teem with salmenella spp, when reconstituted they are sticky and likely to pollute everything and everybody in the bake house. Boyle (1958) has, however, reported, S. *dublin* septicaemia in a child of 8 months of age where he has reported an unusual feature of simultaneous isolation of the organism from blood, skin and faeces.

The findings reported here not only suggest a thorough investigation to find out the position of Salmonella carriers in poultry but also in other animals and birds, domesticated and wild, all of which play an equally important role in the transmission of this infection from one another.

SUMMARY

The isolation of S. *dublin* and S. *enteritidis* from fowls has been reported. The isolation of S. *dublin* from fowls appears to be most unusual and a rarely reported instance. The probable source of this most unusual infection of fowls is discussed. The danger from paratyphoid in chicks to human health is pointed out and need for the investigation of animal reservoirs and carriers of Salmonella stressed.

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EXHIBITION AS A TOOL IN HEALTH EDUCATION

By

DR. V. L. PANDIT, L.M.P., L.P.H., (Cal), M.R.S.H.

Municipal Health Officer, UDIPI. S.K.

Exhibitions arranged by any department are intended to serve as window on the activity of the department and disseminate the knowledge. So Health Exhibitions are intended to educate the public on health matters and the valuable facts about health.

The meaning of an exhibit is different for different persons. For example, to a lawyer an exhibit is supporting evidence, to a merchant an exhibit is his show window, to an author of a scientific paper exhibits are photos, charts etc., and so on. Whatever an exhibit means to different persons one thing is common that is its objectiveness. A good and an honest exhibit offers facts without bias, stimulate observation and encourage contemplation. An exhibition is a collection of such exhibits in a place which creates interest with real objects, tell a story forcefully, combine a variety of training aids and can be circulated as a self explanatory unit.

Though exhibition as an aid in advertisements was known as far back, as the thirteenth century, the first world fair was the great Crystal Palace exhibition at London in 1851, after which many places followed suit. The first mention of "Medicine and Public Health" in a fair where usually industry and inventions had place was in the World's Fair at New York in 1939-40, wherein was a special hall of "Medicine and Public Health" which drew an attendance of 7,500,000 people.

Before this attempts were made to prepare exhibits, as the first tuberculosis exhibit for the general Public was developed in Baltimore in 1904. In 1912 in the International Congress on Hygiene and Demography a large collection of exhibits contributed from many parts of the world were exhibited. In 1911 the child welfare exhibits in New York was very well attended. During the year 1912, a Permanent Public Health Exhibit was installed in New York by Dr. C. E. A. Winslow. Though the motion picture and radio absorb attention still people love a good show to look at anything novel or graphic, and exhibitions are good for this purpose.

Exhibitions have not become obsolete. Only thing needed is a better understanding of how learning takes place through visualisation and how to present arguments in the best visual form. With this end in view it is discussed as to how best an exhibition can be fitted up.

An exhibit has to be planned well ahead, and after deciding the main ideas the material pertaining should be collected and sorted. It will certainly be not possible to show everything but what is shown should be well laid, labelled and explained where necessary.

In planning the exhibit it is to be done in such a way that the first look will give the visitor the main idea of the exhibit. A guide telling the visitor what to expect and what to look will be every useful. The exhibit should appear simple, especially to the foot weary visitor.

The charts, photographs, etc. shown and the amount of money spent depends on circumstances. Though good exhibits cost money, money alone will not make a good scientific exhibit. Much depends not on the brilliance of lighting and method of presentation but on the contribution which the exhibit makes to the field of science.

The exhibits are to be arranged in easy eye range. The booths should not be too high, an average of 8 feet will be convenient where in the top 6-9" cannot be used as the lights of the booth will interfere with this space and the bottom 2 to 2½ feet will not be convenient for an observer to see things placed at that level. So this leaves a space of 5½ feet for the material. In this space is to be put the exhibits, titles, substitles etc. For a good appearance a space of 5 feet will be sufficient.

Space in a scientific exhibit is to be used as economically as possible. It should be so planned as not to leave large areas blank at the top or bottom of the exhibit material. Usually space for each exhibitor is assigned in the basis of his request. So it will be incumbent on the exhibitor to fit his material into the space assigned. An impression that the appearance of the exhibit will be improved by leaving large areas unused is not correct. So also cramming up of exhibits will not improve the appearance.

The floor space of the booth is to be entirely reserved for the visitors and not encumbered with tables and chairs. The shelves around the sides of the booth will make tables unnecessary. Putting of tables and settees is not conducive as few visitors will have the temerity to break in and view the exhibits.

In any exhibit the titles and labels are important items which overdone gives an impression of "a collection of labels illustrated by objects". The labels should not be too wordy not be placed in such a way as to cause inconvenience to the visitor.

A marked effect can be had on the audience by proper choice of words for the labels. Fewer the words better it is but it should not be literally few; the words used must give the proper message.

Even the type and size of letters used in the labels as well as the colour go a long way in making them catch the eye of the visitor. The letters should neither be too small nor too big. The main title should be in the largest type, with subtitles smaller and individual labels smallest. Proper spacing of the words in the label is important to increase readability. The style of the letter is also important. Fancy letters and curlicues should be avoided, straight forward lettering in simple style is to be used.

Graphs when used should be simple and bold. They should be simple bar graph line graph or pie charts. Too many items should not be put on one graph as this will confuse the visitor. Logarithmic graphs should not ordinarily be used. Graphic representation puts the figures into a form that leaves a visual impression. Wording on the charts should be reduced to the minimum.

Photographs are good exhibits and they can be either coloured or black and white. They should be arranged mounted on mats with room for description lable etc. While framing these photos glass should not be used to avoid the glare. "Before and after" photographs are good for demonstration, but they should be accompanied with the indication of methods used to achieve the results.

Simple line drawings will have a distinct advantage over others as all extra matter is omitted and the main points are emphasized. Colour should be judiciously used to give an eye appeal and make the drawing or illustrations more easily comprehendable.

Certain subjects like Anatomy, Surgery, Pathology are best adaptable for this procedure of illustrations. But it should not be exaggerated or over emphasized.

There have been many methods of putting life into exhibits used for public displays. The mechanical devices may catch attention but adds nothing to the educational value and sometimes may act as distraction. Devices to make sound are unacceptable. Motion pictures in booths create difficulty as such are to be eliminated.

Sometimes display cases are made in advance wherein the exhibits are placed and shipped in complete form. In such cases many variations are possible. The style of the case may be subjected to ingenuity and the radius of vision may be increased by projecting the case forward at an angle at the top and bottom. In any circumstances the case should be simple because it is the material in the case that matters and not the case itself. In these cases commercial studios are in making the case as well as the name of the exhibitor very prominant. One disadvantage about these exhibits cases are that the cost of their making and the difficulty in creating and shipping. But in cases of permanent installation these cases are more convenient.

When the Exhibit is complete one task that remains is installation. Before this a definite plan of installation is to be drawn up so as to give an appearance to the visitor. While doing so the short-comings are to be noted for rectification. Straight horizontal lines for charts, and pictures are good. Stair step arrangement is not ordinarily considered good.

Before the exhibits are installed in the stall it is better to have a practice installation, a form of "Preview" locally, in which all the necessary tools etc are to be listed. This preview has an advantage of improving the procedure but has the disadvantage of not being entirely new, to those who have attended the "Preview". But this may not be a great disadvantage because it is shown locally in only one meeting.

Coming to the personal demonstration, it is felt that an unattended exhibit looses much of its value. The attendent should be the person who is responsible for the exhibition or his assistant who is thoroughly conversant with the details. Demonstration of an exhibit is a difficult task as the long hours, heavy pressing crowds and some times the amount of details that has to be explained. But all these does not go unpaid. The exchange of information with many people contributes much. One most important quality for the demonstrator is that he should have a thorough knowledge of his subject, stamina to withstand the strain, patience to answer the same questions over and over, and above all a joyful mind to impart knowledge to others.

These factors will make exhibition a good tool in imparting Health Education.

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OUR TASK AHEAD

The Second Five-Year Plan is about to be over and the Third is in the offing. Our leaders and national planners are busy discussing and deliberating on the shape, size and pattern of the Third Five-Year Plan as well as deciding on the aspects of development which should receive emphasis and priority. We suggest that Third Five-Year Plan should not be treated as merely an expansion of the second plan but as the first phase of a prospective plan covering a period of 20-25 years. This has an advantage in that it allows of targets to be fixed at the end of the long term and takes full cognisance of the increase in population and its important bearing on the plan in its detailed aspects. It also allows of a co-ordinated expansion of community development block and health services. We are fully conscious of the limited financial resources of the country as well as of the co-ordinate problem of man power. Such a perspective plan, though it envisages a programme spread over several plan periods, can be phased as five yearly period and attempts made to reach the targets pro rata at the end of each phase.

Rumours have it that the Third Five-Year Plan is likely to give emphasis and priority in small industries and agriculture. So far so good, if all collateral consideration of national development in other fields indicate the decision. But whatever provisons are made for development of these fields we should not lose sight of the fact that the basic development in the field of the social sciences such as of Educations and Health should not be starved but receive utmost attention and provision for these two aspects of development be made liberally in the third five year plan.

It is customary to explain away inaction and indifference by placing all the blames at the door of finance. But what justification can there be for shortfall in expenditure and lapsing back of the funds provided by the Planning Commission except that the States concerned have shown utter lack of foresight in planning and utmost neglect in performance?

There is another aspect of the question and that concerns the availability of trained personnel for the various fields of Health Services. Who knows more than the State Administration about the wide gap that exists between the needs of trained man power and their availability at present and yet one would feel tempted to enquire why this indifference in developing training centres for all categories of medical and para-medical personnel. Unless each state takes up the issue with the seriousness it deserves lack of man power will

eternally hold back the clock of progress far from realising the targets we set for the phased periods of planning. We shall wake up and discover that we have remained almost static.

It is true that some progress has been made by establishing new medical colleges for providing medical graduates in the country in larger numbers. From 15 medical colleges in the pre-independence period we have now 50 medical colleges—about 35 new ones—established within the latter half of the first plan and the second plan. Let us not forget however that the products of a number of these colleges will not be available for the service of the country before the middle of the Third Five-Year Plan. The impression made on the gap therefore would be negligible. While on this issue of increasing the number of medical colleges and training medical graduates in increasing number, it will be pertinent to refer to one aspect of the question which deserves careful consideration. If inadequacy of medical graduates *vis-a-vis* the needs of the country is deplorably great the observation is applicable with greater force to the availability of trained and experienced teachers to man these colleges. Experienced and trained teachers pursue an educational approacch to medical education, whereby they train the mind of the student, teach him to observe things for himself and form proper judgment. There are others who follow methods of instruction only leading to mere memorising of facts. In our rush for establishing new colleges the lack of properly qualified teachers in the country may be lost sight of and consciously or unconsciously we may be lending our support to lowering of standard and quality of medical education in the country. It is desirable that we guard this tragedy as far as possible.

We now refer to the lack of trained personnel in the para-medical categories The gap between the needs of these personnel for a reasonable health service and their availability in the country is literally staggering. And yet these para-medical personnel, be they sanitary inspectors and health assistants, nurses and public health nurses, midwives and pharmacists—form the vanguard of health campaign in any country. While we needed about 20,000 sanitary inspectors during the second plan period we have barely 4000 in the country. P. H. Nurses available in the country could be counted on fingers of two hands-one solitary institute undertaking their training, the number of admission remaining ridiculously low. By the end of the Third Five-Year Plan the number of Sanitary Inspectors required would amount to 30,000 and Health Assistants about 36,000. Pharmacists of whom barely 100 is available in the country, 2,500 would be required by 1966. Of Nurses for hospital service the position is precariously bad. With a view to providing even elementary services for the mass of the people in any adequate degree the Second Five-Year Plan estimated that against 80,000 nurses including auxiliary nurses needed in the country at least 31,000 would be available. It also emphasised the need for achieving substantial advance in the position of training facilities for different classes of personnel. We are in the last but one year of the second period and the record all over the states shows that we are far behind the target we set for training and making nurses available. The States as well

as the Centre have failed deplorably in this direction. We have some idea of the acute shape the problem has assumed from the report on the floor of the Parliament that in New Delhi beds could not be opened for over six months for wants of nurses. The picture revealed in regard to a hispital in New Delhi will, if enquiries are made in different states, be found to be a very common feature in many large hospitals. Much of the complaints now made against the hospitals in due to lack of adequate nursing staff.

Nursing is a noble profession and unemployment even among the educated women is widespread, as figures published by the various Employment Exchanges from time to time indicate. There must be something seriously wrong if despite all this, the country suffers from shortage of nurses who constitute an essential limb of any organised health service. In the absence of any other explanation the conclusion becomes irresistible that either the remuneration and service conditions are unattractive or that the training facilities provided in the country are hopelessly inadequate. We consider that both the causes are responsible for this state of affairs.

Our Prime Minister, while addressing a recent conference, is reported to have stated that "Of all the various activities in India probably the most important activity and potentially the one which will bring the greatest results is the Community Development because here one is working with the human beings, developing certain mental and bodily attitudes—a certain dynamism developing the quality of the people". If the aim expressed in the Prime Minister's statement is to be achieved the health services in the Community Development Blocks have to be improved. The staff pattern of these blocks for development of health is in ordinately poor and the services now rendered are more in name than effect. This again is due primarily to shortage of trained medical and para-medical personnel, particularly the latter. We refuse to believe that paucity of funds could be the cause.

The task that lies ahead of us is to make the states realise their essential obligation towards providing in each of them training centres and facilities for para-medical personnel. This vitally urgent problem has been placed before them from many a platform by individuals, bodies and associations who could speak with authority on the issue. But it has received scant attention from some states and none from others—even though it is in their own interest that they should have provided the facilities. Even the various committees of health panel of the Planning Commission pleaded for it unanimously as far back as 1955. Very poor progress has been made in the first two plan periods. Let us not lose any more time.

We shall even go further and suggest to the planners of the Third Five-Year Plan that they not only ear-mark provision for establishing training centres for ancillary medical personnel in each state but even make other grants for health development conditional to the states putting up training centres for each category of this group of personnel. For what will it avail us if we have brick and mortar buildings without trained personnel to man them with? Of what value and virtue are Hospitals and Health Centres schemes if we have no personnel to render even the minimum service?

CARDIO-VASCULAR HEALTH CENTRE.

Last few years, the incidence of sudden death due to diseases of the heart and blood vessels particularly coronary thrombosis has been steadily rising in India. Paradoxically, the main target of the attack so far, however, is the medical men themselves upon whom is laid the public confidence for saving them from all untimely death and unnecessary suffering. The other professions who are in similar danger are the lawyers, judges, political leaders, business magnets, scientists and executives of industrial and business concerns etc., that is, those persons who have to exercise a great deal of the mental faculty often subjecting themselves to unusual mental stress and strain with very little or no physical exercise.

The point at issue is why these people are now becoming victims to these conditions. We have to think what changes might have taken place within the last decade or two which could have contributed to this higher incidence. Some try to explain it away by saying that we are now living longer years and coronary diseases of heart are merely the natural sequence of ageing. How futile this argument is can be judged from the fact that the Parsis who are the long-lived persons not only in India, but also perhaps in the world, do not give evidence of an excess of cardio-vascular diseases among them than in the general public. Secondly, our longevity cannot rise to an appreciable extent within one or two decades. It is still below 40 compared to 67 to 70 years among the Westerners. Thirdly, when the longevity started rising in Japan several decades ago it was not followed by immediate appreciable rise of deaths due to coronary thrombosis, as is happening in our country. Fourthly, the coronary attacks have occurred in persons aged even below 40 years, and between 40 and 50, which cannot be considered anything as ageing. Next, coming to the question of stress and strain of life, if anything else, it is being increasingly felt by the middle class working people than by the top-ranking intelligentia or the economically upper strata. The effect of freedom in our country should rather be towards releasing the condition of unemployment and of stress and strain and to assure for each person security of life by providing at least the minimum of the biological needs namely food, shelter (housing clothing) health (including enjoyment) and peace of mind. Thus it appears that the matter is not so simple as it may look. At the same time it cannot be prevented or even cured if the etiology is not properly worked out.

There is, however, no doubt that this highly fatal disease is one of those afflictions which man has, to a large extent, brought upon himself through the so-called process of civilization and by his ways of life, com pared to that of less civilized or primitive people. The difference can however, be easily seen in India where all grades and shades of people —highly civilized, half civilized, primitive, highly intelligent, spiritualistic, illiterates, rich, poor and indigents, and of different religious beliefs etc. are available.

A few obvious things which are the outcome of the so-called civilization may be mentioned here:

(1) The first and the foremost is the increasing use of *Artificial Food.* The processing and adulteration are the two greatest vices of civilization and there is no denying of the fact that pure food has of late become a rarity in India since the Second World War and more so during the last few years. It can, however, he said without any contradiction that the more natural the food the more acceptable it is to the system and causes the least upsetting of the stomach. Sudden change of food habits even though it may be physiologically harmless is another undesirable venture of any human society. The enzymic and digestive system is tuned to the type, quality and quantity of food to which a community is accustomed for generations and this depends upon the availability of food in the region. Sudden change invariably causes an upset particularly if the change is of doubtful harmlessness. The best existing example is the change in the diet brought about by the hydrogenated fat popularly known as *Dalda.* It can be boldly said that whatever may be its ethical virtue there are two definite changes introduced into the naturally available fat. The first is the loss of the essential unsaturated fatty acids (arachidonic, linoletic and linolenic) in the composition of fat and the second is the change in its melting point, both affecting the normal efficiency of gastric digestion and of fat metabolism in the body resulting in increase of cholestrol and lipid substances in the blood which is supposed to give rise to atheromatous conditions in the coronary arteries. The reader may be referred to a previous editorial on this subject in the very first issue of this journal (1956) and to the abstracts of papers published in this issue (p.). The other food factors which also play important role in the building up and maintenance of healthy and strong blood vessels in a healthy body are amino-acids, minerals and vitamins particularly vitamin C, E, and rutin. Over-eating and excessive use of fats in the food are the other contribbutory factors.

(2) Drinking of alcoholic beverages simultaneously with or short while after ingestion of fats or oil, leads to direct absorption of fats from the stomach and necessary accumulation of fats in the body. Besides, alcohol itself favours fat deposition.

(3) Scientific Research has revealed that under certain conditions and in certain individuals, too much drinking of coffee, tea and other caffeine containing beverages may reduce the coagulation time of blood and thus induce thrombosis. (Steyn, 1958)[1]

(4) Recently a large number of antibiotics, hormones and new drugs like penicillin, streptomycin, aureomycin, A.C.T.H., cortisone, benzedrine and its derivatives (for fighting obesity, hay fever and mental depression), etc. have been on the market. These have undoubtedly brought about therapeutic revolution but the full significance of their use may

not be known till some years have passed to gain the necessary and varied experience.

(5) *Smoking:* The possible relationship of smoking to coronary thrombosis has been suggested (Bulbring et. al, 1951)[2 3] in addition to that of smoking and lung cancer. It is now well-known that besides tobacco various other types of leaves are used for the manufacture of different brands of cigarettes, the effects of which on the body are not definitely known.

(6) *Modern urban life with rapid transport facilities:* On the one hand the ordinary physical activities have been greatly minimised by urban living and on the other hand, over-crowding, the din and bustle of the town and industrial noises etc. and the rapid transport system bring about a neurophysical exertion.

(7) *Psychological states:* The civilization has also brought about a great deal of artificial life and people of intelligentia and upper social strata are subjected to strained conditions. There is often an acute apprehension, intense worry and sometimes fear which markedly accelerate blood circulation and coagulation. Similarly the modern social and marriage customs have also brought about mental tension and greater and greater complications of life. Besides, the genetic predisposition and the sex of the individual have also their share in this change.

A large number of such factors may be enumerated but the point of importance is that if we intend to do any thing about it, there should be no further delay, and instead, it is necessary to plan how the condition should be tackled. There is every reason to believe that the condition can be largely *prevented* provided we have assessed the crucial factors involved in the process through an organised investigation. How this can be done and who should do it?

The clinicians who treat such cases are as much in darkness about it as the other scientists. Besides, the interest of the majority of cardiac specialists is to diagnose the condition and to bring about amelioration of the suffering, if not cure. Their interest centres round diet and the psychological state of the patient mainly to obtain guidance for treatment. The disease as a mass phenomena and prevention as the better means of removing human suffering and of prolonging life do not generally enter into their purview being constantly busy with curative practices. It may only be possible for such a specialist to study the problem in all its aspects if he is particularly engaged for the purpose and trained in mass investigation and public health work. He should be assisted by epidemiologist, psychologist, nutritionist and social workers and provided with the necessary laboratory facilities including radiography, electro-cardiography, pathology and biochemistry etc. In other words, a full-fledged team work would be necessary.

We have also to remember that the party actually concerned, that is the public, for whom the study is to be planned has to play the most important role by offering their ready co-operation in this scheme of prevention and cure. The battle against cardio-vascular disease should therefore be fought conjointly by the Health authorities, medical scientists and the suffering public.

The best way to do it is to establish a *"Cardio-vascular Health Centre"* with the above team of workers and laboratory facilities, where the people of all professions above the age of 35 will voluntarily come for a check up and instruction for the manner of living, and if any early evidence of pathological condition is detected attempts would be made to bring him back to the normal state as early as possible. If necessity demands the family group would also be called for check up and the entire group or a particular section of it, as considered necessary, would be followed up continuously for gaining adequate knowledge about the factors and the progressive changes either towards deterioration or improvement through the maintenance of a continuous and good recording system. The Health authorities, the medical scientists and the public are therefore invited to join together to give a serious thought to the suggestion made above.

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1. Lantern, 1958, VII, No. 2.
2. Quart. J. Med., 1949, N.S., 69. 73.
3. Editorial, 1955, B.M.J. 1. 91.

CURRENT PUBLIC HEALTH LITERATURE

CARDIOVASCULAR PROBLEMS

Keys, A., Kimura, N., Kusukawa, A. and others. —**Lessons from Serum Cholesterol Studies in Japan, Hawaii and Los Angeles.**— Annals Internal Medicine 48 : 83-94, (Jan.), 1958.

