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INFLUENCE OF CLIMATE, SEASON AND SUNLIGHT ON THE INCIDENCE OF SMALLPOX AND FORECASTING OF EPIDEMICS

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Introduction :

In pre-vaccination days epidemics of Smallpox, a disease endemic in Asia for centuries, have occurred in almost all parts of the world. Though it is more severe in hot climes, the disease has also taken heavy toll of life in other climates as well. It is known to have extirpated the whole races of men in Mexico, Brazil, Siberia, Greenland and Iceland, countries having entirely different types of climate. It is only vigorous and systematic enforcement of vaccination that has been responsible for the absolute or relative disappearence of the disease from the civilized world.

The disease, however, has been found to exhibit characteristic seasonal and yearly variations. In hot climates like India, it begins to rise in winter and spring, attains its peak in summer and declines remarkably with the onset of south west monsoon usually in June. In England and temperate climes most outbreaks occur during winter and spring and tend to die out with the commencement of summer.

Balwin Latham (1890) appears to be the first person to definitely point out the connection between occurrence of smallpox and climatic conditions (Newsholme, 1902). He attributed occurrence smallpox to intense dryness of ground. Rogers (1926 and 1948) made detailed studies of the effect of meteorological conditions on the monthly and yearly variations of smallpox in 8 Indian provinces, and has concluded that a close relationship exists between absolute humidity favouring the disease and a high one checking it. This has been found to be the feature in the 7 Indian provinces which receive a large of part of their total annual rainfall from the South West monsoon in June-September which coincides with the maximum yearly absolute humidity.

Mode of action of Absolute Humidity :

No explanation however, has so far been offerred as to how exactly the rainfall or the high absolute humidity exert a restraining influence on the disease prevalence. Rogers has only pointed out that the prolonged humid winds combined with a high mean

temperature, appear to be inimical, in some way, to the survival and dissemination of infection during the monsoon and that they must be acting on the organism after it has escaped from one patient and before it reaches another most likely during transit through air.

Mode of Transmission:

In order to appreciate the reasons for the seasonal variations in smallpox prevalence, it it necessary to consider the mode of transmission of the infection. Smallpox infection is transmitted by droplets, fomites and through air. Direct transmission for short distances may occur through projection of droplets or droplet nuclei, from the upper respiratory tract of an infected host. Indirect transmission takes place through contamination of bed clothes and other articles in the patient's surrroundings. Dried infective material may be resuspended as air borne dust particles. Variola virus is quite stable in dried state, and it may retain its viability for some time. (Downie and Dumbell 1947). Flies are said to take a considerable part in the spread of disease in tropics (Van Rooyen and Rhodes, 1948). But, from the fact that the disease shows a remarkable decline after onset of monsoon when conditions are favourable for intense fly breeding, it is evident that the role plaed by flies in transmission of infection, is very doubtful. (Gupta, Yajnik and Murty, 1957).

Role of Biological Activity of Sunlight:

Downs and Blunt recorded the lethal action of sunlight as early as 1877. Since then, a considerable amount of work has been done regarding the germicidal effect etc. of sunlight. Buchbinder et al (1941) have shown that sunlight, direct and through window glass, has measurable germicidal effect on bacteria exposed to common illumination intensities for a day or two. Viruses in general, and smallpox virus in particular, are known to be highly susceptible to ultraviolet radiations. Murty (1957) has suggested that the variable amount of ultraviolet irradiation during the different seasons of the year may possibly be another factor involved in the seasonal distribution of smallpox. We propose to deal at length on this suggestion in the succeeding paragraphs.

From meteorological and biological standpoints, the solar radiations can be broadly divided into 3 parts, viz. the infrared, the visible and the ultraviolet. The infrared portion consists of the longest wave lengths extending from 30,000A° to near about 8000A°, the visible region starts from 8000A° and ends at about 3800A°; and the ultraviolet begins at 3800A° and terminates in the close proximity of 2900A°. Ozone present in the upper layers of the atmosphere is responsible for the suppression of the ultraviolet short wave length radiations emanating from the sun. The absorption due to ozone has been found to be extending from a region in the proximity of 2900A° to 2200A°, depending upon the depth and intensity of the ozone layer in the atmosphere situated at a height of about 50 K.M. The germicidal action of sunlight has been found to be located in the extreme ultraviolet region extending from 3300A° to 2900A°. For most viruses the maximum effectiveness (optimum killing) is for wave length 2650A°, and gradually decreases with increasing wave length upto 3000A° beyond which the effectiveness is very low. A germicidal action curve has not been standardised, but the tentative germicidal action factors (Hollaender, 1955) are given in Table 1. We have unfortunately very little