The following points comprise the hypothesis that dietary fats influence the development of coronary heart disease: 1. The leading etiologic factor in coronary heart disease is the high frequency of fat-loading meals which is characteristic of American society. 2. Hypercholesterolemia, which promotes atherosclerosis, is one of the consequences of the high-fat diet. 3. Changes in the coagulability of the blood as well as in other of its characteristics, induced by high-fat intake, favor thrombosis and inhibition of fibrinolysis. 4. Although dietary fats vary in their effect on blood cholesterol the types most abundant in the American diet promote hypercholesterolemia. The chief concern of this study is the reason for the striking difference in the frequency of coronary heart disease among various peoples. Observations of conditions in South Africa reported in an earlier paper, had already demonstrated that dietary fat is an important factor in the remarkable differences among populations. The present report deals with the authors' findings in Japan, as well as among the Japanese in Hawaii and in California. Statistics show that coronary heart disease is rare in Japan (where the mortality rate in this disease is the lowest of all countries reporting vital statistics), that it is common among the Japanese in Hawaii, and that it is the leading cause of death among the Japanese in California. It seems to appear with much the same frequency among the Japanese in Los Angeles as among Caucasian individuals in California. A study was made of the mean percentage of calories provided by dietary fats and the concentration of beta lipoproteincholesterol in the serum in Japanese men in the three areas. In Japan the fat intake ranged from less than 10% of the total calories in a group of farmers to 22% for a group of physicians. In Hawaii, fat calories in Japanese men in the same group averaged a little more than Los Angeles the average was almost 40%. 30% of total calories. For the Japanese in Serum cholesterol paralled these percentages. Although the results of the authors' study do not prove the theory that dietary fat is a major factor in the development of coronary heart disease, this theory is consistent not only with the present findings but also with the results of studies conducted by the authors in northern and southern Italy, South Africa, England, Spain, and Finland. It is also consistent with the findings of other investigators in Guatemala, Israel, India, Nigera and West Germany. There is not only a low incidence of atherosclerosis and coronary heart disease among people who subsist on low-fat diets but also a low average level of cholesterol in the blood as compared to populations subsisting on high-fat diets.

FOOD FATS AND ATHEROSCLEROSIS

Nath, M. C., and Saikia, A.—**The effect of different food fats on experimental atherosclerosis and the beneficial role played by essential fatty acids, vitamin B and glucose-cyclo-acetoacetate.**—Abstract of paper, Symposium on Fats and Oils, National Institute of Sciences, New Delhi.

The effect of feeding rabbits with different types of fats, hydrogenated vegetable fat viz. Dalda (I. V. 68) and linseed oil (I.V. 160) at 15 p.c. level in the diet for a period of 12 weeks on free and total ester cholesterol and phospholipid levels of serum and tissues have been studied and liver fats, their iodine values, total fecal fat and growth of the animals have been recorded. Higher levels of serum and tissue cholesterol with elevated C/P (Total Cholesterol/ Lipid Phosphorus) and reduced F/T (Free/ Total Cholesterol) ratios have been observed in case of animals fed *dalda.* Significantly lower cholesterol levels and lower C/P and higher F/T ratios were noticed when dalda diet was supplemented with linseed oil at 5 p.c. level. Supplementation with an essential fatty acid mixture containing lino-

leic and linolenic acid (1:3) of I.V. 245 to the dalda diet has been found to cause much reduction in the serum and tissue clolesterol values, thus resulting into lower C/P and higher F/T ratios as compared to those of the animals kept on dalda as source of fat alone. On injection of hydrolysed glucose-cyclo-acetoacetate (GCA) to one of the groups fed dalda, the serum and tissue cholesterol levels and C/P ration were also found to be much lower than those observed in animals fed dalda, or even the mixed diet containing dalda and linseed oil. Almost normal lipid levels in serum and tissues with the normal limit of C/P and F/T ratios have been obtained on injection of vitamin B_{12} to the animals fed dalda along with essential fatty acids. But much more pronounced effect was noted when the animals kept on dalda and essential fatty acid were also treated with GCA. These values were found to be more or less similar to those noticed in the group of animals kept on linseed oil only as the source of fats and oils.

The maximum again in body weight has been found with the animals fed unsaturated oil accompanied with higher level of fecal fat.

Increased level of liver fat with low I.V. has been recorded in dalda fed animals. It is true that the cholesterol and phospholipid levels of the serum and tissues, have been found to be proportional to the degree of unsaturation of the fat in the diet; but the animals receiving dalda, essential fatty acids and GCA, where unsaturation was not to the same extent as in linseed oil diet alone, have however, shown better results.

DIETARY FATS AND CHOLESTEROL

Patel, B. S., and Magar, N. G.—**Effect of Dietary Fats and Cholesterol on the Serum Polyunsaturated Fatty Acids in Rats**—Abstract of paper, Symposium on Fats and Oils, National Institute of Sciences, New Delhi.

Young rats on fat-free diets were fed with (a) cocoanut oil, (b) hydrogenerated groundnut oil, (c) butter fat (ghee), cholesterol per kilogram weight of the rat was included in all the diets, for about thirty four weeks. Influence of dietary fats showed that the increase in the body weight of the rats was proportional to the polyenoic fatty acids presents in the diet. Average final weights of rats fed with dietary fats with cholesterol seemed to be higher than those of without cholesterol. Total fatty acids per 100 c.c. of serum were higher in the groups of rats fed with cholesteriol. The level of dienoic acids and tetraenioc acids were lowered gradually with the influence of feeding cholesterol. Hexaenoic and pentaenoic acids were present in traces. The small amounts of terientoic acids were constant except in groups fed cocoanut oil. In the latter case there was an increase of trienoic acids.

BETTER ANTIRABIC VACCINE

Veeraraghavan, N.—**Improvement of the Antigenicity of Antirabies Vaccine by pooling, checked by Post-Challenge Vaccination of Guineapigs**—Bull. Wld. Hlth. Org., 20, 121-131, 1959.

The author describes some studies carried out at the Pasteur Institute of Southern India, Coonoor, with the object of developing an antirabies vaccine of uniform potency.

It was found that by pooling batches of vaccine from several infected sheep brains a vaccine was produced which was superior in antigencity (as determined by potency tests in mice) to the NIH (United States National Institutes of Health) Reference Vaccine 155-D as well as to most of the individual batches of vaccine tested. Furthermore, the pooled vaccine conferred a significant degree of protection on guineapigs challenged with virulent strains of street virus, even when not administered until an hour after infection.

A brief outline is given of the method used for pooling the vaccine.

SMALLPOX

Herrlich, A. Variola.—**Eindrucke von einer Epidemie in Bombay im Jahre, 1958. (Variola : Observations in an Epidemic in Bombay in 1958.** —Deut. Med.. Woch. 1958, Aug. 22, v. 83, No. 34, 1,426-8, 1,436, 1,441.

The main purpose of this paper was to contrast the relative mildness of smallpox in vaccinated persons (varioloid) as it occured recently in Hamburg with the classical severity of the disease in India and Pakistan in the epidemic year 1958. The

author had the opportunity of seeing cases of the disease in this epidemic in Bombay in the apring of 1958 and, as he says, his previous experiences pale after his observations of variola in India. In his 4 weeks' stay he was able, thanks to the Public Health Service, to examine more than 500 patients in the City Fever Hospital and to obtain specimens of pustular contents, blood and samples of liver, spleen and lung. These specimens, now transported to Germany in continuous refrigeration, will be reported on in a later publication.

There are clinical descriptions of some of the types of the disease which were seen with particular reference to the frequency of an early as well as a secondary haemorrhagic state. There are 12 photographers (pp. 1436 and 1441) to illustrate some cases of particular interest. Reference is made to antibiotic therapy which, though ineffective against the viral infection would, in the author's opinion, be most valuable in smallpox in Africa and Asia since the incidence of secondary bacterial invasion in the Bonbay epidemic was extremely high. Unfortunately it was not possible to administer antibiotics to any large extent.

Accurate figures of the case mortality rate of smallpox in the Province of Bombay could not be obtained but in an analysis of 958 cases the case mortality was 21.9% which is about the average for India as a whole. Age and sex analysis of these 958 case shows how wide the variation is, since in adult women the case mortality was 25.9% as compared with 12.7% for adult men, and it is noted that a high proportion of certain groups of male workers in the city of Bombay are relatively well immunized against smallpox. Children on the other hand, have been but little protected and in female children the case mortality was 77.4% and in male children 51.4%.

Purpura, G.—**Un Episodio Epidemico di Vaiolo a Napoli. (An Epidemic Episode of Smallpox in Naples).**—Ann. d. San. Pubblica. Rome, 1958, May-June, v. 19, No. 3, 545-68, 5 Figs. (13 refs.) English summary (6 Lines).

This is an interesting and instructive account of events which followed the arrival in Naples of an American traveller from India who stayed at 2 hotles in the city, became ill and was then admitted to a private clinic and subsequently to the isolation hospital with a maculo-papular rash which became pustular. A cytopathgenic virus belonging to the pock group was isolated from the pustules and crusts, but was negative when tested on monkeys and rabbits and by complement-fixation. Guarnieri bodies were seen and the diagnosis was discrete smallpox. Although the patient's wife who accompanied him did not develop the disease, 3 primary and secondary cases occured, 1 of the primary cases—in a doctor at the isolation hospital—was fatal, the patient becoming ill 11 days after first attending to the original patient. He died on the 8th day, of clinical haemorrhagic smallpox; virus isolation was negative, but the disease was definitely diagnosed by histopathology. This patient had been vaccinated in infancy and re-vaccinated 3 years before, and again on first attending the original patient and twice subsequently. All attempts were negative. Among the secondary cases was the doctor's father who had been re-vaccinated 13 years previously but who refused re-vaccination on this occasion because of diabetes. He had an attenuated smallpox rash only. Another doctor was also among the secondary cases. The haemorrhagic manifestations in the fatal case are discussed at length and are ascribed to some form of haemorrhagic diathesis which reacts with various infective conditions in an allergic manner.

Although numerous case of varicella were occurring in the city at the time the author is satisfied on epidemiological, laboratory and clinical grounds of the accuracy of diagnosis. As a result extensive measures were taken to deal with a possible widespread epidemic. They included the compulsory quarantine after previous re-vaccination of all the nursing staff of the isolation hospital, compulsory vaccination of the staff of both hotels, surveillance of the families of the contacts at the hotels and clinic for 21 days and finally mass vaccination of the people of Naples and the surrounding area. This was so extensive that in less than 1 month more than 1 million persons were vaccinated. The sale of lymph was permitted from chemist's shops though none had any refrigerator or ice box.

The author recommends that re-vaccination should be performed every 3 years on doctors, health inspectors, health visitors and nurses, and all engaged in public cleansing (including refuse disposal and all forms of transport. He considers that surveillance of direct contacts is not enough and that some form of compulsion is required.

Peirce, E. R., Melville, F. S., Downie, A. W. & Duckworth, Marjorie J.—**Antivaccinal Gammaglobulin in Smallpox Prophylaxis.**—Lancet, 1958, Sept. 20, 635-8, 4 Figs.

(The title is misleading. In fact, this paper gives a tantalizingly incomplete history of the smallpox on Merseyside during March-May, 1958.)

Infection arrived on March 19 in a Lascar who had been ill since March 9 and who had "a severe confluent pustular eruption", He was removed from the ship and admitted to the local smallpox hospital.

Family L. lived in a row of houses 400 yards from the hospital. The son, T. L., an unvaccinated boy aged 2 years, was taken out by his mother on March 25 and visited a barber's shop. Before this date he had been confined to his home for over a fortnight with mumps. On April 6, this boy became ill, and a rash began to appear on April 9, but not until April 14 was he diagnosed as a case of smallpox and removed to the hospital. This boy had a severe attack, but recovered.

Mr. L., the boy's father (vaccinated in infancy and during the war), and Mrs. L. (vaccinated in infancy and in 1946), were re-vaccinated on April 14; both showed "accelerated reactions maximal about the fourth day" and remained well.

J. L. (sister) aged 6 was primarily vaccinated on April 14. On April 15 she was given 1.5 gm. immune gamma globulin, and a further 0.5 gm. on the following day. On the 8th day following vaccination she had "a small vesicle surrounded by a well-marked areola, but next day this was much less and a central scab had formed". After a few days' fever (21-25 April) this child developed a very discrete rash (some 13 lesions in all) which ran a highly modified course, but from which smallpox virus was recovered.

Mrs. K. (grandmother) aged 73, vaccinated in infancy only, was re-vaccinated on 14 April and given 1.0 gm. of the gamma globulin on the following day. Vaccination here ran a typical course. On April 23 she started to develop what became a widespread erythematous rash (some 30-40 lesions) appeared. From these virus was recovered.

On may 17 a Mr. G., aged 54, was admitted to a general hospital, but within a few hours was removed to the smallpox hospital where he died 3 days later of haemorrhagic smallpox. 9 of his hitherto unvaccinated contacts were given gamma globulin; none developed smallpox. This man's wife had visited the home of family L. on April 14 before the little boy was removed to hospital. She had been vaccinated in infancy: re-vaccination on April 15 produced "a good slightly accelerated primary take which left two good scars". There is some doubt about the time of onset of her smallpox illness, which escaped detection until May 18. A few old crusting lesions from which virus was removed were then apparent.

While it is difficult to assess the prophylactic value of gamma globulin in smallpox contacts without large planned field trials, the extreme mildness of attack in 2 of the cases recorded here does suggest perhaps more than the possibility that this had been determined, at least partly, by the gamma globulin given on the day after vaccination. (But, if this is so, it would have been instructive to have had Professor Downie's explanation of why the passive antibodies failed to modify also the course of vaccinia in the case of Mrs. K.).

Espmark, A.—**Vaccin och mot smittkoppor. (Vaccination against Smallpox), Svenska Lakartidningen.**—1958, Oct. 3, v. No. 40, 2,746-66, 4 Figs. (34 refs.)

During the past 18 months increasing use has been made in Sweden of plastic vaccine containers designed so as to facilitate, the technique of vaccination and promote accuracy of dosage. Comparative tests have been carried out with the scarification and multiplepressure techniques of vaccination to determine their relative values. SJOBERG in Sweden applied these methods in 1954 simultaneously to some 230 persons with success in 74.5% after scarification and 97.1% after multiple-pressure. In 1958 (personal

communication) LONBERG vaccinated 183 recruits simultaneously by the two methods, getting a response in 74 after scarification and 83% after multiple-pressure.

Espmark puts the risk of post-vaccinal encephalitis in Sweden at about 1 in 50,000 and he finds it much smaller than in certain other countries such as Holland and Austria. During the decade 1948-57 there were 25 notifications of this ailment in Sweden, with only 2 deaths, whereas its mortality is usually put at about 40%. It should be noted that in Sweden as from January 1, 1959, parents will be allowed to dispense with vaccination for their children more easily than heretofore although it will continue to be compulsory.

LIVE POLIOMYELITIS VACCINE

Eklund, C. M., Bell, E. J. & Gerloff, R. K.—**Poliomyelitis in Idaho after use of Live Virus Vaccine.**—Pub. Health Rep. Wash. 1958, July, v. 73, No. 7, 637-47, 7 Figs.

In April 1955 there were 20 cases of poliomyelitis (17 paralytic and 3 non-paralytic) among 32,000 children given 1 or other of 2 lots of poliovaccine. These cases were thought to be due to living virus in the vaccine because:—(a) they occurred within a few days of vaccination—10 to 7 days or less; (b) cases were scattered throughout the State; (c) of the 17 paralytic cases started with paralysis of the inoculated limb; (d) poliovirus was recovered from the suspected lots of vaccine.

All the cases were due to Type 1 poliovirus, but the vaccine contained all 3 types of virus. One batch was extensively tested in monkeys and 4 out of 10 animals were infected with Type 1, 3 out of 10 with Type 2 out of 7 with Type 3.

20% of a sample of 649 vaccinated children suffered from minor illness consisting of fever, headache, generalized aches, sore throat and nausea, or vomiting within 1-2 weeks of the injection. These illnesses were thought to be due to infection with Type 1, or Type 3 virus on the basis of the frequency or very high titres of neutralizing antibodies. Many children also had high titres to Type 2 virus, suggesting that infection with this type also occurred.

61 cases of poliomyelitis occurred in contacts of vaccinated children. These were usually in children under 15 or in women. About half occurred within not have contact with vaccinated children were diagnosed in Idaho in 1955.

Despite the introduction of a virulent virus into a susceptible population (about 50% children lacked antibodies to one or other type of virus) the expected severe epidemic of poliomyelitis did not occur.

It was found that the serological response of children to 1954 vaccine differed from that to 1955 vaccine containing living virus, in that children usually either failed to respond, or developed a high titre (over 1 in 1,024) to the 1955 vaccine, whereas to 1954 vaccine most children responded with intermediate titres of 1 in 16 to 1 in 256.

B.C.G. VACCINATION

Irvine, K. N.—**Conversion Testing of Schoolchildren after B.C.G. vaccination.**—Brit. Med. J. 1958, Oct. 25, 1,018-19.

The object of this investigation was to find out whether the post-vaccinal tuberculin conversion rate in 13 year-old. School children vaccinated with Danish fresh BCG vaccine was high enough to warrant omitting the test in school-children. The work was done in the Oxford Hospital Region, England, which embraces 6 counties and 3 county boroughs. Only non-contact children were included.

One test only was used for pre-vaccinal and conversion testing; in 5 areas it was the Mantoux eith 10 TU of PPD, and in 4 it was the Heaf test with PPD. The scheme was working smoothly in the school year 1956-57 during which 40 different batches of vaccine were used and valid conversion tests were done on, 10,422 children. The results were:

	Mantoux test	Heaf test
Number vaccinated	6,917	4,867
Number validly tested	5,676	4,746
Number of reactors	5,471	4,647
Number of non-reactors	205	99
Conversion rate (2,840)	96.4%	97.9%

It was concluded that post-vaccinal tuberculin testing of non-contact 13-year-old children is unnecessary. It is mentioned in a postscript to the paper that a similar trial

is to be made in children vaccinated with Glaxo freeze-dried BCG. (The decision to discontinue routine post-vaccinal testing in school leavers in Northern Ireland was taken some 3 years ago on the same grounds as Irvine's).

STANDARDISATION OF DEATH RATES

Kerridge, D.—**A New Method of Standardizing Death Rates.**—Brit. J. Preventive & Social Med. 1958, July, v. No. 3, 154-5.

Two methods are generally used for eliminating age differences in mortality comparisons, the direct and the indirect methods of standardization. The direct method depends upon a knowledge of the age distribution of the population and deaths; and the indirect method depends on the age distribution of the population but the age distribution of the deaths is not necessary. The author proposes a method for use when the age distribution of the deaths and the total population is known, but not the total age distribution. The death rates in the standard population are divided into the number of deaths in each age-group and an expected population found. The sum of the expected populations is compared with the actual population and the resulting ratio gives the standardized index. This method has a large standard error and its use should be avoided if tither the direct or indirect method can be used.

MUMPS

Tucker, D. N. & Overman, J. R.—**Size of Mumps Skin Test Reactions.**—J. Lab. & Clin. Med. 1958, Sept., v. 52, No. 3, 446-8.

Skin tests with an egg-grown mumps virus antigen were performed in 38 young medical students and the results were correlated with clinical history and level of mumps antibodies. The value of the skin test was found to depend on the criterion used in reading the results. When a minimum reaction size of 15mm. was required for a positive result, no false positive reactions were observed but false negative tests were obtained in 7 of 28 subjects. Reduction of the above criterion of minimum reaction size increased the number of false positives without a significant effect on the proportion of false negatives. Most of the subjects with false negative test gave no history of mumps, suggesting a small degree of skin sensitization in apparent infections.

VIRUS INFECTION OF RESPIRATORY TRACT

Andrewes, C. H., Stuart-Harris, C. H., James, J. A., Macbeth, R. and Allinson, S. M.—**Discussion on Virus Infections of the Upper Respiratory Tract.**—Proc. Roy. Soc. Med., 1958, July, v. 51, No. 7, 469-74 (Sect. Laryngol. 5-10), (18 refs.).

The aetiology of virus infections of the upper respiratory tracts is discussed by Dr. C. H. Andrewes, and laboratory methods for the isolation and identification of 9 different viruses are listed. The viruses mentioned include influenza A, B and C, Sendai virus, croup-associated virus, adenoviruses, chimpanzee viruses, 2060 and JH viruses and finally the common cold. The question of whether the common cold is caused by a single or by several different viruses is left unsettled. Evidence for the importance of each of the viruses listed on the aetiology of human infections is briefly reviewed. Professor Stuart-Harris reviews the pathology and symptomatology of acute respiratory disease. The syndromes described include influenza, the common cold, atypical pneumonia and febrile catarrh. The association of each of these syndromes with known viruses is discussed. The fact that a considerable proportion of acute respiratory infections remain without a known aetiology is pointed out and comments are made on the possible importance of bacteria and herpes simplex virus in the pathology of respiratory diseases.

Evans, A. S.—**Adenovirus Infections in Children and Young Adults. With Comments on Vaccination.**—New England J. of Med., 1958, Sept. 4, v. 259, No. 10, 464-8, 2 Figs. (19 refs.).

The aetiological importance of adenoviruses in acute respiratory infections in civilian populations was investigated. Results of a 4-year study involving 710 University students admitted to hospital with respiratory disease revealed that less than 10% of infections were due to bacteria, 8.7% were to influenza virus, 1.4% were due to adenoviruses (types 1, 3, 4 and 6) and 81.7% were of unknown cause. Diagnostic methods included virus isolations in tissue cultures and complement-fixation tests.

Adenoviruses were isolated from 7 patients and a rise in adenovirus complement-fixing antibody was found in 10 patients. Virus isolations were also attempted from throat swabs collected at frequent intervals over a 3-month period from school-children aged 7 to 9 years. Only 3 adenoviruses (2 type 1 and 1 type 5) were isolated from 1,194 swabs from 291 children.

General vaccination of civilian populations against adenoviruses is not recommended.

RESISTANT STAPHYLOCOCCI

Cheng, Wu-Fei & Liu, Tzu-Yi.—**Incidence of Antibiotic Resistant Staphylococci in a Children's Hospital.**—Chinese Med. J. Peking. 1958, June, v. 76, No. 6, 574-80.

88 strains of staphylococci isolated from the throat, and 68 strains from various other sites from patients of the Tientsin Children's Hospital in 1957 were examined for coagulase production and antibiotic resistance. 142 strains were coagulase positive. Of the total of 156 strains, 74% were resistant to penicillin, 60% to streptomycin, 89% to Syntomycin and 46% to Chlortetracycline. Resistance was commonest in the strains isolated from patients who had been in hospital for more than 3 days. Of 150 members of the hospital staff, 20 harboured staphylococci (presumably coagulase-positive or negative) resistant to penicillin and had chlortetracycline resistant strains.

TUBERCULOSIS

Woodruff, P. S.—**Recent Trends in Tuberculosis in South Australia.**—Med. J. Australia, 1958, Aug. 23, v. 2, No. 8, 245-52, 5 Figs.

This is an epidemiological study of tuberculosis in South Australia (population 862,000). Age-specific death rates from the disease have been calculated for census years since 1911, which show that there has not only been a decrease in mortality but a progressive shift to older age-groups. Woodruff remarks, however, that the apparent change may represent only the passing of a genceration of people susceptible to of subjected to this disease at every stage of their lives.

A similar study of death rates in females shows that the 1911 peak of tuberculosis mortality in young women has not moved to older groups and that fatal tuberculosis has not followed that generation through its life span. "Perhaps all the susceptibles were killed off in their early years". (No actual figures for either sex are given in the text, nor can they be found easily from the graphs which, however, show the trend clearly).

There are 3,729 names in the central tuberculosis case register of South Australia (433 per 100,000), but this does not give an accurate estimate of the prevalence of this disease; it is deficient because of the omission of cases not yet notified and excessive because of the inclusion of patients whose names should have been removed but who have not bothered to obtain a certificate of clearance (which can be obtained from any doctor).