TABLE No. I

Germicidal action factors

Mercury spectrum lines A°	Tentative germicidal factors.
2,353	0.35
2,446	0.58
2,482	0.70
2,537	0.85
2,576	0.94
2,650	1.00
2,654	0.99
2,675	0.98
2,700	0.95
2,753	0.81
2,804	0.68
2,857	0.55
2,894	0.46
2,925	0.38
2,967	0.27
3,022	0.13
3,130	0.01

information in India regarding the extreme ultraviolet solar radiations in spite of the

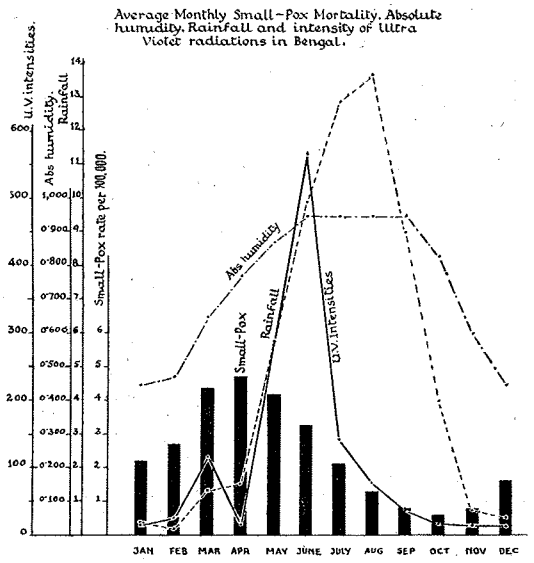
fact that we have abundant sunshine throughout the year. The earliest record is by Suring at Agra in 1924, and by Mukherjee, Boyd and Bose at Calcutta in 1930. Ghosh, Ukil and Sen, have devised a method to accurately determine the intensities of the biologically active region, and have ascertained in 1931-32 the manner in which these radiations are modified during the course of a day as well as for the different months of the year in Calcutta. These observations are mostly limited to wave lengths of the Erythemal Zone (Mean 3050A°); they however give a general idea as to how the ultra violet intensities vary during the different seasons of the year.

The features, noticed for Calcutta are as follows:—(1) The curves for March, April and May (summer months) are indicative of weak ultraviolet intensities. The minimum occurred in the middle of April. These are the hottest months of the year in Calcutta; and the wind movements carry the fine dust particles from the surface layers to considerable heights above and these act as scattering centres, for the ultra violet radiations as they pass through these layers.

(2) The ultraviolet intensity is the highest during the month of June *though the maximum extension is found in July.* The intensities during the months of July, August and September are also found to be high. This is explained by the fact that these months continue to have high mean temperatures, and due to rainfall and consequent settling of dust particles the atmosphere is clearer. Humidity no doubt increase after rainfall, but water vapour is found to be remarkably transparent to the ultraviolet region of the spectrum.

Seasonal distribution of small-pox and ultra violet intensities:

1. *Calcutta and Bengal*:—Small-pox in Calcutta and Bengal (Table II & Fig. 1) is at its height during the months of March, April and May with the peak in April. These are the hottest and driest months of the year characterised by dusty winds and weak ultra violet intensities. The factors responsible for the higher disease prevalence during these months are (1) weak germicidal action of sunlight due to low ultra-violet intensities and (2) favourable conditions for dissemination of infection, suspended in the air as dust particles, through the aerial route, on account of the characteristic dusty winds. Smallpox



rapidly declines from June onwards and reaches a low minimal rate in the month of October. Rainfall usually commences in May, and is fairly heavy in June, July and August. The factors responsible for the remarkable decline in disease prevalence during June and succeeding months are, (1) the high available ultra violet intensities and (2) the relative disappearence of the conditions favourable for the widespread dissemination of infection which were present in the preceeding summer months viz. the charecteristic winds and the pollution of the atmosphere with infected dust particles. The decline in disease prevalence is much more marked in the month of July, and this is accounted for by the fact that the maximum extension of the ultraviolet spectrum is in this month.

2. *Uttar Pradesh.* The seasonal smallpox distribution in U. P. is similar except for the fact that the months April, May and June are the worst, and the peak is in the month of May which happens to be the hottest and dustiest in this state (Table II & Fig. 2). Monsoon usually sets in the latter half of June, and this is followed by the characteristic decline in disease prevalence. This decline is more pronounced in the month of August rather than in July. In a nutshell the whole mechanism is delayed compared to Bengal by a month. On the analogy of Calcutta

TABLE No. II

Monthly Smallpox Mortality Rainfall Absolute Humidity and Intensities of Ultraviolet Radiations of Erythemal Zone.

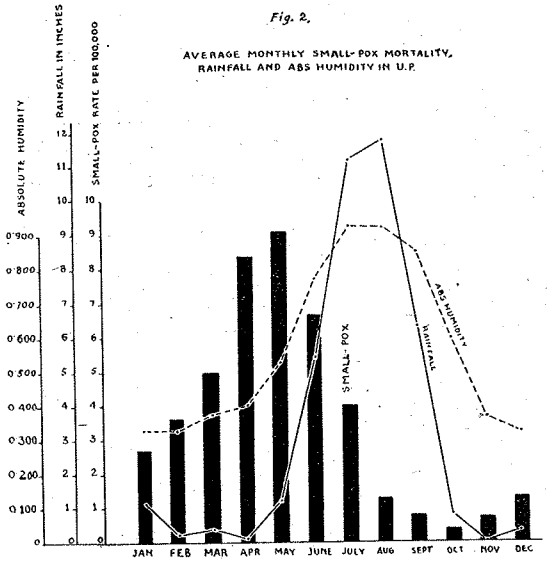
	UTTAR PRADESH				MADRAS				BENGAL				CALCUTTA	
	Mean Small-pox rate per 100,000 (1877-1954)	Mean tempera-ture	Rainfall in inches	Absolute Humid-ity.	Mean Small-pox 100,000 (1877-1954)	Mean tempera-ture	Rainfall in inches	Absolute Humid-ity.	Mean Small-pox 100,000	Mean tempera-ture	Rainfall in inches	Absolute Humid-ity.	Mean Weekly Small-pox Mortal-ity 1957	Noon Ultra Violet in-tensities of Enthemal Zone (Mean Wave-length 3050A)
1		2	3	4	5	6	7	8	9	10	11	12	13	
January	2.7	60.1	1.10	0.325	7.0	76.0	0.83	0.600	2.2	65.2	0.41	0.450	46	16.0
February	3.6	64.0	0.25	0.325	7.8	77.1	0.28	0.650	2.7	70.0	0.20	0.475	85	28.0
March	5.0	76.0	0.37	0.375	8.3	80.0	0.37	0.750	4.3	79.2	1.31	0.650	107	114.5
April	8.4	86.7	0.12	0.400	6.8	82.9	0.65	0.850	4.6	85.0	1.57	0.775	137	14.7
May	9.1	90.3	1.16	0.525	5.5	87.4	1.96	0.850	4.1	85.4	5.52	0.875	72	280.0
June	6.7	86.9	5.43	0.775	4.5	87.3	2.06	0.800	3.2	83.9	9.93	0.950	17	562.3
July	4.0	85.7	11.25	0.925	4.6	85.2	3.81	0.800	2.1	83.1	12.94	0.950	3	139.5
August	1.3	84.5	11.82	0.925	4.4	84.0	4.66	0.800	1.3	82.5	13.70	0.950	3	75.0
September	0.8	84.0	6.27	0.850	4.0	83.8	4.84	0.880	0.8	82.5	9.06	0.950	1	35.0
October	0.4	78.3	0.83	0.600	4.0	81.1	10.93	0.775	0.6	80.0	4.00	0.825	1	16.5
November	0.7	67.4	0.05	0.375	3.5	77.5	13.30	0.750	0.8	72.4	0.68	0.600	2	16.2
December	1.3	60.5	0.35	0.325	5.4	75.1	5.25	0.675	1.6	65.3	0.52	0.450	8	16.2

Figures of Coloumns 2 to 12 are Adopted from Rogers.

findings, and on the basis of the particular local climatic conditions, the month of April, May and June (till onset of monsoon) may be expected to record low ultraviolet intensities, with the minimum in May, and high intensities in July, August and September.