Since March 1952 all persons aged 14 years and over have been reqqired to undergo X-ray examination. The response rate has been high and information is available for 98% of the population in some areas, indicating a prevalence of previously unknown active tuberculosis in 0.089X (1 in 1,124 persons examined). Woodruff recommends that such surveys should be repeated every 3 years in South Australia.

Previously unrecognized tuberculosis in more than twice as common in males as in females, and its incidence in males increases with age. The overall discovery rate in males was 1 in 836 and in females 1 in 1,794.

There has been a slight but progressive decrease each year in the incidence of far-advanced disease notifiee—from 13% in 1953 to 9% in 1956. In spite of a 16% increase in the population in 6 years and increased intensity in case-finding measures, the level of notifications has remained almost constant which indicates that the incidence of the disease is falling.

Examination of recent immigrants reveals almost double the incidence found in the general population. This is due to a much higher infection rate in the newcomers as judged by tuberculin surveys and to their habits of undertaking unduly hard and prolonged work.

There are about 3,000 persons of predominantly aboriginal stock of whom about 1,000 have been examined by X-ray and 1,261 tested with tuberculin. Tuberculosis

appears to be more prevalent in this group than in the white population, but it is very rare among those living in semi-tribal conditions.

During the past 5 years 47,000 tuberculin tests were done (Mantoux 10 TU of TU of OT) on army recruits, school-children in the city of Adelaide. Reactor rates in the last group fell from 8.5 to 4.1% for children born in Australia, but they were 39.4 and 20.4% in immigrant children. The rates in country children born in Australia fell from 5.2 to 2.5% and for immigrant country children from 18.6 to 8.1%. For national service recruits they fell from 21.2 to 15.3%, but the rate of fall was slowed up by the inclusion of immigrant youths after 1954. Details of reactor rates in aboriginals are given, showing difference according to location.

Woodruff draws attention to the need to replace the old-style sanatorium by the chest unit or hospital where relatively brief and intensive in-patient medical and surgical treatment may be given. He also stresses the need for the care of the respiratory cripple disabled by fibrosis, bronchitis and emphysema. A feature of recent years has been the more active treatment of children with established primary disease or recent infection. BCG vaccination is being most widely used in the teenage group in which primary disease appears much more likely to progress to destructive phthisis or dissemination than in the school child.

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NOTES & NEWS

WORLD HEALTH DAY

Mental Illness and Mental Health in the World of Today

Statement of DR. C. MANI,
WHO Regional Director, New Delhi.

It is one of the paradoxes of modern civilization that countries technologically most advanced and enjoying the highest standards of living should have about half the total number of hospital beds occupied by mental patients.

Mental illness has a close relationship with conditions under which people live and the strains and tensions of an industrial society have repercussions on the mental state of the people. In such a society the rate of mental illness may be expected to be high. But it does not mean that the underdeveloped parts of the world—the vast rural or semi-rural communities—are entirely free from the problem.

With so few reliable statistics available it is not possible to determine the true incidence of mental disorders in countries of South East Asia but such indications as are available make it clear that the mental health problem is big enough to cause concern to health planners.

No doubt emotional stresses and strains of daily life are important factors in mental illness but it can also have such causes as chronic malnutrition and under-nourishment. And the strains of industrialization are not the only ones to which communities are subject: anything which leads to a sense of insecurity—unemployment, refugee movements, migration of populations for economic reasons, the sudden impact of urbanization—can contribute to mental ill-health.

While it is only proper that the tremendous health effort now being made in South East Asia should take especially into account the economically ruinous and high fatality communcable diseases such as malaria, tuberculosis, cholera, smallpox, yaws and leprosy and such problems as mother and child health and training of health personnel, the increasing incidence of mental ill-health should not be ignored.

We can learn from the experience of the technologically advanced countries. They were caught unawares by industrialization. We know what they could not at that time know. We can start preventive mental health work in time and avoid the pitfalls.

Psychiatry is a young science and until recently very little was known about the nature of mental disorders. Many beliefs are still prevalent which have no scientific basis. It is necessary to dispel the false beliefs through proper teaching and to make people understand that mental illness is just another kind of illness, that there is nothing disgraceful about it and it is curable and largely preventable, like so many other diseases.

It is my hope that World Health Day 1959, by focussing the attention of the people and the authorities on the problem of mental illness and mental health, will pave the way for the emergence of sound public health services which will cater for the total health needs of the individual and safeguard not only his physical health but also his mental and social well being.

Dr. Radhakrishnan—Mental Health

Vice-President Dr. Radhakrishnan emphasised the urgent need for the attainment of mental health, while stressing the importance of improving the standards of health in countries of the South East-Asian Region.

Dr. Radhakrishnan, who was inaugurating the 11th session of the World Health Organisation Regional Committee in New Delhi, said "Unless we rise the standard of of health and efficiency it will not be possible to rise the agricultural of industrial output of the country" Delegates from Nine South East Asian Countries, including India, attended the week-long session.

WE MUST WORK FAST AGAINST MALARIA—MR. NEHRU

Prime Minister opens Third Asian Conference

Inaugurating the Third Asian Malaria Conference at Vigyan Bhavan on 16th March, 1959, Prime Minister Nehru warned against the danger of slackening the pace of efforts to eradicate malaria.

Twenty countries or territories belonging to WHO's South East Asia and Western Pacific Regions were represented at the conference by their ministers of health and chief malariologists or high ranking health officials. Also attending the conference were a number of malariologists and public health specialists working in various Asian countries under the US International Co operation Administration.

"There is a great danger in going slowly", the Prime Minister said referring to the problem of the malarial mosquito developing resistance to insecticides, "lest the enemy should get accustomed to your weapons and then it will not be easy to master it.

"If you do not go fast enough the enemy will. In fact, you are standing still if you do not go faster than the enemy. Therefore you have to make a greater effort."

The speed of the advance against the disease was still more important in the case of underdeveloped countries.

The Prime Minister made a pointed reference to the economic role of malaria which he described as "in some ways the worst" of the fell diseases that afflicted mankind. There might be other diseases, more painful and more terrible and fatal, but perhaps sudden death was preferable to the slow death and decay brought about by malaria, the enfeebling of whole populations and the sapping away of the vital energies of the people.

History was full of examples, Mr. Nehru said, of the effect of malaria on the course of civilization. Empires had decayed and armies were known to have been defeated or halted as a result of the disease.

"I wonder", he added, "if it would be possible for someone, eminent both in historical knowledge and in the knowledge of malaria, to join the two together and write a history of the world showing what a powerful determinant malaria has been in the course of history."

In a tribute to the work of the WHO Regional Office Mr. Nehru commented on the "businesslike opening of the conference" which gave evidence of the "workmanlike way" in which the problem was being approached. The problem of malaria eradication required a planned effort and he agreed with the approach of making it concentrated and speedy.

Earlier, welcoming the Prime Minister, Dr. C. Mani, WHO Regional Director for South East Asia, said that until a few years back efforts in the field of malaria had the limited goal of controlling the disease. The present conference was of great importance as it was the first to concern itself with eradication in Asia.

It had become clear, Dr. Mani said, that complete eradication of the disease was feasible. It had also become clear that unless that was done quickly there was a chance that malaria-carrying mosquitoes might develop resistance to insecticides and make even control measures impossible.

In a message to the conference, Dr. M. G. Candau, Director-General of the World Health Organization, expressed his appreciation of the progress made in Asian countries in the fight against malaria but added a word of caution.

"If malaria eradication is a feasible operation, it is by no means an easy and inexpensive enterprise. It needs continuous and strong support, both administrative and financial, from the governments, and the skill, devotion and imagination of the malariologists, whatever their rank, responsibility and place of work", Dr. Candau said.

Dr. C. A. Alvarado, Director, Malaria Eradication Division, WHO Headquarters, Geneva, who gave the message, added that WHO, as the co-ordinating and advisory agency, would not spare any efforts to collaborate to its maximum capacity in this world-wide campaign.

Dr. I. C. Fang, WHO Regional Director for Western Pacific, in a message said: "It seems to me that the next few years will be decisive in the campaign to eradicate malaria from Asia; an excellent start has been made. But it is no use avoiding the unpleasant fact that the actual success that has been achieeved in reducing malaria to a disease of little public health importance, has actually had an adverse effect on the drive to achieve eradication. I cannot stress too strongly that eradication of the disease is the objective and to be satisfied with anything short of this goal will constitute a constant threat to the resurgence of the disease in the country concerned and also among its neighbours".

Dr. A. H. Taba, WHO Regional Director for the Eastern Mediterranean, in a message said: "Malaria is a major public health problem in the Eastern Mediterranean Region which comprises twentyfour countries and territories. Out of the 190 million inhabitants there are 145 million living in malarious areas (about 75%). So far only 30 millions are being protected under eradication of control programmes. The urgency for developing malaria eradication programmes in every country is being felt and has been repeatedly expressed in regional committees. Apart from sharing with the South East Asia Region the medico-geographic neighbourhood and problems, the Eastern Mediterranean Region is confronted also with the traditional annual pilgrimage of huge masses of Moslems from this Region and from the Western Pacific to holy places in Saudi Arabia.

"These, together with the enhanced developments in connecting countries with networks of airlines and other rapid means of communication, will certainly increase the chances of importing malaria cases and vicious malaria vectors to malaria-free areas and hence the need for multi-co-ordinated efforts in developing an effective strategy for malaria eradication."

Karmarkar's address

After the inaugural session Mr. D. P. Karmarkar, Minister of Health, India, was elected chairman and Mr. V. T. Sambantham, Minister of Health, Federation of Malaya, vice-chairman. Mr. R. Subha, Miniser of Health, Nepal, and Dr. M. Seijo of the Ministry of Health, Japan, were elected Rapporteurs.

Addressing the conference, Mr. Karmarkar said that the eradication of malaria, though a formidable task, was worthwhile and should be carried out with grim determination.

"This effort", he said, "has to be total. The problem does not lend itself to any attitude of complacency. It is a race against time."

Mr. Karmarkar added: "Considering that the countries represented in this conference have more than half the total of world population our deliberations and their fruitful implementation in the next few years are of a profound interst not only to Asia and the Far East but to the entire world."

Stressing the need to stimulate the support of the people for the eradication programme the Health Minister said: "In countries where democracy is the rule of life a venture of this kind has essentially to be broadbased on the willing co-operation of the people which would be forthcoming to the extent to which they are educated on the duties of the government, the technical people and every citizen of the country."—*W.H.O. Regional Office, New Delhi.*

U.N. Report on Radiation

"Some hazards are implicit in almost all technological advances," but radiation exposure in x-ray diagnosis and treatment, as well as in research and industry, are "for the benefit of mankind and can be controlled." In this respect the Committee drew a sharp distinction between hazards undertaken voluntarily and hazards imposed on all the people of the world without their consent.

Dr. Orr discussed the hazards of radiation fall-out in general, including the genetic effects of strontium 90 and compared the amount of radiation to which man has been subjected from natural sources to all from tests, and what would be the probable effects if tests were continued either at the present rate or at the highest rate of a few years ago. He noted that "the 30 year dose to the

gonads received by the average person in the United States of America is estimated to be (a) from background radiation—about 4.3 roentgens, (b) from x-ray and fluoroscopy—about 4.3 roentgens, (c) from nuclear weapons testing if continued at the rate of the last five years—would give a probable does of only 0.1 of one roentgen. If nuclear testing were continued at the rate of the two most active years the possible exposure of 30 years would be only about 0.2 of one roentgen."

There was substantial agreement between this statement made by Dr. Orr and the Report issued by the United Nations.

Dr. Orr warned governments making nuclear tests to take every possible precaution. He was of the opinion that while there should be no indiscriminate testing of atomic devices, especially of thermonuclear weapons, neither should there be discontinuance of properly controlled testing that could contribute to knowledge that would be beneficial to all people in the fields of medicine, mining, chemistry, power, generation and agriculture. He stated that some risk was justified, though every precaution should be taken to minimise that risk.

The doctors of the world have become so concerned about this whole problem and the hysteria which has developed chiefly from ignorance that they asked the World Medical Association to obtain information which could be distributed to the medical profession and through it to the people of the world.

A year ago, the United Nations informed the World Medical Association that it could not supply it with any advance information on this subject. Hence, The World Medical Association turned to areas which had information and were willing to release it for the mental and physical well-being of mankind. Dr. Orr was selected to speak on the subject of biological effects of nuclear radiation before the XIIth General Assembly of The World Medical Association because of his consultant status at the Oak Ridge Institute and because he came from a country where the latest research information could be freely obtained.

The World Medical Association notes with justifiable pride that it received information prepared prior to the issuance of the Report of the United Nations Scientific Committee and without its contents being available to the speaker and that the facts it received were not controverted by the U. N. Report.

However, the World Medical Association is of the opinion that there should be closer co-operation between international organisations having the health of the people of the world as one of their objectives. The public is gravely concerned about events which may affect their health and longevity. They turn to their doctors for information on these subjects. The doctors must be kept infomed of the most advanced scientific research findings in order to provide their patients with the true facts. The World Medical Association has pledged itself to continue its activity in supplying the information that the doctors of the world need "To assist all peoples of the world to attain the highest possible level of health," and "to promote world peace".

Course for S.E. Asia Workers on Health Aspects of Radiation

A new step towards establishing India as a training centre for S. E. Asia workers in the health aspects of radiation and atomic energy was taken on November 17 when about twenty students from three countries in the S. E. Asia region began a five weeks' course in health physics in Bombay. There will also be four participants from the Western Pacific Region.

Health physics, a branch of science which has grown up in recent years around atomic energy undertakings, deals with radiation protection in such plants but health physicists are also widely concerned in the protective measures necessary in radio therapy and radiodiagnosis.

This course is designed for physicists who will serve as supervisors and instructors in radiation protection and aims to extend their knowledge and acquaint them with the latest techniques in this field.

It is sponsored by the Government of India (through its Department of Atomic Energy) and the World Health Organisation, with the co-operation of the Atomic Energy

Commission of the United States. It will be held in the Department of Atomic Energy.

The Course Director is Dr. Elda E. Anderson, director for many years of the health physics courses in Oak Ridge National Laboratory of the American Atomic Energy Commission, and President-elect of the Health Physics Society.

Dr. Anderson is assisted by two international Lecturers. Ons is Dr. L. C. Emerson, who works at Oak Ridge and is an risk.

expert on reactor health physics. Dr. Emerson was a lecturer at a previous health physics course organised by WHO and held at Mol in Belgium. The second is Mr. Luis Garcia, who for seven years directed the health physics activities in the Naval Research Laboratory (Washington).

S.E. Asia Conference on Controlling Health Hazards of Industrialisation

The rapid increase in industrialisation in South East Asia has raised many new health problems which need to be tackled as soon as possible. These problems, and the means for tackling them, was discussed at a conference on industrial and occupational health which opened in the All-India Institute of Hygiene and Public Health, Calcutta, from November 24 to December 5, 1958.

The conference, jointly sponsored by WHO and the International Labour Organisation brought together people who are actively engaged in occupational industrial health activities in all their aspects and its main object was to produce conclusions which may form a guide to the planning of adequate and co-ordinated health services for workers.

The participants came from six countries: Afganistan, Burma, Ceylon, India, Indonesia and Thailand. The discussions covered organisation of occupational health services, co-ordination in the field of occupational health and the teaching of personnel needed in this work.

Views of W.H.O. Conference on Auxiliary Nursing

A brighter future for the auxiliary nurse and better training for this type of health worker were called for at the 12-nation conference of auxiliary nursing, sponsored by WHO, which has just ended in Delhi.

In order to meet the needs of the health services, by improving local recruitment, it was suggested that local Nursing School Committees should be set up. The main purpose of such committees would be to inform the public about nursing training and services and to make living and service conditions of nursing workers attractive. At Ministry level a Nursing Board or Council would be able to encourage recruitment in the State or country as a whole. One of the groups examining the situation suggested that the registration of auxiliaries was desirable.

Every auxiliary should receive one basic training to prepare him or her to act as an assistant nurse. Such assistant nurses could be employed in institutions where day-to-day supervision by well qualified nurses is available. For workers to be assigned to specialised fields (tuberculosis, to give one example) a further period of training would be necessary.

One important result of this would be that the auxiliary who became redundant in one service would require only brief training in a new specialised area to be of value in a new or different programme.

The countries from which the participants came were: Afganistan, Burma, Ceylon, United Arab Republic (Province of Egypt), India, Indonesia, Iran, Japan, Pakistan, Sudan, China and Thailand.

Health Conditions in India

Births and deaths registered in towns with a population of 30,000 and over during September, 1958, were of the order of 35 and 14 per thousand respectively as against as against 31 and 11 in the months of August, 1958.

According to the latest reports the country has been free from plague, but the incidence of cholera and smallpox has been in some parts of the country.

Cholera: Based on preliminary data available for the last week of October, cholera was prevalent in an epidemic form in

Shimoga district of Mysore State and heavy incidence was reported from Wardha and Bhandara districts of the Bombay State and Bellary district of the Mysore State.

The incidence was mild in the districts of Anantapur, Cuddapah, Godavari East, Godavari West, Nellore, Srikakulam and Visakhapatnam of Andhra Pradesh; Bihar, Osmanabad, Broach, Ahmednagar, East Khandesh, Poona, Sholapur, West Khandesh, Akola, Amravati, Buldana, Greater Bombay and Cannada in Bombay State; Ganjam and Balasore in Orissa; Karnal in Punjab; Faizabad in Uttar Pradesh and Calcutta City.

Smallpox: Considerable incidence of smallpox was reported from Raigarh district of Madhya Pradesh, and Madras city. Mild incidence was also reported from the districts of Anantapur, Godavari East, Nellore, Visakhapatnam and Krishna in Andhra Pradesh; East Khandesh, Greater Bombay, Poona Satara North, Canada and Aurangabad in Bombay State; Narshingpur in Madhya Pradesh; Coimbatore, Mathurari, Salem, Tirunelveli in Madras State; Mysore, Dharwar and Kolar in Mysore State; Cuttack and Ganjam in Orissa; Lucknow and Kanpur in Uttar Pradesh; and Burdwan, Bankura, Midnapur, Darjeeling and Calcutta city in West Bengal.

Gastroenteritis: Gastroenteritis, which was prevalent in Uttar Pradesh in a mild form, has been on the increase for the last two months. During the last week of October, 933 cases and 433 deaths were reported from several districts of the State.

Prevention of Leprosy—B.C.G. Vaccine Recommended

The Scientific Advisory Board of the Indian Council of Medical Research has recommended to the Union Health Ministry that B.C.G. vacination should also be used on an experimental basis in the prevention of leprosy among children.

The Board, which met at Indore recently emphasised the need of integrating the work of maternal and child welfare and family planning centres established by the Ministry throughout the country.

The Board sanctioned Rs. 70 lakhs for intensifying medical research programmes in India.

The Board appreciated the work done by the working parties set up to study the problem of malnutrition in India and decided to formulate low-cost menus for different age groups and for different physical conditions.

Noting with satisfaction the results obtained by the use of calcium in the Indian diet, the Board felt that fortification of salt with calcium, or modifying the salt-manufacturing process to retain a certain amount of calcium from the sea water, should be considered. This single measure was likely to promote the proper development of children throughout the country, the Board said.

Frontiers Hamper Epidemics Fight

The setting up of a regional Council of medical experts from India, Pakistan, Burma and Ceylon for the adoption of co-ordinated and simultaneous action for the eradication of smallpox, cholera, malaria and other diseases endemic in these countries has been suggested by Dr. I. A. Cockburn, Provincial Health Adviser to the East Pakistan Government.

He thought that the West Bengal expert committee's recommendations for the control of smallpox on a national scale was a move in the right direction but said that unilateral action by one country, however comprehensive it might be, could not prove successful unless boosted by similar control measures in its immediate neighbouring countries.

Oserving that diseases like smallpox and cholera could not be confined by national boundaries, he referred to India's ambitious programme for the eradication of malaria already taken in hand. This was bound to fail, he said, unless similar anti-malaria measures were adopted in East Pakistan.

Dr. Cockburn, who served for two years in Ceylon as the W.H.O. health adviser to the Government, observed that Bengal was the only area where cholera was endemic throughout the year. If cholera could be wiped out from Bengal, it could be removed from the face of the earth, but "you cannot do so with a political boundary running through the middle of your control efforts."

Cortisone in India

In addition to Vitamin A, the Fine Chemicals Division of Glaxo Laboratories is now

making cortisone and its derivatives, hydrocortisone, prednisone and prednisolone, in India.

At present they are manufacturing cortisone from an imported intermediate. But in progressive stages, extending over a period of four years, they plan to undertake the whole manufacture in India. Not only is this a pioneer achievement by Glaxo, but it represents a step forward in the economic development of the country.

Cobalt Therapy Units

Sales to India, Ceylon and France of 200,000 dollars worth of cobalt 60 therapy units for cancer treatment were announced recently by the Commercial Products Division of Atomic Energy of Canada Limited.

The company said the shipment was the largest made in the Western world. It consists of five therapy units and six cobalt 60 sources which provide gamma rays to attack cancer.

Three of the units and their sources were shipped recently for cancer clinics in Calcutta, Bombay and Ludhiana.

A separate cobalt 60 source for a clinic in Madras has also been shipped.

The units and sources for India and Ceylon were being paid for out of Colombo Plan funds.

Five Plants for Production of Drugs—Soviet Experts' Report : Officer of 80 Million Roubles

The Minister for Industry, Mr. Manubhai Shah, told in the Rajya Sabha that the report of the Soviet experts on the setting up of drug industries was under the consideration of the Government and a decision was likely to be reached soon.

Mr. Shah said that the Soviet Government had offered 80 million roubles to cover the foreign exchange requirements, of all the five plants that they had recommended.

Mr. Shah said that the Soviet team had recommended the setting up of five plants for manufacturing various drugs including antibiotics. They had not worked out any cost of production and no firm cost could be established until a unit was set up and had began manufacturing. The Hindustan Antibiotics at Pimpri was already producing 40 million mega units of penicillin while other private manufacturers were producing 30 million mega units compared to Indian demand for 60 million mega units.

Medical College Plan

The U. P. Government has approved the setting up of a medical college at Aligarh Muslim University.

The University has already collected Rs. 75 lakhs for the purpose, excluding Rs. 10 lakhs contributed by King Saud of Saudi Arabia.

Medical College for Warangal

The Andhra Pradesh Government had considered the starting of a new medical college at Warangal and proposed to take up the scheme in the Third Five-Year Plan or even earlier if possible. In the meanwhile the Government of India would be approached for Central Assistance for the expansion of the Gandhi Medical College at Hyderabad.

Replying to supplementaries the Chief Minister said that they had received Central assistance to the value of Rs. 15 lakhs for the Kurnool Medical College. For the promotion of the medical college at Warangal a local committee had been set up to collect funds. The Government had also issued orders to acauire 80 acres of land for the college. If the efforts of the committee were successful, a college could be opened there. The State Government had, however, asked the Central Government to give them the necessary financial assistance. With regard to the opening of a medical college at Tirupathi, the Chief Minister said that it might be possible to start it in the last year of the present Five-Year Plan. First they had to upgrade the local hospital to serve the needs of a teaching hospital.

Only 213 Plague victims in 1958

There were only 213 cases of plague officially recorded in 1958, the lowest number since the beginning of the century, according to a notice issued by the World Health Oganization in its Weekly Epidemiological Record.

This is further confirmation of the downward trend of plague incidence observed in recent years, especially since 1951 when 15,399 cases were reported (of which 8,230 were in India). In 1957 the total was 569.

The distribution of the 213 cases in 1958 was as follows:

In *continental Africa* only six cases were reported in the north-eastern part of Belgian Congo and 19 cases in the Central Provinces of Kenya. In *Madagascar* 21 sporadic cases were recorded in several local areas most of which were situated in Tananarive Province.

In *America,* active foci were located in Ecuador (Loja and Chimborazo Provinces), in Peru (Piura, Lambayeque, Ancash and Cajamarca Departments) and in a number of local areas of the State of Bahia in Brazil.

In *Asia* (outside continental China and USSR) a new foci (11 cases) was discovered in the Kurdistan-Miandoab area of Iran. The 26 cases reported in India were observed in three districts in the southern part of the country. All cases reported in Burma occurred in urban areas: twelve in Bassein, one in Rangoon and five in Meiktila. In Viet-Nam ten cases were reported in one area of the Tanan Province, four in the Baria Province and one case in Saigon.

Extension of W.H.O. Activities in Medical Research—Plans Endorsed by Executive Board

The Executive Board of WHO has unanimously endorsed a programme for extended medical research, presented by the Director-General, Dr. M. G. Candau, that was characterized by several Board members as one of the most important steps in the Organization's history, opening up vast new horizons for international health action.

The Director-General had drawn up the programme on the instructions of the Eleventh World Health Assembly which met in Minneapolis, USA, last year, when it was decided that further knowledge was needed on the causes, treatment and prevention of certain diseases common to mankind, as well as chronic diseases such as cancer and heart disease.

Dr. L. T. Coggeshall, Dean, Division of Biological Sciences, University of Chicago, commenting on the proposals, pointed out that despite the explosive advances in medical research in recent years, there are still many old problems to solve, while new ones constantly are appearing. "There is a good deal of co-operation going on internationally but this is not rapid enough", he said, at the same time emphasizing that the Organization must move with caution in order not to disappoint the many people for whom research is now an almost magic word.

Professor E. A. Aujaleu, Director-General of Public Health, Ministry of Health, Paris, urged that WHO's programme of medical research be given the widest possible interpretation, taking into account not only the patient, hospital and laboratory but the population at large. Dr. Aujaleu also drew the attention of the Board that it was necessary not only to train research workers, but to give them opportunities and funds to make full use of this training.

Statement supporting the Director-General's proposals, and underlining the wide opportunities they open for the Organization, were also made by: Dr. N. V. Zhdanov, Deputy Minister of Health of USSR, Moscow; Sir John Charles, Chief Medical Officer, Ministry of Health, London; Professor G. A. Canaperia, Director of the Office of International Relations, Ministry of Health, Rome; Dr. A. J. Metcalfe, Director-General of Health, Canberra; Dr. M. Slim, Chief of Central Technical Services of the Tunis Health Service; and Dr. Cao Xuan Cam, Ministry of Public Health, Saigon.

Describing the role of WHO in medical research, the Director-General observed that, great as any national research effort may be, there remain problems which cannot be solved within the national boundaries of any one country. The clues to some of the greatest health problems of mankind may very well depend on their solution. Some require exploration in particular geographic areas, climatic conditions, among populations of different races or in particular conditions of living. Co-ordinated research in different parts of the world which would yield comparable results, international teamwork which would pool talent, better exchange of knowledge to expedite scientific

progress must all become parts of the international endeavour if essential gaps in our knowledge are to be filled.

The report described six categories of research problems particularly suitable for international collaboration, chief among which are those of world-wide significance, such as the genetic description of populations and the measuing of the incidence and prevalence of disease. Certain other problems, while not world wide, require study on a region-wide basis, like kwashiorkor and others common to all tropical countries.

The second category includes communicable diseases; tuberculosis and many virus diseases that are universal, and malaria that requires a regional approach.

Cancer, coronary thrombosis, hypertension, rheumatoid arthritis and diabetes mellitus represent a third category for which the comparison of health and illness in different environments and economic conditions may provide the key to understanding. The Director-General urged speedy exploration of these contrasts that tend to disappear due to rapid social change and evolution.

In describing the fourth category the report pointed out that an investigation of a rare condition often has had unexpected practical importance. For instance, an unusual kind of pulmonary hypertension has been reported in populations living above 4,000 meters, the study of which might throw light on pulmonary hypertension in general.

A fifth category arises from the need to assist highly skilled research workers to combine their experience for the expeditious solution of problems.

Lastly, there is a need for international co-operative, because the necessary research resources are lacking in the countries where problems are found. Assistance from other nations either in manpower or facilities or both is necessary and could be arranged through an international organization like WHO.

At the conclusion of the discussions the Board requested the Director-General to continue the study and submit his proposed research programme with budget estimates to the Twelfth World Health Assembly, which meets in Geneva in May.

The Rights and Obligations of Soviet Doctors

All Soviet doctors work at clinics, hospitals and other medical institutions, or at research institutes, and laboratories. Private practice is permitted in the Soviet Union, and doctors have the right to receive patients at home. Yet the number of private practitioners in the Soviet Union is relatively small. This is accounted for by two factors:

(a) Medical aid in USSR is free and acces- to consult a private practitioner and to pay sible to all. Therefore there is no necessity for treatment.

(b) Doctors do not finnd it advantageous to go in for private practice, which would mean having to rely on an unsettled income, whereas they receive a regular salary when they work at a state medical institution. Therefore doctors who engage in private practice do it only as a sideline, as a source of additional income.

Doctors receive their salaries from funds allocated by the state and are paid fortnightly. If a doctor is summoned to a patient for a special consultation, the state pays a fee for each such call made. Doctors who have worked 30 years in towns or cities, or 25 years in the countryside, receive an additional payment of 40 per cent of their fixed salary for length of service.

Doctors, like all other Soviet citizens, are eligible for state social insurance payments during temporary loss of working capacity due to illness or injury. It should be understood that no deductions from a doctor's pay are made for the upkeep of the social insurance fund. The administration of the institution or enterprise where he works pays a fixed amount from its own fund for social insurance, and this does not affect the medical worker's salary in any way.

The pension law applies to all citizens of the Soviet Union. Accordingly doctrs are eligible to receive old age or invalid pensions. The latter pensions can amount to 100 per cent of their pay. Old age pensions are paid to men at 60 and to women at 55 years of age, and for both categories are calculated on their pay, on a percentage basis, ranging from 50 to 100 per cent of their calaries.—*U.S.S.R Information Dept.*

50 Per Cent. Reduction in Tuberculosis Deaths

A decrease of 50 per cent. or more in the number of deaths from tuberculosis has taken place in many countries during the period from 1952 to 1957, according to a statistical report of the World Health Organization.*

This drop is mainly a result of the use of new drugs, such as INH and streptomycin, thanks to which tuberculosis need no langer be a killing disease. Another factor is the intensive TB case-finding and vaccination campaigns in recent years, as a result of which fewer people contract tuberculosis.

Among the countries and territories covered by the report, the lowst tuberculosis death rate is now found in Iceland, where it dropped from 13.5 per 100,000 population in 1952 to 4.3 in 1957, with a rate of only 2.5 in 1955. The highest rate is in Hong Kong, where it dropped from 158.8 in 1952 to 102.6 in 1957.

For all the countries under review, tuberculosis death rates since 1952 are shown in next page.

Cats, Dogs, Parrots, Possible Tuberculosis Carriers.

Cattle are becoming much less important as a source of transmission of tuberculosis to man in many countries. At the same time, public health authorities are paying more attention to other animal sources of tuberculosis infection, notably dogs, cats, parrots, goats, pigs and monkeys.

During the last few years, rapid progress in the control of bovine tuberculosis has been reported from Portugal, United Kingdom, German Federal Republic and Switzerland. In the Scandinavian countries the Netherlands and the United States of America, this disease is now practically non-existent, mainly due to systemic application for the tuberculin test in cattle and slaughter of all animals reacting to this test.

The progress was noted with satisfaction by the Joint Expert Committee on Zoonoses (animal diseases transmissible to man) of the World Health Organisation (WHO) and the Food and Agriculture Organization (FAO) during a recent meeting in Stockholm. In countries where bovine tuberculosis is still an important problem, the Committee Noted, approximately 10 per cent of human infections are derived from cattle.

The discussions at the meeting revealed that dogs can become infected with either human or bovine tuberculosis. Cats are resistant to the human type but susceptible to the bovine type. Parrots can contract human tuberculosis. Monkeys are susceptible to both types.

Animals, however, can also become infected from humans, and many cases of reinfection of tuberculosis-free cattle with human or bovine type strains have been traced to this source.

Study Tour to USSR Organised by W,H.O.

Five senior public health administrators from WHO's South East Asia Region left New Delhi on October 15, 1958 for Moscow on a six-week tour sponsored by WHO during which they will study public health administration methods in the USSR and its constituent republics.

They will be joined in Moscow by 18 other participants from various countries of the world. The 23-man group will be led by Dr. J. Peterson, Director of the Division of Organization of Public Health Services at WHO Headquarters in Geneva.

The Indian member of the group is Dr. N. Jungalwalla, Director, All-India Institute of Hygiene and Public Health, Calcutta. Other members from South East Asia are: Dr. U. Kyaw Sein (Burma); Dr. W. A. Karunaratne (Ceylon); Dr. Adjidarmo (Indonesia) and Dr. Erb na Bangxang (Thailand).

The six-week study tour will include visits to medical and health institutions in Russia, observation visits to work in the field carried out at different levels of government administration, and exchange of views on the spot with local and national health administrators.

* W.H.O. "Epidemiological and Vital Statistics Report," Vol. II, No. 10, 1958.
Besides tuberculosis death rates, the Report gives TB morbidity statistics and statistics of BCG vaccinations for a number of countries.

TUBERCULOSIS DEATH RATES PER 100,000 POPULATION

	1952	1953	1954	1955	1956	1957
Australia	14.9	11.0	10.0	7.9	7.7	6.1
Austria	45.8	34.1	34.5	31.5	29.3	27.4
Belgium	26.8	28.5	26.4	25.2	22.8	—
Canada	17.1	12.3	10.3	8.9	7.8	7.1
Chile	109.1	78.0	69.8	67.0	59.5	57.9
Ceylon	38.4	29.6	23.6	21.8	19.0	—
Colombia	30.8	26.2	26.1	28.2	26.9	—
Costa Rica	38.3	25.4	17.0	23.1	20.0	21.0
Denmark	10.9	8.8	7.7	6.3	5.1	4.9
El Salvador	32.6	27.6	22.4	20.8	16.0	—
Finland	57.7	44.6	40.4	41.8	38.1	38.0
France	43.8	36.8	32.4	31.3	28.5	27.0
Germany :						
Democratic Republic	48.4	31.5	27.1	25.5	23.8	—
Federal Republic	27.4	21.6	20.4	20.1	19.5	18.7
Hawaii	12.8	8.0	8.4	6.3	6.0	—
Hong Kong	158.8	130.6	126.3	120.1	107.7	102.6
Hungary	64.3	44.3	36.2	34.0	35.0	34.4
Iceland	13.5	9.3	6.3	2.5	8.1	4.3
Ireland	53.5	40.3	34.3	30.5	23.8	24.1
Israel (Jewish population)	13.4	10.3	9.3	6.8	6.7	5.1
Italy	27.7	23.6	23.0	22.7	22.2	20.6
Japan	82.5	66.7	62.5	52.3	48.7	46.9
Luxembourg	23.9	17.1	11.8	18.1	11.5	15.0
Malta and Gozo	14.6	16.7	12.2	14.6	11.8	11.3
Mauritius	40.1	28.3	25.1	24.4	25.5	26.7
Mexico	37.1	30.7	27.9	26.0	—	—
Netherlands	12.3	9.2	7.5	6.7	5.5	4.7
New Zealand	21.1	17.4	14.5	13.8	10.9	11.2
Norway	20.0	16.0	15.3	12.7	10.2	—
Portugal	96.8	62.7	61.5	63.0	63.2	58.4
Puerto Rico	94.0	46.5	38.2	33.2	36.4	—
Singapore	119.9	89.8	82.7	81.7	62.0	57.8
Spain	56.4	40.4	37.6	35.4	33.2	—
Sweden	17.3	14.3	13.0	10.7	9.6	8.8
Switzerland	25.4	23.4	22.1	21.5	19.3	17.6
Trinidad and Tobago	54.6	46.7	39.7	40.2	22.8	—
United Arab Republic (Egypt)	36.4	29.4	26.2	—	—	—
Union of South Africa :						
White Population	15.0	9.8	9.3	8.3	8.2	—
Asian Population	57.1	32.0	32.1	30.2	23.8	—
Coloured Population	319.5	248.7	216.9	162.1	137.2	—
United Kingdom :						
England and Wales	24.1	20.2	17.8	14.6	12.0	10.6
Scotland	31.5	26.2	22.0	19.1	15.6	14.0
N. Ireland	29.8	22.8	18.1	15.1	11.7	12.5
U.S.A.	15.8	12.3	10.2	9.2	8.4	7.5
Yugoslavia	74.7	48.5	67.9	55.8	54.1	—

Nobel Prize for Medicine

Three American scientists were awarded the Nobel Prize for Medicine this year for developing a genetic research technique that has been used on cancer and other medical problems.

The winners, American by birth, are Dr. George Wells Beadle, Professor of Biology at the California Institute of Technology, Pasadena, Dr. Edward L. Tatum, head of a department at the Rockefeller Institute for Medical Research, New York, and Dr. Joshua Lederberg, Professor of Genetics at the University of Wisconsin, Madison.

Their work concerns the actual basis of heredity the way in which characteristics are transmitted from one generation to another. Their technique has become one of the most important tools in the study of cell metabolism. Now widely used, it has given important results on various biological and medical problems.

One half of the prize went jointly to Dr. Beadle and Dr. Tatum for their discovery that genes act by regulating definite chemical events. The other half went to Dr. Ledergert for his discoveries concerning genetic recombination and the organisation of the genetic material of bacteria.

C.S.I.R. Fellowship for Scientists

The Council of Scientific and Industrial Research has decided to enhance the rate of stipend of junior research fellowship from Rs. 200 p.m. to Rs. 250 p.m. fixed and in the case of certain specialised subjects to Rs. 300 p.m. to encourage young and brilliant scientists to persue research in the scientific and technological fields.

According to an official Press release, the Council has also decided that fo r certain specialised subjects the senior fellowships will be of the value of Rs. 400 and Rs. 500 p.m.

The Council has been awarding junior and senior research fellowships for research work in National laboratories and institutes run by the Council as well as in other research institutions, university laboratories, scientific and technological colleges.

About 400 scholars are at present receiving these stipends.

Sanitation Schemes for Punjab

The Punjab Sanitation Board at a recent meeting approved urban and rural schemes estimated at Rs. 50 lakhs.

The urban schemes relating to drainage and water supply will be implemnted in Rohtak, Budlada, Sohna, Bhadurgarh and Shahbad. The rural schmes will be carried out in Hissar, Gurgaon, Sangrur, Bhatinda, Kangra, Mohindergarh, Rohtak, Ambala and Patiala districts.

Family Planning Centres in West Bengal

A total of 54 Family Planning Centres have been opened in West Bengal, according to a Press Note issued by the State Government.

Of these centres 22 have been started in Calcutta. The rest are located at different places covering all the districts except Purulia.

Domiciliary Treatment of Tuberculosis

Dr. K. K. Hegde, Health Minister of Mysore, inaugurated at Mysore the domiciliary treatment service for tuberculous patients—the first in Mysore city. Under the scheme doctors will call on patients and render them medical aid free of cost.

Dr. Hegde said proposals were also under consideration for establishing T.B. demonstration and training centres in Bangalore.

The World Medical Asscіation

Dr. Louis H. Bauer, Secretary General of the World Medical Association, announced that the Association has made initial arrangements for providing its practicipants at the Second World Conference of Medical Education (Chicago, Illinois, August 30—September 7—12, 1959) with a special chartered transportation plane. Members of the national medical association and their families are eligible to apply for reservations on the chartered flights. Additional information may be obtained from: The World Medical Association, 10, Columbus Circle, New York 19, New York.

International Congress on Occupational Health

The 13th International Congress on Occupational Health—first to be held in the Western Hemisphere—will meet in New York City, July 25 to 29, 1960.

Physicians, nurses, industrial hygienists and other delegates from more than forty countries will attend.

Theme of the New York meeting will be prevention, rather than cure. Programme participants from the many countries will report on their experiences, the findings of both clinical and laboratory research, and on methods for control of occupational health hazards. Plans already are under way to provide meeting facilities, and for translation services, accommodations for the visitors, and other arrangements.

The Scientific Programme Committee invites submission of papers for presentation at the Congress. The Programme will be devoted to the discussion of the different aspects of Occupational Health.

Further details from Dr. C. K. Ramchandra, Parry & Co. Ltd., Ranipet, N. A. Dist., South India.

World Health Organisation Fellowships

The World Health Organisation is likely to offer some fellowships for post-graduate training in (i) Social and Preventive Medicine, (ii) Malaria Eradication, and (iii) Environmental Sanitation. The facilities are for 'practical' training as distinct from 'purely academic' training.

Applicants should be graduates in the particular subject and should have experience sufficient to enable them to take advantage of the training. Preference will be given to those who have exhausted the opportunities available in the subject in India.

The candidates should be below 50 years of age and employed under a State Government, local body or a non-governmental voluntry organisation. Only those honorary workers, in whose case a guarantee of regular whole-time employment from States is forthcoming, are eligible.

Applications should be submitted through the State Governments in all cases on the prescribed froms obtainable from Secretary to the Government of India, Ministry of Health, New Delhi. The last date for the receipt of application through the State Government is April 6, 1959.

International Conference on Planned Parenthood Concludes

The sixth International Conference of Planned Parenthood concluded its session in New Delhi on February 21 with an appeal to the United Nations Human Rights Commission to include in the Declaration of Human Rights' voluntary parenthood and freedom to obtain family planning education as a basic human right. By a resolution, the Conference, attended by 750 delegates and observers from 27 countries, suggested to the World organisations, through the Secretary-General of the United Nations, to take steps for giving a fillip to the movement of planned parenthood.

The Vice-President, Dr. S. Radhakrishnan, who addressed the concluding plenary session of the Conference held at the Vigyan Bhavan, praising the work of the conference, said: "If you want to raise a better quality of human beings, certain things are essential like physical health and mental health. If mothers themselves suffer from malutrition and if they are underfed and if they have to face so many problems of life, how can they be expected to feed their children and bring them up in a proper way?" He asked family planning workers to approach the people in an intelligent, sincere and earnest manner in explaining family planning. "If you do that, you will be able to achieve success in your work," he said.

In its resolutions, the Conference suggested to the Food and Agricultural Organisation to recommend to its member nations to combine its efforts to increase food production with programmes for planned parenthood. It appealed to the World Health Organisation to include contraceptive information as an integral part of its Health programmes. The Conference stated in its resolution that while the WHO had rendered outstanding service in improving human health and reducing death rate, it had made

no corresponding effort to educate people in limiting the size of their families and thus lower the birth rate. It asked the Economic and Social Council of United Nations to take into consideration measures of planned parenthood "as a major means of improving living standards."

The election of Sweden's Mrs. Elise Ottensen-Jensen as the new President of the International Planned Parenthood Federation was announced amidst cheers.

Tuberculosis in Calcutta

The prevalence of "active and probably active" cases of tuberculosis in Calcutta was 16.73 per 1,000 persons x-rayed in the age group of five and above. The number of infective cases was 6.39 per 1,000.

Giving the information in a written reply in the Lok Sabha on 11-2-59, the Union Minister, Shri D. P. Karmarkar, said that the result were obtained after a sample survey conducted by the Indian Council of Medical Research during 1955-58. The survey also covered Panihati, Bokanda, Uttar Jafardhar, Chittaranjan, Kalna and Purushottampur. But the data regarding these areas had not been analysed so far.

Three year Campaign for Eradication of Smallpox

A country-wide three year campaign for the total eradication of smallpox will soon be launched by the Government of India in collaboration with the respective State Governments.

The Union Government's measures to fight out the menace of smallpox from the country within the second Five-Year Plan period will be guided by the recommendations of an expert committee of the Indian Council of Medical Research which met recently in Delhi, at their instance, to consider ways and means. The entire cost for the campaign will be borne by the Centre.

Comprehensive Health Plan for India

The Union Minister announced in the Lok Sabha on 26-3-59 the Government's opinion to appoint a high-power committee to assess the progress in health and draw up a comprehensive programme for future development.

The committee would include Dr. A. L. Mudaliar, Vice-Chancellor of Madras University, as chairman and other eminent doctors and experts. He hoped to announce its personnel shortly. The committee would function for a considerable period.

Replying to the critical five-hour debate on his Ministry's demands for grants, Mr. Karmarkar listed the measures the Government had taken to combat malaria, leprosy and tuberculosis and expand the medical facilities, particularly in the rural areas. Striking an optimistic note, he said the Government hoped to eradicate malaria completely from the country within the next three years.

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(*Continued from page* 216)

as its objective the raising of consumption levels, although to much below the basic standards set by nutrition experts. While the possibility of achieving the limited targets set in the Second Five-Year Plan is open to doubt, it is increasingly realised that the major impediment in the realisation of these targets is the accelerating population growth. Whole-hearted support for Government's population policy and the adoption of family planning on a national scale are essential if the food requirements of our population are to be fully met from internal sources. The sooner efforts are made in these directions, the greater the prospects for achieving self-sufficiency in food.

REPORTS & REVIEWS

THE PROBLEM OF FOOD AND POPULATION IN INDIA*

C. Chandrasekaran.—Professor of Statistics, All-India Institute of Hygiene and Public Health, Calcutta.

INTRODUCTION

Once again, in the last few months India's food position has become the country's problem number one. The Lok Sabha debate on it held during this week is a testimony of the grave concern with which our statesmen are considering this question. Our Prime Minister in a recent statement said that the food problem was to be tackled on a war footing. Inaugurating this year's rabi campaign in the U.P. State, the Chief Minister Dr. Sampurnanand outlined the State programme for raising an army of two and a half lakhs of non-official "Gram Sahayaks" to carry to the farmers the message of more and better food production. This time, the widespread interest in the food problem stems from foreign exchange difficulties and the need to keep food imports to a minimum if the Second Five-Year programme is not to flounder for lack of basic supplies for industrial development from abroad. But most of you assembled here will realise that the present position is not without parallel and will recall that in the last two decades food crises have been recurrent. Only five or six years ago, the food problem was accentuated by the inadequacy of food supply in the South of India and the near famine conditions that prevailed over large parts of the Madras and Mysore States. A few years earlier, Bengal was in the grip of famine and although the Second World War was then on neither the Government nor the people were in a mood to dismiss the calamity as inevitable, and a Famine Inquiry Commission was set up to examine the food position in various parts of this country. Along with such recurrent crises, expressions of optimism are also frequently heard about our potentialities for food production and "self-sufficiency in food" has been suggested not only as a goal but urged by some as a short range possibility. Others go still further and ask that India should be able to produce enough food grains to enable her to earn foreign exchange by exporting the food surplus. It is against this background of diversity of views and of the conflict between aspirations and attainments that we today have to consider India's food problem. Inevitably this problem cannot be assessed apart from India's growing population and I am grateful to the Ramakrishna Mission Institute of Culture for asking me to discuss before you the problem of Food and Population in India.

Food Position Prior to Plan Period

We may begin by reviewing the food position and its trend during the several decades prior to 1951. Fortunately our task in this respect has been made easy by the clear and careful exposition of this subject by the former Census Commissioner Shri R. A. Gopalaswami in the 1951 Census Report. His findings were briefly as follows :

During the three decades from 1891 to 1921, the area of cultivated land per capita moved up and down slowly and was a little higher at the end than at the beginning. The second thirty-year period between 1921 and 1951 when the population showed a rapid growth, the picture was very different—the cultivated land per capita dropped steadily from census to census (See Table 1). It came down from 1.11 acres per capita in 1921 to 0.84 acres in 1951.

Table 1. **Area of cultivated land per capita**

Census year	Area in acres per capita*
1891	1.09
1901	1.03
1911	1.09
1921	1.11
1931	1.04
1941	0.94
1951	0.84

* Districts with reliable and continuous statistics only included. Source Census of India 1951, Vol. 1 Part IA, Report page 141.

Other things being equal, a diminution in the average area of land cultivated per capita would mean lesser production per capita. Production, however, can be increased by improving farming methods and thus augmenting the average yield per acre. Indirect evidence leads to the conclusion that such improvement did not occur to any large extent between 1921 and 1951. The area under double crop per capita and the irrigated area per capita actually diminished during this period (see Table 2), so that any improvements in these directions were more than off-set by the increase in population.

Table 2. **Double crop area and Irrigated area, per capita*** (in acres)

	1891	1921	1951
Double crop area	0.12	0.13	0.10
Irrigated area	0.16	0.18	0.14

* Source ibid page 146.

* Speech delivered at the Ramakrishna Mission Institute of Culture, Calcutta, on 23rd August, 1958. I am indebted to Shri R. Viswanathan for his assistance in the preparation of this lecture.

The decline in per capita production in food grains indicated by the statistics of the area under cultivation, is fully supported by those of exports and imports. These statistics show that round about 1921, undivided India changed over from being a net exporter of food grains to a net importer (Table 3). While in the 1890's India had a net export of over one million tons of food grains, the net export gradually declined when about the conclusion of the First World War the exports and imports practically balanced. After 1920, the net imports gradually increased and prior to the outbreak of the Second World War averaged 1.4 million tons per annum.

During the war years, mainly because of the abnormal conditions which prevailed, net imports diminished. In 1940-41 and 1941-42 the net imports amounted to 0.96 and 0.43 million tons respectively. During 1942-43 imports were cut off. India supplied Ceylon and a few other countries about a million tons of food grains. The Bengal Famine of 1943-44 is a sorry reminder of the acute shortage in food supply when under international allocation India received a net supply

Table 3. **Export and Import of food grains on annual basis***

	In millions of tons		
	Exports	Imports	Exports-Imports
1890-91 to 1894-95	1.45	0.21	1.24
1895-96 to 1899-1900	1.10	0.48	0.62
1900-01 to 1904-1905	1.66	0.62	1.04
1905-06 to 1909-1910	1.48	0.96	0.52
1920-21 to 1924-1925	0.98	1.14	—0.16
1925-26 to 1929-1930	0.83	1.59	—0.76
1930-31 to 1934-1935	0.57	1.84	—1.27
1935-36 to 1939-1940	0.69	2.07	—1.38

* *The statistics of exports and imports of food grains for the successive five-year periods beginning from 1890-91 to 1909-1910 and relating to undivided India, were compiled by a Special Officer, appointed by the Government of India in 1910. From about the period of World War I, these statistics are available from the Directorate of Economics and Statistics of the Ministry of Food and Agriculture (Refer—Census of India, Vol. I, Part IA, Report, Pages 164-166).*

of 0.3 million tons. With imports dwindling, the shortage was made over by consuming from carry over, and led to the particularly difficult condition in 1946. With the cessation of War, India's imports began to increase again and according to the report of the Planning Commission the net average annual import during the period 1947-52 was 3.3 million tons.

The above review leads to one important conclusion that from about 1921 India had ceased to be self-sufficient in her food supply. Although some improvement in agricultural production did take place, it was outpaced by the growth of population. Just before the beginning of the First Five-Year Plan, import of about 3 million tons of food grains per year had become a necessity to meet even the low average consumption demands of the Indian population.

The Plan Period

In the First Five-Year Plan emphasis was naturally laid on agricultural development; outlays for agriculture and community development, along with irrigation and power accounted for about 45 per cent of the total outlay of Rs. 23,56 crores under the plan. The immediate objective was that of the Grow More Food campaign which antedated the plan—to increase the output of basic food stuff, primarily food grains and remove India's dependence upon food imports while raising somewhat the level of consumption. In addition, a ground work was to be laid for continuing expansion and reorganisation of the farm economy through the Community Development and National Extension Programmes.

The targets of additional production, especially of food grains were worked out in terms of the contribution anticipated from different programmes such as irrigation, use of larger quantities of fertilisers, supply of improved seeds and programmes of land reclamation and development. The course of food grain production is shown in Table 4. The overall index of agricultural production of 100 in the base year 1949-50 which stood at 96 in 1950-51, just before the plan period reached, 114 in 1953-54 and increased to 116 in 1954-55 and 1955-56. In regard to food grains only, the index of 100 in 1949-50 increased to 114 in 1955-56. Such an increase helped to reduce the volume of imports and also check the inflationary tendencies which existed when the First Plan was formulated.

Of the increase of 7.6 million tons in food grains, anticipated over the First Five-Year Plan period it was thought that rice might account for 4 million tons, wheat for 2 million tons, grains and pulses for a million tons and other cereals for about half a million tons. Although the total target aimed at by the First Five-Year Plan was exceeded the largest increase occurred in millets and other cereals. On the whole the expectation in regard to rice was not fulfilled except in one favourable year.

According to the Planning Commission's report, among programmes that have contributed to increased agricultural production during the First Plan period, minor irrigation works, increased use of fertilisers, land reclamation and development and the extension of area under cultivation have been specially significant. The extension of cultivation, it is remarked, has been a larger contributory factor towards increase in production than had been anticipated when the plan was drawn up. Thus the total cropped area had increased from 326 million acres before the plan to 352 million acres in 1955-56. The area under food crops had risen from 257 million to 272 million acres and under commercial crops from 49 million to about 60 million acres.

TABLE 4. **Data on food grain production (1949-50 to 1957-58)**

	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1957-58
Total food grain production in million tons ...	54.0	50.0	51.2	58.3	68.7	67.0	65.8	68.7	62.0
Index number for food* grain production ...	100.0	90.5	91.1	101.1	119.1	114.4	113.5	119.6	Not available

*Source : Agricultural situation in India 1957.

Note : Production data : 1949-50 to 1955-56 figures finally revised; 1956-57 figures partially revised; 1957-58 figure subject to revision.

Index numbers : 1949-50 to 1953-54 figures finally revised; 1954-55 and 1955-56 partially revised; 1956-57 figure subject to revision.

In the Second Plan agricultural programmes are intended to provide "adequate food to support the increased population and the raw materials needed for a growing industrial economy and also to make available larger exportable surpluses of agricultural commodities." In regard to the goal to be kept in view the plan aims at the doubling of agricultural production including food crops, oil seeds, cotton, sugar cane, plantation and other crops, animal husbandry products etc., within a period of ten years.

The target for the Second Five-Year Plan is to increase food grain production to 75 million tons by 1960-61. Production figures available till now make one question the achieving of this goal. The unrevised figures for production food grains in 1957-58 is 62.0 million tons. During the present year there are indications that production figures might not come up to expectations.

The numerous problems connected with the increase of food production have been pointed out even in the Report on the Second Five-Year Plan. Significant is the fact that agriculture in India is still a "gamble in the rain." If the weather conditions prove unhelpful production suffers. Apart from natural conditions which are unpredictable there are limitations to the resources available for immediate exploitation. As has been emphasised in the Second Five-Year Plan the scope for increasing the area under cultivation is extremely limited. Such increase as may take place in the area under cultivation is likely to increase the production of mainly the coarser grains. With the general tendency to shift from the use of coarser grains to the superior ones such as rice, wheat or maize, particularly among the urban population the hope of increasing production in a real sense has to depend essentiall on the possibility of increasing the average yields in areas under cultivation. While the low average yields now recorded in India as compared with those of many other countries (670 lbs. of wheat per acre in India as compared with 2,040 and 2,016 los. in Egypt and Japan) shows the possibilities for improvement, the manner by which such improvement can be effected should not be lost sight of. Use of better seeds and fertilisers, crop rotation, prevention of crop diseases, and even mechanisation of agriculture are suggested as possible methods for achieving this end. What is required as the plan emphasises, is not merely record achievement here and there but programmes for raising levels of productivity which go down to "individual villages and individual families." In short what is asked for is a social and economic revolution in agriculture extending over the length and breadth of the country. Leaving aside the economic factors which can sustain such a programme, the social factors involved cannot be underrated. The age-old practices of the rural population have to give place to new. Who knows as to how new motivations can be set to work in communities which are largely illiterate and where life is dominated by forces beyond one's control!

The race between population and production

While the difficulties of achieving the targets for food production set out in the Second Five-Year Plan appear great, it is worthwhile looking into the objectives with which the targets for the First and Second Five-Year Plans were worked out. As stated earlier, the First Five-Year Plan set a target for increased production of 7.6 million tons. This increase was intended mainly to stop import of food grains which amounted to about 3 million tons annually and to provide the extra needed for meeting the requirements of the increase in population. No attempt could be made during this plan period to increase the per capita consumption by making available additional supply. In the Second Five-Year Plan, it was estimated that out of the 10* million tons of increased food production aimed at, 5.5 million tons would be used up for sustaining the additional population while

* This figure was subsequently revised to 15 million tons.

4.5 million tons would be used for improving the nutritional standards of the population. The average intake of calories was 2,200 at the end of the First Plan period and was expected to increase to 2,450 calories at the end of the Second Five-Year Plan period, as against 3,000 calories recommended by nutrition experts.

In both the First and Second Five-Year Plans, therefore, over fifty per cent of the increase in production was to be utilised merely to meet the requirements of the additional population. It is in this context that the rate of growth of population assumes special significance in discussions of food problems.

India's population growth has accelerated in the last few decades. Since the 1921 census, the three successive decades have recorded increases in population of 11.0, 13.5 and 14.1 per cent respectively. There are definite indications that unless there is wide-spread acceptance and use of family planning in the country, the rate of population growth will touch unprecedented levels. The estimation of future population size is by no means easy, particularly when the basic data on birth and death rates are defective as in India. However, utilising whatever information was available, several projections have been made. Some of these have been presented in Table 5. According to Shri R. A. Gopalaswami, India's population may be expected to increase from36 crores in 1951 to 52 crores in 1981. He has indicated that his estimates are likely to err on the side of under-statement, unless the rate of growth of population is checked by contraception to an extent not known yet in this country or the break-down in food supply is of such a nature as to allow death rates to soar high. Coale and Hoover of Princeton University have also made estimates of future population size upto 1986 under three sets of assumptions, viz:

(1) Fertility will remain unchanged between 1951 and 1981.

(2) Fertility will be reduced by 50 per cent between 1956 and 1981.

(3) Fertility will be reduced by 50 per cent between 1966 and 1981.

In all the three cases mortality was assumed to decline continuously throughout the period 1951 to 1986.

According to the first assumption the population size will increase from 357 million in 1951 to 775 in 1986 or by 117 per cent. The second and third assumptions result in population increases of 65 and 78 per cent, respectively, during the thirty-five-year period. Coale and Hoover's projections bring out one important fact viz., that from the point of view of determining future population size what is important is not only whether fertility will decline but as to how soon the decline would begin. In addition to the estimates given above, mention may also be made of those used by the Planning Commission in formulating the Five-Year Plans. Their estimate leads to a population of 500 millions in 1976. Just as in the case of the Census Commissioner, the Planning Commission has also indicated that their estimates may be on the low side.

All the above estimates have one distubring feature in common viz., that in the foreseeable future vast millions will be added to India's population. Has the country the resources to feed and provide decent living standards for such large numbers of people? If such resources be available, is it practicable to harness them at such a fast rate that enough will be produced not only to improve the existing low standards but also to provide extra for the mounting millions?

Shri R. A. Gopalaswami who was formerly the Secretary of the Famine Inquiry Commission of 1944, studied the problem of agricultural production from these points of view and was of the opinion that production will fail to keep pace with unchecked population growth and that the population had to be stabilised at 450 million, if food shortage was not to become acute. Coale and Hoover, taking into account various factors

Table 5. **Population Projection for India**
(in millions)

Source	1951	1956	1961	1966	1971	1976	1981	1986
Census Report 1951 ...	360	—	410	—	460	—	520	—
Coale & Hoover* :								
Fertility unchanged ...	357	384	424	473	532	601	682	775
Fertility reduced 50 per cent 1956-1981	357	384	420	458	496	531	562	589
Fertility reduced 50 per cent 1966-1981	357	384	424	473	524	569	603	634
Planning Commission ...	357	—	408	434	465	500	—	—

* "Population Growth and Economic Development in India, 1956-86," by Ausley J. Coale and Edgar M. Hoover, Office of Population Research, Princeton University—Preliminary draft.

of agricultural production found it "not unreasonable to foresee an approximate doubling of farm output within say the next 25 years" but added, "the indicated potential growth of Indian agriculture will not come about automatically nor is it contingent merely on supplying certain amounts of effort and capital and generalising the application of presently known techniques. It is a far more complicated undertaking than that, which will require the finding of altogether new solutions to some perplexing problems of production and organisation."

Apparently in reckoning the possibilities of future production the imponderables are numerous. Current experience and recognised limitations increasing production warrant a cautious view of the future. The many difficulties which may stand in the way of attaining the targets in the Second Five-Year, some of which have been mentioned earlier, have been dealt at length by the Food Grain Inquiry Committee which was set up last year under the Chairmanship of Shri Ashoka Mehta, the Committee's verdict was that the likely supply of food grains from domestic production would continue to fall short of estimated demand and that in 1960-61 at the end of the Second Five-Year Plan period the deficit would amount to 2 to 3 million tons. Even the optimistic estimates of future food production leave no room for complacency especially when it is recognised that because of poor dietary and want of protective food factors, India's population has to depend largely on the calories provided by cereals and pulses. The pressure on land for food grains is so much that hardly any hope is extended for diverting large areas of it to animal husbandry with a view to provide a more well-balanced diet by increasing supplies of milk and other dairy products.

Whole-hearted support for family planning

The above review has emphasised the difficulties in food supply created by rapid population growth. Logically, at least as much attention has to be paid for regulating population growth as for increasing food production. Yet, sadly enough, public consciousness has not yet been aroused to the effects of unrestricted procreation. It is, however, commendable that while there was still a tendency in this country to whittle down the seriousness of the problems created by a rapidly growing population by certain sections of the intelligentsia, the Government of India included Family Planning as one of the programmes in the First Five-Year Plan. In the Second Five-Year Plan, added emphasis was given to Family Planning and the allocation of Rs. 65 lakhs made in the First Five-Year Plan for this programme was increased to about Rs. 500 lakhs in the Second Plan.

The Government's family planning programme, although in its infancy has much to its credit. Ad hoc centres for training workers for family planning clinics have been started in different parts of the country. A full-fledged Family Planning Training and Research Centre has been opened in Bombay. Another Centre for the training of rural workers has been set up at Ramanagaram, Mysore State. Contraceptive testing units have been established and researches to assess the acceptability and effectiveness of various family planning methods among the Indian population have been supported. About 500 clinics have been opened in urban and rural areas. Demographic studies have also been encouraged by starting a centre in Bombay and two units in Delhi and Calcutta.

All these are good beginnings but to make an impact of the type required, the Family Planning Campaign must become a national movement. It must receive whole-hearted support from all sections of the intelligentsia. Our leaders in all walks of life be it in politics, education or social service must give high priority to population control in their thinking and should miss no opportunity to mould public opinion in its favour. Voluntary organisations whatever their spheres of activity must serve also as the nuclei from where the message of family planning would radiate. Family planning must become a household word.

A drastic reduction in the national birth-rate cannot be expected immediately. Far reaching changes in social organisation and community thinking have usually to occur before patterns of fertility can get modified. Limited researches in India have shown that even in selected areas where closed communities have been provided with knowledge and means of family planning by specialised staff, the effect on fertility has been disappointing. This, inspite of the fact that both in urban and rural areas, women as well as men express great readiness to limit the number of children born. At the present time, the motivation towards family planning is extremely weak in most sections of the population and the need of the hour is to strengthen it. It is a challenge which must be faced.

The present food crisis can be made into a God-send. People can be taken into confidence and be told that the gravity of the problems of food supply and poverty are not likely to be mitigated as long as population growth remains unchecked. The Indian people alive to their responsibilities, known to make sacrifices and with a tradition of "moral restraint" will, I believe, accept family planning once the seriousness of the population problem is impressed upon them. The role of our leaders and voluntary organisations and the response of the public will determine whether India becomes self-sufficient in food or will be long relegated to the position of depending upon other countries for assistance in feeding her millions.

In Conclusion

Since about 1921, India's food production has lagged behind its requirement. The First Five-Year Plan aimed at self-sufficiency in food production at existing levels of consumption. The Second Five-Year Plan has

(*Continued on page* 211)

THE THIRD ANNUAL CONFERENCE OF THE INDIAN PUBLIC HEALTH ASSOCIATION.

SCIENTIFIC SESSION—27th December, 1958.

(MISCELLANEOUS PAPERS)

Chairman—Dr. B. C. Das Gupta.

Opening Remarks :—

It is my great pleasure to open the Scientific Session this morning. On order to meet the convenience of Dr. B. C. Roy, the Chief Minister who could not give us time for inauguration earlier than 5 P.M. we had to fill up the morning with the scientific session, we did not like to waste any time. With that object in view we have arranged for a programme of papers to be read by many of our colleagues who are not taking part in the symposium. This is a new opportunity and I trust that it will be repeated in the future conferences also. It affords an opportunity to the workers from various fields to discuss some of their urgent local problems and to ventilate their views on urgent and pressing public health problems of the country. I find that there is a large number of papers which have been proposed to be read by various eminent colleagues of mine. I would only request that time being short—we are starting at 10-45 A.M.—we have to close this particular session by 1 o'clock to break for lunch. I would request the readers of the papers to limit their paper to one of 10 minutes each. I am very anxious that we should close this session at 1 o'clock.

*BEHAVIOUR PROBLEMS IN CHILDREN FOUND IN A PARTICULAR AREA IN CALCUTTA

By

K. C. MOOKERJEE, M.Sc., Ph.D.,

Assistant Professor of Psychology,
Section of Maternity & Child Welfare,
All India Institute of Hygiene & Public Health, Calcutta.

Behaviour problems in children are not disease entities but symptoms caused by emotional disturbance or environmental maladjustments or both and in either case it is the personality which is most directly involved.

The conditions which are now considered to be symptoms of maladjusted personality cover a wide variety of emotional and behaviour reactions ranging in severity from persistent and chronic temper tantrums of the infants to the profound psychoses of patients in the care of mental hospitals; and the chronic delinquency of offenders in penal institutions. One need not have to go far to find out that the present condition in the above cases is but the accumulative end result of a long and gradual evolution in the course of which earlier and milder symptoms of maladjustment were succeeded by

* Read at the Scientific Session of the Indian Public Health Assoc. Conference held at the All India Institute of Hyg. & P.H., Calcutta-12, on 27-12-58, with the kind permission of the Director, All India Inst. of Hygiene & Public Health, Calcutta.

more and more serious and complex manifestations of emotional disorders. Preventive aspects no doubt concern with the study and treatment of the mental disorders and the delinquent behaviour which are the final result in this pathological process but at the same time it is equally concerned with the study and treatment of the milder symptoms in the earlier stages, in the belief that effective treatment may correct these conditions and thus prevent more serious developments.

The method followed by us in the clinic in brief is as follows:—

Every child brought to the clinic is referred from either (1) the School Health clinic; or (2) the M.C.H. clinic and at both these places a thorough physical check-up is made. This includes a routine physical examination with its attendant laboratory test, e.g. blood, urine, stool (where indicated), etc., as well as neurological (in some cases), endocrine, visual, dental examinations. In addition, roentgenograms of the heart, lungs, etc. or the E.E.G. where indicated, are also done. If the medical findings from these various examinations warrant further special investigations, consultation is obtained from the medical and surgical services. Whatever special examinations may be indicated are thereupon carried out. Very ofen it is only by means of such an intensive medical study that it is possible to establish the genesis of the trouble. To the question, 'Are such expensive and time consuming medical examinations essential and worthwhile? the answer is emphatically in the affirmative. There are many physical conditions which are not very rare, that are provocative of conduct disorders in children. Pathological states may and often cause pathological behaviour.

Psychological and psychometric tests are important diagnostic procedures in Child Guidance work. A determination of the intellectual status of every child must be made. Many behaviour and personality problems seen in children are best understood in terms of the child's capacities and abilities in relation to the demands which his environment places upon them. Determination of this relationship somewhat precisely is one of the first tasks confronting a clinical psychologist.

In the field of Intelligence tests we are using—(1) the Collins & Drever battery; and (2) the Terman Merill revisions of the Binet tests. For judging social development—we are sometimes using the Vineland Social Maturity test from which a S.Q. (Social Quotient like the I.Q.) can be calculated by the formula S.A./C.A. For probing emotional life and personality problems we are using Rorschach psychodiagnostic tests. Sometimes we ask a simple question, e.g. what the child would wish if he were granted 2 or say 3 wishes—and much can be revealed in these informations, e.g. hidden physical or emotional deprivations, suppressed aspirations and longings, etc. Simple observations, e.g. the child's manners, way of facing the test situations, or his attitude towards certain things may often be productive of interesting diagonistic materials for the case. Very important it is to have the social history which is to be obtained through the trained Social Worker. We get it through our Health Visitors and Public Health Nurses. It should contain specific data pertinent to the problem presented by the child. As our health visitors are not trained social workers, the history obtained through them sometimes lacks in some essential details and in such cases, I have to arrange for special visits by our staff of public health nurses who are better qualified to handle such histories. When all this has been done, we decide about the possible course of treatment which also is reviewed after a fairly reasonable period of trial.

RESULTS

Results of 50 cases have been tabulated in the present paper. The table below shows the distribution of cases according to the problems.

(*a*) Cases of habit disorders e.g. thumb sucking, nail biting, bed wetting, food difficulties etc = 22

(*b*) Cases of personality disorders, e.g. timidity, excessive shyness and sensitivity, temper tantrums, obstinacy, unsocialleness, etc. = 5

(*c*) Disturbances of physical functioning or psychosomatic problems, e.g. nervousness, fits,

anxiety attacks, pains in the chest and abdomen, difficulty in breathing, etc. = 6

(*d*) Organic diseases, e.g. epilepsy, etc. = 1

(*e*) Educational problems, e.g. backwardness at studies, no interest in studies, etc. = 10

(*f*) Mental deficiency = 3

(*g*) Juvenile schizophrenia = 3

From the above it would appear that by far the largest number of cases has been drawn from the habit disorder group.

Bed wetting :

Cases of bed wetting seem to be too many compared to the total number of cases. This is one of the obstinate diseases of children and long treatment with drugs like, ephedrine and belladonna does not produce much change. It is not always realised that emotional factors could ever be the cause of it. The other fact about this illness is that it is seldom reported because of such ideas, as, others in the family had it, etc.

In summing up the factors revealed we find the following:—Too much intake of fluids, going to bed too early and immediately after the dinner (this was particularly so in the case of children living in bustees; too much babying and bullying, absence of proper toilet training and waking up at a specified hour of the night, dearth of suitable living accommodation and consequent arrangement of joint sleeping beds, faulty attitude towards the act, etc. All these are environmental factors and were more or less successfully tackled in individual cases. Psychotherapeutic procedure which means work with the child was adopted in a few cases and with good result. In this procedure when applied to younger children play therapy and observation of play activities form a very useful part. In psychotherapeutic procedure no deep analysis was undertaken here. Mostly, bringing up the unconscious emotional conflicts on the surface and the sense of security as well as explaining the unconscious motives behind the act helped in the treatment. In one case of a grown up boy we made use of the star-chart method but that did not help us very much. In another case of an adolescent girl we made her wash her bed linen after each wetting and after a time that seemed to put a curb on her habit. Some mechanical and electrical gadgets have been recently devised to cure bed wetting but we have not used them here for practical difficulties. The drug Benzedrine also we have not used for any of the cases reported here. Only recently we are administering this drug under the care of the School Medical Officer to one of our cases not included in the present report and where the history and the physical make up of the case indicated the suitability of its use.

Other findings of a psychological nature with regard to this class of cases are as under:—

50% of our bed wetting cases enjoyed a privileged position in the birth order. Out of this 75% were the last born child and the remaining 25% were drawn from the 1st borns. This is very significant psychologically as it shows the unconsicious desire for the prolongation of this habit and in many cases further evidence on this point was provided by the non-existence of any form of toilet training at home or waking up the child once or twice by the mother during the night. Another interesting fact about them was that many of these cases responded well with such simple treatment procedure as serving the child an early supper, waking him up once during the night—restriction of fluid intake during the early part of the night and before retiring, etc. In one-third of the total number of our bed wetters jealousy was a strong secondary symptom which proves the existence of the basic underlying desire, viz. of 'attention seeking' in many of these cases.

So far as the I.Q. (Intelligence quotient) of our bed wetters is concerned, the values have been ascertained in most of the cases and there are as many below the normal level as at the normal level. From this it will be reasonable to assume that intelligence as a factor in the etiology of the habit is not totally unrelated. Since our sample has been drawn from a somewhat poor (both intellectually and otherwise) representation of the population we cannot indicate the

possible distribution of bed wetters amongst the normal, super-normal and sub-normal grades of intelligence. Out of the total number of bed wetting cases all excepting very few (1 or 2) have responded to our treatment and the habit has been under control.

Juvenile Schizophrenia :

Schizophrenia is one of the most dreaded mental illnesses and its incidence in the population is very high compared to other forms of mental disorders. Prognosis in Schizophrenia is also not very good in a large number of patients. However, it is somewhat rare that children become victims of this disorder. There were 3 cases of Juvenile Schizophrenia amongst our clinic attendants. The first case was of a 12 year old boy who lost his mother at the age of 4 years and the father had not married again. He presented the usual symptoms viz. muttering to himself, making gestures and grimaces when alone, laughing to himself, avoiding company, hallucinated, etc. He has been treated somewhat successfully with largactil. The second case was that of a girl aged 9 years who presented the following symptoms: Violent and uncontrollable manifestation of temper, talks somewhat loudly to herself, laughs for no reason, etc. All these symptoms were manifest in her after a severe attack of typhoid from which she has suffered recently. In this case I adopted a little go slow method primarily because she had just recovered from a severe typhoid illness and it was possible that her so-called symptoms were transitional in nature and given more time she might settle down to something basically different from the picture shown at the time of her referrel to the clinic. At the clinic she was found to be very restless and fidgeting most of the time. She would not co-operate for a mental test. In the circumstances and in order to gain some time, I advised the mother not to interfere too much with her ways of life ordinarily—to show an equal degree of affection to her as to her other children—to encourage more socialization and socialised activity for the child, etc. For a time the above lines of treatment produced good result and she remained fairly well for nearly two months after which she again had a mild relapse. But again after sometime she became better. The third case was of a somewhat milder type and it related to a boy of 7 years age who was a 1st born child followed by a daughter. At birth his general condition was reported to be very poor and he passed through the milestone of growth and development late. He was an over indulged and over protected child in every sense of the terms and the mother kept a continuous vigil over his activities and movements, as she had not much else to do. The child was obstinate, negativistic and non-co-operating and would make a nuisance of himself in most of the daily situations. In this case the mother was strongly advised,—(1) to allow the child to live his own life as far as possible, (2) to encourage the child into corporate and group activities of his own choice; (3) to stop nagging the child; etc. The results were satisfactory.

SOCIAL AND PREVENTIVE PAEDIATRICS*

By

DR. P. S. MUKHERJI,

Associate Professor of Pediatrics, All-India Institute of Hygiene & Public Health, Calcutta.

Out of a population of 356 millions, India has 150 million children under the age of 16; in otherwords, the problem of child health in India is almost as great as the total public health problems of a whole country like the United States of America.

Anywhere in India, more than half of the patients attending a general practitioner are children. Our outpatients are equally overcrowded with them. The practitioner, either in his chamber or in the hospital, can spare very little time for one child. He can hardly talk to the mother to get a detailed story. The child gets a bottle of medicine, and is cured for the time being. Soon after he may be ill again, as the circumstances for which he was ill for the first time still prevail. He may visit another doctor with a similar illness, or a different one. A child may die in one of his repeated attacks of illnesses or becomes resistant and survives. An individual illness in child's life is just like pages of a big book. One must know the environment to know the whole child and to cure him his environment has to be rectified.

A child from the very day of birth or rather from the day of conception is very much influenced by the environment in which he lives. His physical, mental, and spiritual development which makes this period of life so characteristic, depends on the size, income and education of the family; housing, sanitation and his relationship with parents. We can not study a child without taking into consideration all these factors. This study in the background of the family is the correct approach, not only to know how a child develops but also to answer the problem of why he becomes ill. This is social paediatrics and unless we know the factors which influences child's life we won't be able to prevent illnesses.

First factor which influences a child's life, is, the level of environmental sanitation. Large number of people living in one room, increases the possibility of spread of infection, for a small infant even a simple attack of cold is as much of a menace as a serious illness. His nose is blocked, he cannot suck, infection spreads into ear and lungs producing discharging ears and pneumonia. One out of every 4 small children coming to our clinic suffers from discharging ears. A good percentage of them will become deaf in later years. Whenever one child or adult gets an attack of cold, in an overcrowded place all other children will get it. It is same with many other infections including skin diseases. Incidence of skin diseases are highest among children living in poor and overcrowded homes. In England there are 1.5 rooms per capita whereas Calcutta is so crowded that each room is shared by 3.5 to 5 persons, on average, and in bustee areas there may be 10 persons sharing one room. Water supply is unsatisfactory in villages and children suffer from gastrointestinal infections, whereas indiscriminate and inadequate disposal of excreta due to limited number of latrines causes intestinal worms. In bustee areas in Chetla more than 50% of the households share one latrine between 8 or more households, whereas in pucca houses only 30% of households have one latrine to themselves. This results in children finding it much easier to defaecate in the field or by roadside. The situation is worse in rural areas. In 1944, 42% of the total population at Singur were hookworm carriers (Lal & Seal 1944). Even now one out of every 3 or 4 children suffers from hookworm causing much illhealth.

Our people are poor and can't provide adequate food, either to the pregnant mother or to the child. Protein food which is necessary for the growing child is costly. Lacta-

* Read at the Third Annual Conference of the Indian Public Health Association, December, 1958, with the kind permission of the Director, All-India Inst. of Hyg. & Public Health, Calcutta-12.

ting mothers do not have an adequate diet, resulting in early failure of breast milk. In our clinics 90% of the mothers have to give complementary feeds even before the child is only few months old. Although only substitute of breast milk at this period is animal milk, infants are given barley, sago and misriwater as cows milk is costly, resulting in defective growth and malnutrition. Malnutrition to-day, is the most dominant problem to the paediatricians. More than 15% of all children's attendances in any hospital or clinic in India are of gross malnutrition. This will be much higher if we examine all the children and if a survey is done 50% will be found suffering from some illness or deficiency. Rickets is prevalant in abundance inspite of our tropical sunshine. 1/3rd of the children suffer from Vit. A deficiency and it is a pity to see so many eyes bing lost from Keratomalcia. After trachoma, I think to-day, keratomalcia will be the main cause of blindness in our country, as the small pox and gonococcal opthalmitis have been so adequately controlled. Though poverty is the main cause of malnutrition, illiteracy and ignorance plays a great role. More than 90% of our mothers are illiterate in the rural areas and even if they can afford, they do not know what is the best food for the child. They are so much influenced by the customs and beliefs that, even if we advise them in the clinic to do something they go back home and do something else, to the instruction of some grandmother or of the old lady at the corner. Customs preventing them giving solids until a certain age or animal protein until a special ceremony have been performed, have great bearings on the nutritional state. A momentary consultation in the outpatients of a hospital will have absolutely no influence on the mother. Here again is the importance of repeated home visits and educating the family in health matters. She will have no faith in us if we give her advise without taking her surroundings into consideration and all our treatment will have no permanent effect until the mother is convinced and balance swings to our side.

(*Diagrams*)

India has a high birth rate of about 40/1000 and of these huge number of children born 50% die before they are even 15 years old. Large percentage of them die during the 1st year of life, and 25% of a general death rate is due to infant deaths.

A nation's progress in health, economic condition and literacy is judged by her infant mortality rate. At birth an infant in India expects to live for 32 years whereas in New Zealand 68 years. 50 years ago Infant Mortality Rate (IMR) in England was 138 and to-day it is 25, in 1931 Sweden had IMR of 62 and to-day it is lowest in the world of less than 20. India's IMR to-day is 127.1 whereas 10 years ago this was 163.1. In 1944, in Singur (a rural area in W. Bengal) IMR was 168.9 and to-day this has come down to 85. We have definitely made progress in the right way.

Following were the 10 main causes of deaths in infancy at Singur Health Centre during the period of 1946-51 (Sen 1953)

Neonatal Deaths 0—1 month		Infant Deaths 1—12 months	
Causes	Percentage	Causes	Percentage
Prematurity	41.12	Diarrhoea and Dysentry	25.00
Miscellaneous	18.25	Respiratory Infections	16.12
Convulsions & Tetanus	12.48	Malnutrition	15.42
Asphyxia & Birth-Injury	9.30	Fever	11.92
Respiratory Infection	5.14	Communicable Disease	7.48
Diarrhoea and Dysentry	3.54	Others	6.08
Sepsis	3.19	Sepsis	6.07
Malnutrition	2.20	Prematurity	5.37
Fever	1.71	Accidents	3.04
Developmental Defects	1.59	Developmental Defects	2.10

Prematurity and birth injuries, convulsions and congenital malformations, malnutrition and infections are thus main cause of death during first year of life. Later in childhood various infections tuberculosis fever and communicable diseases are the main cause of death. More than 60% of these deaths are easily preventable and there is no reason why infant mortality shall not come down to a lower level in India, as in other countries.

Improvement of environmental sanitation is a basic public health problem but vigorous and much more active health education will be needed for the people to accept the principles of hygiene. An effective MCH organisation is a necessity in every province to reduce both morbidity and mortality in children.

On average there are about 5 children per married woman in Calcutta and in England to-day it is 2.5. Poverty and increased number of children go side by side in every country. In a study (Sen, 1957) it is found that poor families who are always in need at Calcutta have 7.17 children whereas "comfortable group" have only 4.69. On average in rural West Bengal 40% of children are born at internal of less than 2 years. Prematurity, infant mortality and perinatal deaths are more common when the interval between pregnancies are short, mothers too young or over 40 and number of children large. The children born at the end of a large family have a possibility to become deformed and mentally defective. Thus family planning is extremely important for prevention of infant loss.

Prematurity and hazards at birth are the two main causes of death during the neonatal period. An efficient antenatal care will prevent at least 50% of these deaths. Improvement of maternal health, treatment of maternal diseases and improvement of her nutritional state will be responsible for such reduction. A deficient nutritional state in mother is supposed to produce congenital abnormalities. Regular home and clinic visits and supply of iron, calcium, and vitamins are essential. Skilled attendance and better obstetrics care at the time of birth to prevent birth injuries, asphyxia, infection and tetanus and adequate experienced personnel in care of prematures both at home and at the hospital are necessary. It is interesting to note that of all neonatal deaths at Singur in 1953 only 25% were attended either by midwife or delivered at hospital wehereas 75% were not attended at all or by untrained dais. In Chetla 72% mothers were delivered in hospital or maternity homes whereas in Sweden 98% of mothers have institutional deliveries. More efficient and increasing number of trained midwives are thus needed for our rural areas if we want to prevent these deaths.

Regular domiciliary and clinic visits are essential to teach the mother art of child care. We want mothers to come to our clinics, long before his child is ill, for advice about feeding, immunisation and for checking up of growth and development but 90% of our mothers never bring their children until they are ill. They of course should be treated because mothers will never listen to us otherwise. But our main aim should be, to educate them and tell them how to prevent future illnesses. Health education should be a very important programme in MCH. Group discussions and demonstrations of mothercraft in the clinic and individual instructions are all worthwhile. Every year more than 1000 cases of diptheria are notified in Calcutta and there are more than 200 deaths. Whooping cough may not produce as many deaths but produces great morbidity. Regular immunisation against small pox, whooping cough, diptheria, tetanus and B.C.G. will easily prevent these diseases. Detection and correction of abnormalities, supplying children with vitamins, iron and skimmed milk to prevent malnutrition; eye, dental, E.N.T., orthopaedic and physiotherapy assistance are other preventive activities of an MCH clinic. School children should be examined regularly and supplied with free milk, and a well-balanced lunch to prevent deficiences and promote growth at this most important part of their life. As a child is so much influenced by the environmental condition, any problem at home or school will affect the child and such a child will develop into a problem child. Detection and rectification of the abnormal behaviour problems, is a very important part of preventive paediatrics. We not only want our children to be healthy, physically

but mentally too and establishment of child guidance clinic is thus an essential part of preventive child health.

Last of all I must stress of the fact that we need more people with specialised knowledge in child care and greater number of beds for the treatment of children in the hospitals. In America there are 5000 qualified paediatricians, in Russia there is one paediatrician for every 1000 children whereas for our 150 millions children we have barely 150 paediatricians. There are only few medical colleges in India which have separate childrens department in charge of a paediatrician. Pediatricians should be given more importance than to-day. It is not just a miniature medicine but a speciality in itself as the growth and development and illness in children are very peculiar to this age group. But very important is that paediatricians should not only be good clinicians to detect disorders but at the same time they should be a good public health workers to understand the child in the background of his family and help to prevent illnesses and promote health. It is better for the department of pediatrics to collaborate with the department of preventive and social medicine in the undergraduate medical course. Students should be given few families to study and to follow up right from the preclinical year until they qualify. This will help them to undrstand how growth and development of a child in health and in illness are affected by environment. They will learn more paediatrics this way than any number of lectures in a class room.

By taking part in the public health work paediatrician has got a great role to play, as healthy children of to-day will make a healtheir nation of to-morrow.

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NATIONAL LEPROSY CONTROL SCHEME

By

DR. VENKATASHAMANNA
3, Kyd. St. Calcutta

It is a concerted effort of the Central Government and State Governments for the control of spread of leprosy in India.

It works through the aegies of State Health Departments by a subsidised scheme, executed through the State Directorates of Health and/or Medical Services. The Central Government has allotted Centres called Subsidiary and/or Treatment and Study Centres for individual States in proportion to the magnitude of the problem.

Each unit will be located in a rural setting with a view to cover not less than 50,000 population.

The services that are rendered from this set up will be—

(1) Foci detection.

(2) Treatment of all detected cases with sulphones.

(3) Careful follow up of all healthy contacts i.e., surveillance.

(4) Propaganda to retrieve the common man from the grip of obscessional fears and to install rational thinking about leprosy.

(5) Social services in leprosy.

The day-to-day working of these units is under the control of States but the Central Government have a Directorate of Leprosy Work which acts as co-ordinating office and technical 'know-how' Bureau.

Each unit will have a Medical Officer and at least 4 non-Medical Assistants who are immediately responsible for the execution of all the duties asigned to these units.

Modern drug sulphone has shown that leprosy is a cureable disease and also that infectiveness of leprosy could be minimised within reasonable period of treatment with sulphone.

So "Foci" detection and mass treatment of cases should, logically speaking, break the chain of events and at a future date there should be no leprosy. The immediate usefulness of this scheme is that large number of those silent sufferers are accorded treatment and significant percentage cured and much more significant percentage ameliorated. In 1955 in the concluding years of 1st Five-Year Plan period the National Leprosy Control Scheme was started as part of a health programme for the nation. The scheme has gradually expanded during the years and in the 2nd Fiv-Year Plan the Government have contemplated to establish 100 more units.

The year wise functioning.

Units are:—	1955	—	22
	1956	—	37
	1957	—	56
	1958	—	72

The like-wise coverage of population being—

1955	—	2	millions
1956	—	2.7	„
1957	—	4.5	„
1958	—	8.5	„

The achievements to the end of December, 1958 reported has been as follows—

34,98,445	Population have been examined.
53,637	Cases have been detected.
64,586	Cases have been brought under treatment.
1,64,199	Contracts are hold under surveillance.

ANTI-TUBERCULOSIS MEASURES IN LEPROSY CONTROL

By

V. K. Sharma, M.B.B.S., D.P.H., P.H.S.,

Leprosy Research Department,
School of Tropical Medicine, Calcutta.

Leprosy and tuberculosis are major threats to the health of mankind in many parts of the world. Their bracketing together in the title of this communication is not a device, on my part, for attracting attention to the oft-neglected Leprosy Problem. There is now a considerable number of workers both in the field of tuberculosis and of leprosy, who are of opinion that research and preventive programme in respect of these two diseases ought to be co-ordinated, and this communication is an humble effort to submit the problem of leprosy control in that perspective, to this representative body of Indian health workers.

In a country like India where the prevalence of both tuberculosis and leprosy is great and where the resources in the shape of finance, equipment and trained manpower to deal with them are pitiably lacking, it shall be unfortunate, indeed, to ignore either of them, and, wrong to keep the two preventive campaigns apart. The results of several surveys in urban areas and one survey in a rural area indicate that the morbidity rate for tuberculosis in India is 1-25% in towns and 0.42% in villages (Benjamin—1957). These figures, microscopic as they are, assume an alarming aspect when considered in terms of the total number of cases in this much too well populated country. Reliable data regarding the incidence of leprosy in India are not available, yet, the number of Leprosy sufferers in this country has been variously estimated to be well over one million. When confronted with problems of this magnitude, and, when these are not the only problems of this size that stare us in the face, the only practical course to adopt is to devise ways and means to kill as many birds with as few stones as possible.

However, the magnitude of the task involved is neither the only nor the most pressing reason for bringing these two diseases together. There does exist between them a relationship which extends beyond the similarity between their causative organisms. Both of them are infective, and preventible. Each shows a silent phase and a tendency to self-healing. There is an 'Open'—'Infective' stage and a 'Closed'—'Non-infective' stage with either of them. Above all both are 'household' diseases and children are their most susceptible targets.

The matter does not end here. The relationship between the two diseases goes further, both immunologically and epidemiologically. BCG vaccination converts a negative Lepromin reaction into a positive one (Fernandez—1939). It has been shown that the positive tuberculin reaction is consistant with a positive lepromin reaction (Lowe, *et al*-1953). Some workers Edwards *et al*-1953) suggest a production of cross immunity by these two infections, and, Chaussinand and several South American Leprosy workers consider them to be mutually 'antagonistic' diseases. Their hypothesis is that leprosy is eliminated from a community in which the Mycobateria tuberculosis and Leprae find themselves in competition, because of the premunition induced by the more virulent and rapidly spreading Tubercle bacillus against a subsequent attack by the Lepra bacilli. My personal experience of this aspect of the matter consists of an inconclusive study (Sharma-1957-58) made in Kanpur district in Uttar Pradesh, wherein it was observed that the incidence of leprosy *in a population as a* whole, was inversely related to the incidence of Tuberculin positivity amongst the children of the age group 0-14 yrs. Then there are now some works showing that the Leprosy contacts vaccinated with BCG are significantly more resistant to Leprosy than the non-vaccinated contacts (Convit *et al*-1956; Chatterjee-1958). Even though it may come as an anticlimax, it must be remarked here that the subject of immunological and epidemiological relationship between these two diseases, unfortunately as yet, is the territory not of finally proved and

established facts but of theory and experimentation. This however applies, more or less equally, to the field of immunology of Tuberculosis also, where, even to-day, opinions differ as to whether it is better to attempt to create a tuberculin positive population or a Tuberculin negative one (HEAF-1957).

Despite all that has been said in the above paragraphs, this is however true that it is sheer necessity that has forced the leprosy worker to invite himself to the preserves of tuberculosis and other Mycobacteria. The inability to cultivate in vitro the Mycobacterium leprae and to find an animal susceptible to it has been and continues to be the greatest obstacle in the progress of leprology. Leprosy has haunted humanity for ages like a dark cloud. The use of sulphones and the possible application of BCG vaccination in Leprosy Control are the only streaks of light that have penetrated this cloud thus far and both owing to the studies pertaining to tuberculosis.

Apart from the general measures like education of the public, judicious prevention of contact between the infectious and the susceptible which play an important part in the Control of almost all the infectious diseases, the particular features in leprosy control to-day which are to be considered here are:—

i. Chemotherapy with DDS
ii. Chemoprophylaxis with DDS
iii. Immunoprophylaxis with BCG.

The advent of sulphones against leprosy is a result of the observation of their effects in experimental tuberculosis by Feldmann and others. With the use of sulphones has come a hope, not only of the cure of the disease but also of its control in the endemic areas. It is only the second decade of the application of this drug, but, already there is evidence that as a result of mass treatment with it, leprosy is beginning to be brought under control in more than one country. The parent drug of the group Di-amino-diphenyl sulphone or DDS is now in almost universal use.

Results with DDS are certain though slow. The incidence of reactions and toxic manifestations have been cut down by adopting dosages of a low order of 5-10 mgs. per day, when initiating its administration to each patient, and, by careful supervision during the course of treatment. The action of DDS in control is—by reducing the quantum of the tremendously heavy infection and by closing the channels of its exit in healing the ulcers and other lesions of the cases of lepromatous leprosy. Apparently DDS has come to stay atleast till the Discovery of a more potent, effective and rapidly acting bacteriostatic agent.

Therapy with other anti-tuberculosis agents like streptomycin, Isoniazid, and PAS has not met with much success in lepsosy. Apart from manifestation of toxicity and the question of cost, the development of resistance has been a big reason for this failure.

Chemoprophylaxis either with DDS or with some other agent does not, to my mind, appear to be a practical public health proposition. The task is much too big and the resistance of the healthy contracts against 'eternal' drugging is bound to be unsurmountable.

The question of immunoprophylaxis brings us back to BCG vaccination. There is overwhelming evidence of its usefulness in tuberculosis control. At the same time the evidence of its probable role in leprosy control can not be brushed aside. (Hanks-1955) is of the opinion that in places where these diseases co-exist—'No programme in tuberculosis should be undertaken without the participation of those interested in assessing the effects upon leprosy.' It is in this light that the use of BCG vaccination is called for.

Search for effective immunoprophylactic agents against leprosy continues. Entirely new concepts are coming up. The problem according to Hanks (1955) both in tuberculosis and leprosy is to evolve methods to identify the 'poor immunological responders' and at the same time to devise means to improve their immunological response. One of the alternatives suggested by him is the trial of combined antigens.

While concluding, I would say that the Health Organisations in this country are bristling with activity and are not oblivious to the problems that contront them. Ambi-

tious projects like the National Malaria Control Programme are the symbols of this activity.

This is a time when public health set-ups are taking new shapes. The long awaited synthesis between the curative and preventive programmes has begun. Multipurpose health centres are gradually replacing the antiquated dispensaries. Is it not, therefore, the time also to re-orientate and co-ordinate the measures against these 'social' diseases. Co-ordination in tuberculosis and leprosy work is possible, not only that, it is essential to have this co-ordination in the services dispensed from health centres, in the health education programmes, in the mass BCG Campaigns and particularly in social services rendered to the patients and the families of the patients. This shall not only save duplication of efforts but shall also save the general Health Campaign from becoming lop-sided.

To achieve this unity is our duty not only for the sake of our good name, not even for the sake of the patients alone, but also and chiefly for the sake of millions of children contacts at risk.

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ORGANISATION OF SCHOOL HEALTH PROGRAMME IN RURAL HEALTH CENTRE

By

DR. P. C. SEN AND DR. R. N. BASU

Health Centre in the rural area has to cover a vast area and population and is expected to look after all aspects of health of the community. The Unit has to cater preventive health services such as communicable disease control and improvent of sanitation; organise medical relief facilities by providing out-patients' and in-patients' department, take care of special group of population such as mothers and children. Health Education has to be blended with all the different activities. In this short paper an attempt has been made to discuss how a modest school health programme can be organised by the Rural Health Unit with the existing shortage of technical personnel and lack of different facilities. School health, at present is the weakest link of whole chain of health programme. A large segment of the population belong to the school age group (nearly 30 percent) and approximately 50 percent of this group attend schools. As the number of schools will increase and the primary education will be free and compulsory, the number of scholars will be doubled. The students of to-day, who are citizens of to-morrow, cannot be allowed to grow neglected and uncared for and it is this growing and developmental age, when they require maximum health supervision and guidance.

School Health Team :

A well organised school health programme is the team work of teachers and health workers with the active collaboration of parents. In our country, there are not sufficient health workers and under the existing circumstance, it will take many years to get the service of Public Health Nurse for school health work in the rural area. The Medical Officer, on full time basis, for this work will also be not available. Rural Medical Officer has to devote a part of his time for the health programme in the schools. It has been found that if his programme is properly planned, he can devote three sessions in a week for school health during the non-vacation period of the schools. Health Inspector and Health Visitor or Midwife attached to the Centre have also to play their role in the schools, under the guidance of the Medical Officer.

The Teacher can be utilised as a hard-working member of the school health team and the role he can play is fundamental and important. The Teacher is one of the few persons in the community, besides the parents, interested in child's health. Even when and if the school health nurse becomes available, the role of Teacher will be still as important to the child's welfare as ever and there is no substitute for the knowledge gained from teachers' continued class-room observations. An interested and observant teacher can be a tremendous aid to parents and school child. A study was initiated at Singur to see how much of the work of school health nurse could be performed by trained hygiene teachers and a job analysis of the duties of each health worker was made. It was found that many of the routine school health procedures could be done by teachers and the students on self-help basis.

Training of Teachers :

School Health is as much a health problem as it is an educational problem. Education and Health Departments should join their hands together for the implementation of a health programme in the schools. If the teacher is to fulfil effectively his role in health programme, he needs careful preparation both in the institution and during service. The Education Department arranges for general training of school teachers and elementary knowledge of school health may also be included in their curriculum by extending the duration of the course. This will help the teachers in acquiring the necessary skill and attitude to contribute his help in the school health pro-

gramme. Apart from this, arrangement has to be made for training at least one teacher from each school for special training in school health, who can be designated as Hygiene Trained Teacher.

A Centre for the later type of training has been organised at Singur with joint collaboration of Health and Education Departments of Government of West Bengal. The Education Department deputes the Teacher, from Hooghly District, where Health Centre has been established and arranges for the necessary stipend for their maintenance. Singur Health Centre organises the training programme.

The syllabus can be summarised as follows:

General Science is taught in elementary way which includes study of the Thermometer, barometer, specific gravity, element and compound, acid and alkali, biology and physiology (digestive system, respiratory system etc.). As the Teacher will be treating minor ailments in the school, a full course of instructions in First Aid and Home Nursing is given. The standard syllabus prepared by St. John Ambulance Brigade is followed here. The sanitary problems of the village are fully discussed and the solutions are dmonstrated to them. The teachers are taught to undertake minor repair of tube-wells, construct manure pit, soakage pit and latrine with their own hands. Village sanitation is inter-related with various communicable diseases. The method of transmission of disease, indications of common diseases and prevention of these are taught to them. About nutrition, they are taught, the principles and functions of food, balanced diet, deficiency diseases of school children and low cost nutritious food available in the village. The teachers are assigned in batches for practical work in a school under the guidance and supervision of Medical Officers.

Role of a Teacher:

Under the guidance of health worker, the services of trained teacher can be utilised for implementation of many health activities. (*i*) He can be helpful for making screening tests of vision, hearing and speech and measuring students' height and weight. He can note the mental capacity and regularity of attendance of the students. Thus the Teacher may help the Medical Officer by preparing the student for routine medical inspection. The eye chart, height measuring red, weighing machine and other necessary articles will be lent from the Health Centre to the School as and when required. (*ii*) The Teacher can pay attention to sudden accidents or illness of the students in the schools with the help of first aid box. The medicine of the first aid box will be replenished from the Centre. The teacher will arrange to send the sick children to the clinic. (*iii*) So that, the students develop desirable health practices, the teacher will conduct morning health inspection daily, to look after the personal hygiene of the children. This simple procedure in Singur Area has brought down the incidence of skin diseases, louse infestation, unclean teeth etc. to a minimum among school-going population. He can investigate the cause of absenteeism for continuous days. (*iv*) The teacher can also be made responsible for maintaining sanitary conditions of the school site. In the villages, it is the students, under the guidance of teacher, who keep school compound and class-rooms clean. (*v*) The teacher can organise community games, sports, folk dance etc. among the students which will help endowing young children with an abundance of health and vigour. (vi) Health instructions by the teachers can be given in the class-rooms and in all situations in the school, both by direct and indirect method. (*vii*) The teacher will keep close contact and liason with the parents on one side and health personnel on the other. He will try to interpret the health programme to the parents and find community resources for improvement of conditions, which have bearing on health of school children. Organisation of Parent Teachers' Association will be very helpful to achieve the objective especially to solve problem as mid-day tiffin.

These are the few activities, which the teacher can satisfactorily perform, has been mentioned. In one word, the teacher may be described as pivot in the school health programme.

Organisation of Programme:

The Medical Officer, being the leader of team, will supervise the work of health per-

sonnel and teachers done in regard to school health. He will be directly responsible for (*i*) medical inspection of students, at least twice during the primary school carrier of 4 years, (*ii*) conducting the clinic for treatment of ailments of school children. The Health Inspector will carry the immunisation programme in the schools and guide the teacher in improving the sanitation of school. The participation of teacher in preparing the school for immunisation is so useful in making the programme successful that, there was no case of small-pox among school children during last 12 years in Singur. The Hygiene Trained Teacher should get some allowance for school health work from Education Department, which may be a token recognition of his service. Moreover, this emolument will permit him to practice in his own life the ideals of healthful living that he is to teach. In Singur Area, the Teachers are paid Rs. 5/- per month provided the Medical Officer certifies that he has done satisfactory work. Physicians, Health Inspector or other health personnel who may come in contact with children have special contribution to make to Health Education, as their influence is far reaching. All contacts of health workers with school children should be occasions for positive learning. During immunisation, treatment of illness or health appraisal, interest is high and these contacts thus provide teaching moments. Children have a great power for observation, imitation and passive learning. So the activities of health and school personnel and the school environment should be such that children gain favourable experiences. Rural water supply and sanitation schemes should give priority for the school sanitation.

Conclusion :

1. The Teacher is the key person in the School Health Programme. First step that should be taken is to give health training to teachers and involve them in the programme. He should be given an allowance for school health work.

2. Education Department should depute Teachers for training, arrange for allowance of school teachers and make health grant for improving school sanitation.

3. Health Department will organise centre for Teachers' Training with model school for participative learning of at least one in each district. School Health Forms, First Aid Boxes and other necessary medicines and equipments should be supplied to the Health Centre to render services in the schools.

4. Activities should be organised in full collaboration between Health and Education Department. It is preferable that a School Health Board should be constituted at State and District level taking representative of health and education personnel, who will plan and review the health work done in the schools.

5. Ideal health programme can not be started in the school at the present moment, but the Medical Officer of Health Centre who will act as part-time School Medical Officer, with the participation of teachers and co-operation of villagers, can develop modest school health programme with tangible result. A day may be set apart for holding the school health clinic for the scholars.

6. The problem of food should be fought on national front. In the absence of such a solution immediately, it is strongly suggested that attempt should be made to get the co-operation of well-organised Parent Teachers' Association, and other Voluntary Agencies to supply food supplements, the consumption of some of which are ridiculously low.

Last but the most important point to realise, the man, material and money spent on such a programme as school health will bring a greater dividend than any other procedures of public health, as a well developed educated young community is an asset to any democratic country.

INSECT CONTROL THROUGH INSECTICIDES

By

DR. P. SEN, M.Sc., Ph.D. (Lond.), D.I.C.

(School of Tropical Medicine, Calcutta)

The subject of insects control covers a wide field but the purpose here is to discuss the effort of newer synthetic insecticides on insects of public health importance.

Insect control as a measure of eradication of diseases originated from the time Ross made his epoch-making discovery of the role of mosquitoes in the transmission of malaria from person to person after completing another (Sexual) cycle of development in them. Although he (1899) realised even those early days that in mosquito reduction lay the answer to break the chain of Malaria transmission and eventually to eradicate malaria, the suggestion for rural malaria was to construct houses at a safe distance from the mosquito (Anopheles) breeding places.

Watson (1910) in Malaria, for the first time, proved that the disease in rural areas might also be controlled through mosquito reduction measures, but Ross was doubtful about its soundness. Since then our knowledge on the problem of mosquito control has advanced much further. We are now instead of depending on the method of shifting houses for protection against malaria alluring people to build more houses in areas where the dangerous species once frequented. Thanks to the change in strategy of mosquito control by DDT indoor residual spraying in rural huts.

DDT has no doubt brought back the smiling face in our rural people and Malaria has been effectively controlled proving that it is truly a preventible disease (Viswanathan, 1958). The use of an insecticide against adult mosquitoes reduces chances of their survival and is likely to bring in altered conditions in mosquito density of an area, in their biting habits and longevity. It decreases mosquito density, lessens the possibility of the mosquito surviving till the sporozoites are developed to infect a person and also cuts down expectation of life of the mosquito to take the infection. (Macdonald, 1957). Adult mosquito control has thus proved the only practical means to free the country from malaria, the other much tried method of malaria control by gametocidal drugs having failed mostly owing to difficulty in finding out an ideal drug, in regular administration of the drugs to every sick and affected person and to the unforeseen importation of infection from outside.

Although adult control would appear to be the best in most instances, larvicidal control has also its use and may prove preferable under certain conditions. In urban areas the larvicidal measures seem to be the only practicable way. Mosquito control in antifilarial programme has been largely in the nature of both larvicidal and imagicidal. The relative convenience, cost of application and performance of the measures determine the choice of the two methods.

The insecticides are usually grouped as imagicidal and larvicidal in accordance with the substances used but may also be termed as residual with differing methods of application. The residual insecticides most commonly used fall under the chlorinated hydrocarbons being composed of one or more benzene rings with chlorine atoms. The most effective and simplest in composition among the hydrocarbons is the BHC which contains several isomeric forms. One of these, the gamma isomer, is highly toxic to insects and although odourless by itself, the other isomers mixed up gives it a musty smell. Gamma BHC kills insects by vapour action, the substance being highly volatile. Direct contact is not necessary to produce the lethal effect which operates almost unabated even if the insecticide is absorbed in the treated surface or masked by smoke. It has no irritant effect on the insects and they do not show evidence of leaving the treated surface. A fatal dose is thus picked up by the insects while resting, the kill however will depend on the amount of the insecticide applied to the resting surface.

DDT is however the most widely used residual insecticide and has been a household talk for every insect problem. The

technical DDT also has more than one isomer with Chlorine atoms arranged differently on the benzene ring. Of these isomers para para isomer is the most potent. Unlike BHC it is not volatile and therefore the lethal effect is picked up by the insect on contact only with the solid substance while resting on treated surface. The DDT particles enters through the insect cuticle disolved in waxy material of the tarsi. It excites irritability and most insects are forced to leave the treated surface before the lethal dose is picked up. It is insoluble in water and so long as the particles are not absorbed in the treated surface or covered by smoke or lime-wash or separated by plasters the poisoning effect will persist for a long period.

The kill will depend on the dose picked up and on the particle size of the DDT, the smaller the crystals the greater is the chance to get these entangled in the feet of the insects. The crystals should be between 10 and 30 microns in size to effect the maximum kill. Much variation in the persistence of the film on the treated surface in mosquito control programme has been noticed as a result of active sorption of the mud walls causing early deterioration of the film or the insecticide may be inactivated by the ferrous iron in the mud. The film has remained active for two months in certain places while for six months or more in others. It may be expected that under such conditions the initial mortality among the mosquitoes entering rooms shall not exceed 60 to 70 per cent.

Dieldrin another residual insecticide of the hydrocarbon group is also highly lethal to insects and has been extensively used. It is more toxic to animals and man than the others. The fatal dose is picked up by the insects through contacts with the crystals of the insecticide as in DDT and like the latter it is non-volatile, and may suffer deterioration through sorption in the mud wall. The lethal effect follows only after sufficient dieldrin has been absorbed into the insect body through the tarsal cuticle. The killing effect of the film may remain on a non-absorbant surface for a long period, and the initial mortality in mosquitoes entering treated rooms has been very high. Two other closely related compounds aldrin and chlordane are however not as toxic as the dieldrin.

One other group of synthetic insecticides, the organophosphorus compounds although much extensively used in the control of agricultural pests have only been relatively new in the field of vector control in human diseases. These compounds owing to highly poisonous nature and insufficient residual effect have not yet received the same popularity as the hydrocarbons. The best known among the organo-phosphorous compounds are the Diazinon, malathion and parathion. Both diazinon and malathion have been known to give better results in the control of those anophelines and housflies which are found resistant to hydrocarbon insecticides. The organo-phosphorus insecticides thus afford an answer in tackling the resistant forms of insects. These insecticides may be used as stomach poisons in the form of baits or as contact poisons in wall sprays. The killing effect of these insecticides has been found to surpass the others, yet their mass application must await further intensified work. Only experience can show whether free use of the organo-phosphorus insecticides are justified like the chlorinated hydrocarbons.

For instantaneous knock-down effect and reduction in insect number pyrethrum extracts still stand very high. The active principles in pyrethrum extract are the pyrethrins I and II which are highly toxic to insects. These extracts have no residual effect and are highly unstable. When mixed with kerosene these form an ideal space spray. Some chlorinated hydrocarbons like DDT or dieldrin are usually added to space sprays as synergist. One inherent defect with these sprays is that the effect of the sprays does not last more than a few hours and has to be repeated almost daily or every 48 hours.

The choice of an insecticide in the control of insects related to public health problems should thus depend not only on the insect susceptibility to the toxic substance making up the spray, but also to other factors such as persistence of the fiim, irritability, repellence effect, volatility and reaction set out on the treated surface by the insecticide. The insect susceptibility is determined by measuring the doses and the time of exposure.

The susceptibility tests bring out the range of mortalty at different doses of the insecticide when exposed for a standard time from which a median lethal concentration can be worked out. The susceptibilities vary among the different insects and also in the same species under varying conditions of tests. In order that the tests afford comparable data a strictly standardised technique devised by Busvine and Nash has been widely accepted. The technique ensures contact of the insects with filter papers impregnated with different dosages of the insecticides for a standard period of time. Much valuable data from various parts of the world have been collected by this method which has since been extended to many other insects with equally good results.

Lowered susceptibility to insecticides following repeated exposure although has been long known in agricultural pasts, the phenomenon was not appreciated by many in the field of medically important insects until the advent of chlorinated hydrocarbons. True resistance among the latter group was first recorded in houseflies from Italy in 1946. This was soon followed by instances from culicines such as *Culex* and *Anopheles* in various countries between the years 1947 and 1953. Resistance to these insecticides has gone to such an extent after exposure through several generations particularly in houseflies that hydrocarbons had to be substituted by other insecticides for effective control. When such an event arises the normal control operations meet disastrous fate which all successful campaign must guard against by taking timely action to eradicate the pest insect through intensive and drastic measures. Often however an alternative insecticide even of the same group be it hydrocarbons or organo-phosphorus has given desired effect. Thus if an insect is resistant to DDT, it may still be susceptible to BHC or dieldrin, although they all belong to the hydrocarbon compounds. In this respect DDT behaves antagonistically to BHC or dieldrin.

Susceptibility of insects varies with various factors like nutritional condition, vigour or behaviour. This phenomenon may on the other hand depend on specific factors empowering the insects to degrade or inactivate the materials. There may be several physiological explanations for increased tolerance in insects to insecticides. Likewise this factor may be linked with distinct genes which get an upper hand by artificial selection as happens in widespread control operations with the chlorinated insecticides. This fact has interfered with the progress of many malaria control programmes in the past few years. We may mention the instances of *A. sundaicus* in Indonesia and *A. stephensi* in Saudi Arabia as suitable examples. Insects may often avoid intoxication by not resting on treated surface or by remaining there for a short while forming what is known as behaviouristic resistance.

The position although would appear somewhat distracting we have come nowhere nearer bancrupcy in directing control operations whether large or small scale, but as a precaution there seems much to commend on switching the control programme particularly in malaria, to eradication campaign which is distinct from eradication of mosquitoes. Mosquitoes may be there but owing to elimination of the disease the chance development of resistance in the insects will have no deterrent ffect. Similar campaign may be possible for other insects as well.

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PEOPLE AND PUBLIC HEALTH

By

DR. A. L. SAHA,

Assistant Professor of Epidemiology, All-India Institute of Hygiene & Public Health, Calcutta.

That the science and art of public health, its scheme and programme, are all meant for the people need no explanation. But it must be brought home to the people that in the execution of any scheme or programme of public health, people's part is the most important factor.

The public health workers were often handicapped in achieving the desirable result on account of the failure of the people to understand this mere fact that without their co-operation no public health programme can be successfully executed.

That is why the planners went for health education and it resulted in evolution of highly refined health education technique. Health education materials are often exhibited in large gatherings with apparent appreciation. But how about the result? Public health workers have to ask themselves often—who listened, who saw, who understood and who followed? They sit to discuss the problem and conclude by saying that the public are to be blamed for their anti-intellectual aptitute, apathy, inadequate education and what not!

But that is no solution to the problem, the public health administrators have to study more objectively the reason why people do not respond. They have to ask themselves, if they themselves have understood the people and known the community. In that respect a close working relationship is absolutely needed. Mere lip services which the public health workers have so often accorded in the past was quite futile, although the gathering at the demonstration was found to be quite pleasing and convincing. Thus it has been agreed that public health and social sciences are to join, necessitating the social scientists who are so few in this country, to become familiar with the needs for their bretheren in public health and also the public health workers to know something of the social sciences and at least to take active part in the application of social science technique to the solution of public health problems for which the latter (public health workers) have to point out the practical difficulties in overcoming the obstacles.

The health workers often come across absolute apathy of the people towards their work. The reason may be explained by the following facts. The people's relation with medicine is established only when they fall ill or in other words when they become handicapped in some way or the other. At that time whatever the doctor advises are carried out. The phenomenon of pain and suffering motivate an individual to doctor's advice. If he wants relief he must follow the dictum of the physician. As such the physician has to adopt no special method to convince his patient, as to why the latter should follow his curative therapy. It is the condition created in him which is giving him the urge.

The state of affairs is quite different so far as the public health physician or health officer is concerned. Unless there is epidemic the people do not consider the existence of such persons to be a necessity. During non-epidemic period the wages given to the health workers are considered by some as sheer waste of public money. Any activity during non-epidemic period are taken to be unnecessary troubles to the public. For instance, when the vaccination-programme is taken up the children starts crying and run away and the adults say "please come some other day". In the sanitation programme no body minds the children defaecating on the main road or in the drain even in well-developed metropolis. Refuse is thrown on the road no matter even if it falls in front of somebody's doorstep or opposite his own window. Throwing of water, clean or dirty, from the roof top or upper floor on the road is not taken as an offence even if it drops on somebody's head.

Reporting of vital events of birth, death or of any infectious disease though declared compulsory by law has not yet been taken

to be any concern of the public. If the health staff make a visit for enquiry their motive is often questioned.

The health workers, therefore, should be very cautious before rendering any service either in the form of education or actual preventive work. It will be agreed that prior to understanding the health problem the understanding the public is a greater problem. The public health workers have to go right into the core of the community structure. They have to identify their activities in full confidence of the public. The first thing they need is to be well informed about the community.

Among the various methods and techniques so far adopted, health survey enables the health workers to know the ecologic and social structure of the community. The information obtained through this method e.g., the population structure, its state of growth, anthropometry, family organisations, its vital events, socio-economic condition including standard of education and occupation, etc. state of health and disease including morbidity and mortality due to different causes, state of artificial immunisation, outlook on cause and prevention of disease, food habits, conditions of environmental sanitation including water supply, disposal of night soil and refuse, family cleanliness, overcrowding, housing conditions etc., are considered essential priliminary to the promotion of a modern public health programme in the community. With the first hand knowledge through health surveys the public health workers may assume their responsibility but in order to be successful in the field, they have to know the attitude of the community towards health services and the health programme. For this, long continued observations and frequent contacts with the public will be necessary in this country in the present state of affairs, particularly when the general standard of education is low.

While considering the attitude of the community towards public health it will be a quicker step if the attitude of the medical colleagues (I mean the therapeutists) are studied first and the programmes are designed accordingly. If the therapeutists, who out-numbers the public health workers to a great extent, are motivated about public health, the people will be readily informed and motivated in health matters.

The last but not of least importance is the study of habits, behaviour and tradition in the community. Some of them might be apparently undesirable from the health point of view e.g., defaecation in the open field. For the sake of argumnts everybody (even an illiterate) will accept that one should use latrine for defaecation. But if we ask a man of sixty years, why of sixty, a man of twenty who throughout his life has been using open fields for defaecation, to use latrine, will he follow our advice immediately? Of course not. One day we went to visit some village where a community organisation was made for introducing latrine. Villagers were found very co-operative. A gentleman on the very approach of ours, politely said, "Please do not ask me anything, my sons and nephews are there, they will tell you everything you want to know". But he accompanied us all along giving information of location of the newly installed latrines in the village, e.g., the name of the owner, particularly information of the trades, occupation etc. At the end when we were collecting information about use of the latrine we were informed that the particular gentleman told certain staff that it was not possible for him to adopt latrine habit at that age but he would definitely see that the younger generation develops this habit.

Thus it was clear, though very co-operative why this old gentleman behaved like that in the beginning. Because he did not want to tell a lie about his personal use of latrine which was installed in his house? Neither he could tell in presence of some visitors that he did not use it.

For a health worker who wants to introduce latrine in a community it is necessary for him to give consideration to such conditions and design his planning accordingly.

A close and congenial contact is necessary for determining the real state of affairs.

My thanks are due to the Director of the All-India Institute of Hygiene & Public Health, Calcutta for his kind permission to publish this paper.

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Chairman's Summing up remarks:—

(1) *Behaviour disorder of Children*:—The subject treated by Dr. K. C. Mootherji is extremely interesting. It is also very informative, particularly when he mentioned about Schizophrenia. Before the child has developed a personality we come across the issue of split personality even though rare. It is very desirable that those employed in child welfare services should have a through training in the psychological and psychosomatic aspect of diseases so that they are able to observe them, detect them early and apply the necessary treatment.

(2) *Preventive and Social Pediatrics*:—Dr. P. S. Mukherji has given an elaborate paper on Preventive and Social Pediatrics emphasising various aspects of activities in this connection. He has also mentioned about the lack of Pediatrics in the country and indicated how the gap may be filled in the shortest possible time. The country is aware of the deficiencies of child health services having been developed almost dissociated from Pediatrics. In the new context of the comprehensive health services and of the new outlook on health and its goal this should not be the case and the sooner this is rectified the better for the service as well as the children.

(3) *Leprosy Pilot Project Scheme*:—Dr. Venkatasamanna has given, in a very concise and clear description the incidence of the disease in the project areas, the various age groups affected and the line of treatment and care that should be adopted, including surgical measures for deformed cases and preventive surgical work.

(4) *Antituberculosis measures in Leprosy Control*:—Dr. Sharma stated that the problem is vast affecting a large number of people even though the percentage of population affected is low. T. B. and Leprosy work, according to him, should be pursued together as a unified unit of control work, killing as many birds as possible with as few stones as possible. He adduced reasons why these two diseases should be taken up together for control. He advocated chemotherapy with D. D. S. and immunoprophylaxis with B. C. G. but not chemoprophylaxiz with D. D. S. Co-ordination is essential in the light of the poor health campaign carried out in the country.

(5) *Organisation of School Health Work in Rural Areas*:—Dr. Basu has given an idea how a model School health programme can be introduced in every area of public health operation. A School health team consists of medical officer, public health nurse, sanitary inspector, school teacher and the parents. Among these there is an acute shortage of public health nurse. He also described the routine work in Singur Health Centre, how the services of the School teachers are utilized with the permission and co-operation of the Education Department, what has been achieved as a result of this collaboration, and how with the teachers help in the immunisation programme smallpox was completely stopped among the School-going children during the last 12 years. The teachers were trained in the Singur Health Centre and an allowance was given to them for this health work and the equipments were provided by the Health Department.

(6) *Control of Insects*:—Spray killing of adult mosquitoes by insecticides has been formed by malaria workers better than larvicide control. Dr. Sen explained the chemical composition of D.D.T. and other insecticides and the mechanism of lethal action of the insecticides on the mosquitoes is determined by the dosage and time of exposure. Organophosphates are not of importance to medical problems. Pyrethrum is very expensive. Dr. Sen has also referred to the loss of susceptibility and increased resistance as a result of repeated use of insecticides. Dr. S. K. Sen of Bombay emphasised on the need for control of the use of insecticides. Work in Bombay showd that the plasma cholestrol was lowered and 20 per cent of handlers of sprayers were liable to get poisonous effect and hence protection to the workers was of importance. Dr. Subrahmanyam also threw some light of the 'folidol' poisoning inquiry. According to him workers could be protected but the point of importance was whether the chemicals should be properly ccntrolled.

Dr. P. Sen in reply stated that organophosphorous insecticides were coming into the field and hence it was a problem of control of insects versus control of insecticides. It would be very difficult to control the chemical in the field even if it was possible to control it in the factories. Plasma cholesterol is depleted after absorption of this organo-phosphorus drugs.

The Chairman then wound up the discussion by offering thanks to all the speakers who had taken part in the symposium and had contributed to the success of that morning's session.

MULTIPURPOSE HEALTH WORKERS*

By

DR. G. SEN, M.B., D.P.H.

Singur Rural Health & Training Centre

India is mainly a rural country. 80 p.c. of the total population of India live in 5½ lakh villages. That is why Government of India decided the planned development of the rural areas in the five year plans. This development programme which is really a human movement for bringing about a socio-economic change in the countryside is a multipurpose and a comprehensive programme. Community Development programme is essentially a human movement concerning itself with human problems and depending upon human participation in the solution of these problems. This human element in the programme demands of all its workers, including health workers, a high degree of proficiency in working with human material. They must understand that rural life is an interrelated whole. No compartmental programme can bring any change. There must be concerted efforts to improve all sides of village life, to change the outlook of the people and to mobilise local initiative and resources for the betterment of rural conditions.

Thus there is a *need for specialised training* in human relations for all categories of staff including health workers. Here lies the importance and necessity of orientation training for all types of workers. Like all other workers associated with the development programme health workers must be also *multipurpose workers.* Public health work to-day is widening its frontiers. From its main concern being the control of communicable diseases, improving the environmental sanitation and enforcing general sanitary provisions, it has now become the science of preventive and social medicine. Health is the part of the total development programme and adequate training facilities should be provided to all types of health workers. The knowledge in medical science should be orientated to the welfare of the community as a whole. The trainees should be made familiar with the rural areas, rural people and rural problems including health problems. A new methodology of approach to the village health problems, with a view to solving them with peoples' participation should be imparted to the workers.

The specialised orientation training really aims at four points. *Firstly,* the training aims to provide training in extension techniques.

The word "extension" means carrying knowledge of the better ways of doing things to the field. It includes all types of development work. It is a constant process of education. It is a technique by which people are motivated through a proper approach to help themselves by applying science to their daily life viz., in farming, in house making, and community living; in other words, to accept improved practices for better living.

Secondly, it provides training in rural environmental sanitation, an experience in the various operations needed in a comprehensive environmental sanitation programme for rural areas. Environment plays a dominant role in the development of physical health and well being of an individual.

Thirdly, it gives the trainees an understanding of the concept of the primary health centre and its working.

Fourthly, the training provides a refresher experiences in the different branches of public health. There is no attempt to deliver lectures with a view to impart basic knowledge. But stress has been laid on the demonstration of the different administrative methds of proved value in the rural areas and practical work.

Health Centre is the focus from which health activities will radiate into the interior areas. The main object of a health centre is to cater health services to the community for the preservation, restoration and promo-

* Presented in the symposium on the above subject held during the Third Annual Conference held in 1958.

tion of health of the community. A primary health centre is a small unit which provides an integrated form of medical care. The functions of a health centre demands that the health staff attached with the centre should be multipurpose workers. In the new concept of the health services, the attention to the sick people only is not the rule, but the new outlook is beyond the routine treatment of the sick only. The role of a clinical doctor is fast changing. Instead of waiting for a breakdown in health in an individual, the doctor must become more and more an educator who will be on the look out for potential patients. Follow-up of cases at home taking the family as an unit should be the routine work of all health workers. A health worker while visiting a family, be a P.H.N. or Sanitary Inspector or a lady health visitor or a midwife, should collect all the information in the family viz., sickness, pregnancy, incidence of communicable disease, birth, death or any other health problem in the family and try to help the family. The immunisation work for the control of communicable diseases, investigation and follow-up for infectious diseases, giving little health talks for the acceptance and use of latrines, use of soakage pits and collection of information of birth can be done by the same health worker during his or her routine visit to the family in the villages. These workers can meet in the afternoon and exchange their information with their co-workers, so that special services may be given by the subject specialists as the case may be. Unless the health workers are multipurpose workers, co-ordinated health services will not be possible in the vast rural areas of our country.

Co-ordination of activities:

The heavy responsibility lies on the medical officer-in-charge of a health centre. He is the natural leader of the team of workers in the centre. He has to co-ordinate all the existing medical and health services in the UNIT and try to help all the workers in a team for the development of better health and creation of healthful environment. This system will minimise the cost and increase the quality and quantity of work. It would, however, require continuous thinking and re-thinking to maintain proper co-ordination, fixing up of priorities and high level efficiency.

There are of course difficulties and limitations. The medical officer-in-charge of a centre has heavy load and he can hardly do justice to his job unless he is a hard worker. The training should be compulsory for all categories of health workers and there should be proper *utilisation of the trained* personnel.

ASSOCIATION NEWS

PROCEEDING OF THE FIRST MEETING OF THE CENTRAL COUNCIL

The first meeting of the Central Council of the Indian Public Health Association was held on the 31st of March 1959 at 6 p.m. at the All-India Institute of Hygiene and Public Health, Calcutta with Col. Jaswant Singh, the President of the Association in the Chair.

Members Present:—

Col. Jaswant Singh, (President)
Dr. N. Jungalwalla,
Dr. B. Ganguli,
Dr. Mrs. Mukta Sen,
Dr. P. K. Ghose,
Dr. S. E. D. Masilamani,
Sri K. R. Bhide,
Dr. R. K. Banerjee, } (Jt. Secretaries)
Dr. T. R. Bhaskaran, }
Dr. S. C. Seal, (General Secretary).

Col. Barkatnarain, Col. N. D. P. Karani, Dr. T. B. Patel, Major, K. N. Rao, Dr. S. K. Sinha, regretted their inability to be present at the meeting.

The Agenda were as follows:—

1. To confirm the proceedings of the last meeting of the Central Council.
2. Opening of State Branches.
3. Financial Aid from the Government.
4. Formation of Sub-Committees.
5. Consideration of the Auditors Report for 1957-58 and appointment of Auditors for 1958-59.
6. Venue of the Fouth Annual Conference.
7. Miscellaneous.

The Secretary read out the report of the last meeting of the Central Council held on 27th December, 1958. After a brief discussion Dr. Masilamani suggested that the minutes of the meeting might be circulated among the Council Members separately for their information and comments before circulation among general members. To this the Secretary agreed and the proceedings were confirmed.

Agenda 2.

The Secretary reported that only two state branchs had so far been formed and functioning, namely the West Bengal and the Bihar State Branches. A sub-committee under the name of "Formation of Branches Sub-Committee" consisting of the following members was formed.

Dr. K. C. Patnaik	New Delhi.
Dr. T. B. Patel,	Poona.
Dr. S. E. D. Masilamani	Calcutta.
Major, K. N. Rao	Hyderabad.

Dr. T. R. Bhaskaran Calcutta (Convenor).

Agenda 3.

The Secretary mentioned about the financial position of the Association *vis-a-vis* the increasing cost of the journal printing and diminishing out-turn of advertisement. He stated that excluding the life membership subscriptions the excess expenditure over the income would run upto Rs. 3000/- on account of the first 10 issues of the Journal and including the 11th issue the deficit would exceed Rs. 4000/-.

Under the circumstances the last Central Council was agreeble to seek the help of the Government. The Secretary however, pointed out that the National Organisations like the C. S. I. R., National Institute of Sciences of India etc. donate a large sum of money every year to encourage publication of the scientific journals. Shri Bhide suggested the idea of building a reserve fund and having learnt from the Secretary that reserve fund of Rs. 5000/- should at least be built, he proposed that an appeal to our members should first be made and, to start with, he himself agreed to donate Rs. 25/-. Col. Jaswant Singh said that for the National Society of India for Malaria and other Mosquito borne Diseases it was not difficult for him to collect a fairly large amount of money exceeding Rs. 30,000/- and as such he supported the idea of approaching our own members first, before thinking of donation from the Government or other bodies. However, after a brief discussion the follow-

ing sub-committee was formed to go into the matter.

Dr. R. K. Banerjee, (Convenor)
Dr. K. C. Patnaik,
Sri K. R. Bhide,
Col. N. D. P. Karani,
Major K. N. Rao.

Agenda 4.

Besides the above two sub-committies the council approved the continuence of the following sub-committies namely:—(1) The Medical Education Sub-Committee and (2) The Scientific Sub-Committee. The members, however, expressed in favour of enlarging the scope of the scientific sub-committee to arrange special lectures, symposia, publication, etc.

The compositions of the two sub-committies as enlarged were as follows:—

1. Medical Education Sub-Committee:—

Dr. B. C. Dasgupta, Chairman
Dr. N. Jungalwalla, Calcutta
Dr. A. K. Neogi, Baroda
Dr. B. N. Kolekar, Gowalior
Dr. S. G. Vengsarkar, Pondichery
Dr. J. K. Bhattacharjee, West Bengal
Dr. N. D. P. Karani, Poona
Dr. D. T. Rice, Ludhiana
Dr. K. N. Gour, Kanpur
Dr. A. R. Allen, New Delhi
Dr. S. C. Seal, Convenor.

2. Scientific Sub-Committee:—

Dr. B. C. Dasgupta, Dr. N. Jungalwalla, Shri P. C. Bose, Dr. K. S. Viswanathan, Dr. J. K. Bhattacherjee, Dr. Mrs. Muktha Sen, Dr. A. Mukherjee & Dr. S. C. Seal, (Convenor).

In addition, Dr. P. K. Ghose proposed by Dr. Seal and supported by the Chairman was also elected.

The sub-committies were also given the power to co-opt members as and when necessary.

Agenda 5.

The Secretary then presented the Auditor's report which was duly adopted by the members after scrutiny as empowered by the third Annual General Meeting held in December 1958. In regard to the appointment of the Auditor however, Dr. Ganguly pointed out that according to rules it should have been done in the Annual General Meeting. Since it was not done in that meeting nor any clear cut direction given to the Central Council, Dr. Ganguly proposed that the same Auditor might continue to carry out work but the matter should be placed before the next Annual General Meeting for ratification. Dr. Mrs. Sen seconded the proposal and it was unanimously passed.

Agenda 6.

Since there was no other proposal than the tentative offer by Sri Bhide on behalf of the Bihar Branch in regard to the holding of the next Annual General Meeting, the Chairman requested Sri Bhide to inform the Council if there was any further development. Sri Bhide said that the State Government had not yet been approached but he suggested that the Bihar Branch would hold a meeting in May next. The Secretary should in the meantime address a letter to the President of the Bihar Branch with a copy to him and to Dr. B. B. A. Dalal of Jamshedpur for taking necessary action in the matter. This was agreed upon.

Agend 7.

The Secretary presented before the meeting the printed copies of the Resolutions approved in the last Annual General Meeting, and mentioned that on the suggestion of Dr. Ganguly the members agreed to the circulation of these resolutions to the members of the Central Legislatures and the Directors of Public Health of the States. After a brief discussion the members agreed that these should first be circulated among the members of the Central Council to elicit their opinion and suggestion if any, before they were circulated to the members of the Central Legislature.

The meeting ended with a vote of thanks to the chair.

ANNUAL REPORT OF THE INDIAN PUBLIC HEALTH ASSOCIATION, BIHAR STATE BRANCH, PUBLIC HEALTH INSTITUTE, PATNA FOR 1958.

The Bihar State Branch of the Indian Public Health Association was started on 2nd October, 1957 at Patna with its office temporarily located at the Public Health Institute, Patna-4, consequent upon the desire of the Members and Associate Members of the Association belonging to this states with the following office bearers:—

President—
Dr. S. K. Chatterjee, Director of Health Services, Bihar.

Vice-President—
(1) Sri K. R. Bhide, Chief Engineering, Public Health Engineering Department, Bihar.

(2) Dr. S. B. Lal, Dy. Director of Health Services, (Special) Bihar.

Hony. State Secretary—
Dr. S. C. Ray, Director of Public Health Institute, Patna.

Hony. Joint Secretaries—
(1) Sri B. B. Rau, Assist. Engineer, P. H. Engineering Department, Bihar.

(2) Dr. S. K. Sinha, Assistant Bacteriologist, Public Health Institute, Patna.

Treasurer—
Dr. R. V. N. Sinha, Assist. Director of Public Health (Nutrition), Bihar.

MEMBERS OF THE EXECUTIVE COMMITTEE

In addition to the above office bearers the following Members will constitute the Executive Committee.

(1) Sri K. N. Rohatgi, Superintending Engineer, P. H. Engineering Department, Patna.

(2) Dr. B. B. A. Dalal, Chief Health Officer, TISCO, Jamshedpur.

(3) Dr. L. R. N. S. Deo, Bacteriologist, P. H. Institute, Patna.

(4) Dr. S. N. P. Sinha, Superintendent, Vaccine Institute, Namkum, Ranchi.

(5) Mrs. P. Katyayani, W.H.O., Counterpart, P. H. Nursing, Rajendra Block, Patna Medical College Hospital, Patna.

Since the entire amount of the subscriptions for the year 1957 received from the Members/Associate Members residing in this state were remitted to the Central Organisation, the funds available at the disposal of the State Branch was NIL. The share money for the year 1957 was also not admissible, as per rules.

Thanks to the Himalaya Press, Patna-4, and other well wishers of the branch through whose benevolence it was possible to notify the opening of the branch to the Members/Associate Members of the Association residing in this State.

In view of the poor financial condition of the branch, the main activity of the branch centered round the Membership drive by the Hony. Joint Secretary, Dr. S. K. Sinha, under the guidance of the Hony. State Secretary. The office works were managed by the Hony. State Secretary.

Owing to the absence of contact with most of the Memebrs/Associate Members of the branch, inspite of every possible efforts the Annual subscriptions from a fair number of old Members/Associate Members could not be realised. The position of membership at the close of the half year on 30-6-58 was as follows:—

1. Old Members	(i)	Ordinary	... 9	(ii)	Life	... 4
2. New Members	(i)	Ordinary	... 17	(ii)	Life	... 3
3. Old Associate Members	(i)	With Journal	... 7	(ii)	Without Journal	... 9
4. New Associate Members	(i)	With Journal	... 28	(ii)	Without Journal	... 51

N.B.—Defaulters have been excluded.

The Central share of the subscriptions along with the journal fees obtained from the Members/Associate Members was duly remitted to General Secretary of the Indian Public Health Association at suitable intervals. The state share of the subscriptions was retained by the state branch.

The following table represents the Receipt and Expenditure position of the branch on 30-6-58 (from 1-1-58).

Receipts (upto 30-6-58)		Rs.	**Expenditures (upto 8-7 58)**	Rs.
*Membership Fee	...	324.00	Central share of Subscriptions ...	995.00
Life Membership Fee	...	450.00	Remittingcharges on Central share	10.47
Associate Membership Fee	...	570.00	Postal charges on Correspondence	13.76
Journal Fee from A/Ms.	...	210.00	Stationery, etc.	16.13
Total	...	1,554.00 n.P.	Total ...	1,035.36 nP.

* Inclusive of arrear from 1 member.

Balance—Rs. 518.64 nP. only.

During the latter half of the year the Membership drive was pursued intensively. The question of holding a general meeting during the year for election of office bearers of the branch was avoided for the following reasons:—

(i) Poor financial condition of the branch.

(ii) Recognition of the Branch was still pending in the central office.

(iii) Constant absence of the President from the State who was on tour in the different parts of the country.

A meeting of the Associate Members of the Branch was however held on 24-8-58 at the State Branch Office for the election of voting Associate Members from amidst them The following Associate Members were duly elected as the voting Associate Members for the year 1958.

(i) Sri B. N. Shaw, Health Inspector, P.O. Chakulia, Dist. Singhbhum, (Unanimously elected—65 votes).

(ii) Sri Radha Narain Verma, B. C. G. Technician, P. H. Institute, Patna (50 votes).

(iii) Sri Pitambar Pd. Biswas, Health Inspector, Kathihar Dist. Purnea, (40 votes).

(iv) Sri Meghan Gope, Health Inspector, Bakhri, P.O. Bakhri Bazar, Dist. Monghyr, (38 votes).

(v) Sri Parmanand Sinha, H. I. Patna, D. B., Patna (38 votes).

The list of the voting Associate Members had been duly forwarded to the Central Office for necessary action.

The response to the membership drive during the latter half of the year was not to the desired extent. The position of Membership of the branch as on 30-11-58 stood as follows.

1. Old Members	(i) Ordinary	... 13	(ii) Life	... 4	
2. New Members	(i) Ordinary	... 22	(ii) Life	... 3	
	(iii) Half-yearly	... 4			
	Total Members	... 46			
3. Old Associate Members	(i) With Journal	... 7	(ii) Without Journal	... 13	
4. New Associate Members	(i) With Journal	... 9	(ii) Without Journal	... 63	
	Total Associate Members—112				

N.B.—Defaulters have been excluded from above.

The Central share of the subscriptions along with the journal fees obtained from the Members/Associate Members of the Branch was duly remitted to the General Secretary of the Indian Public Health Association at suitable intervals. The state share of the subscriptions was retained in the State Branch.

BOOK-REVIEWS

HAND-BOOK ON SMALLPOX VACCINATION—PRINCIPLE & PRACTICE—By Dr. J. Das Gupta, M.B., D.P.H., D.T.M. Published by the author from the Vaccine Institute, Calcutta Corporation. Pages 50. Price not mentioned.

This small booklet has been compiled from a note prepared by the author for the demonstration of the methods of production of smallpox calf lymph vaccine to the medical and public health students of different institutions in Calcutta. The book has been written out in a delightfully clear manner free from ambiguity. The author has been associated with the manufacture of smallpox vaccine for over two decades and his experience in this field has been fairly represented within the short compass of this book. It contains four chapters and each chapter, though short, contains ample information. In the opinion of the reviewer, this brevity combined with clear style and expression is a great advantage of this book. There are some printing mistakes for which a corrigendum list has been appended.

The booklet will prove of particular value to the medical students and also prove very helpful to the medical practitioners, workers in public health as well as to those who are interested in the production and standardisation of smallpox vaccine.—M.N.L.