Fig. 2.

AVERAGE MONTHLY SMALL-POX MORTALITY, RAINFALL AND ABS HUMIDITY IN U.P.



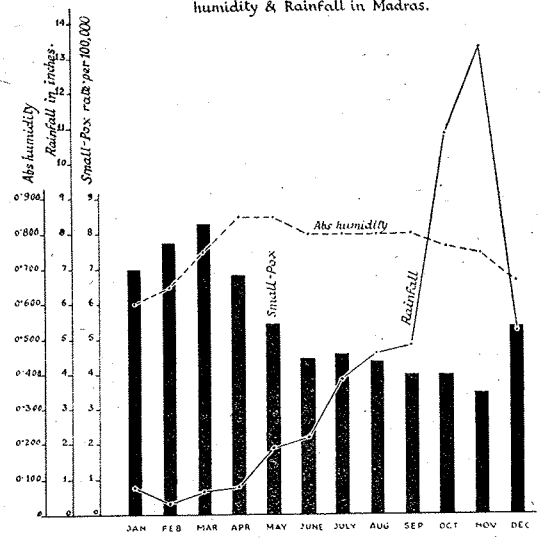
3. *Madras*:—Madras (undivided) is the only exceptional State where the decline in disease prevalence during the post Summer months is very moderate and the monthly variations limited. (Table II & Fig. 3). It is quite possible, that in this State the ultraviolet intensities never reach high intensities as in other areas, on account of the exceptionally poor rainfall during the period April to September. This State receives a large part of its total annual rainfall during October and November which is the monsoon period in this part of the country. Rainfall during these months brings about little or no decrease in smallpox prevalence; on the other hand the disease shows its usual rise during the month of December. Because of the falling temperatures and approaching winter, the intensities of ultraviolet radiations are invariably low during this part of the year which explains why winter rains fail to bring about a decrease in smallpox prevalence.

Altitude, ultraviolet intensities and smallpox:

A study of the smallpox mortality rates of certain hill districts of Uttar Pradesh viz. Garhwal, Almora and Dehra-dun over a long

Fig.3.

Average monthly Small-Pox mortality, Absolute humidity & Rainfall in Madras.



period of 78 years (1877-1954) shows that the disease prevalence has throughout been conspicuously low in these districts and the disease has never attained severe epidemic proportions (Table III). The towns situated at a high altitude in the hills, have also registered very few deaths (Table IV). The reasons generally attributed for the low smallpox prevalence in hill areas, are (1) The low density of population (2) the greater

TABLE No. III

Mean smallpox rates in certain hill districts of Uttar Pradesh (1877-1954) *Quinqquennia*

Quinquennial period	Garhwal	Almora	Dehra-dun	Uttar Pradesh
1877-79 x	0.02	0.06	0.05	2.18
1880-84	0.01	0.08	0.04	1.78
1885-89	0.01	0.09	0.02	0.48
1890-94	0.08	0.08	0.02	0.44
1895-99	0.02	0.09	0.07	0.58
1900-04	0.01	0.06	0.03	0.15
1905-09	0.01	0.33	0.08	0.44
1910-14	0.02	0.07	0.07	0.13
1915-19	0.01	0.04	0.04	0.08
1920-24	0.01	0.02	0.04	0.05
1925-29	0.07	0.15	0.16	0.21
1930-34	0.03	0.06	0.17	0.18
1935-39	0.03	0.09	0.13	0.24
1940-44	0.03	0.08	0.07	0.20
1945-49	0.04	0.13	0.12	0.18
1950-54	0.04	0.05	0.05	0.39
1877-1954	0.03	0.09	0.07	0.44

x Period of 3 years.

effectiveness of the vaccination operation itself, because the natural cool surroundings are conducive to proper storage of vaccine lymph and (3) possibily the comparatively greater popularity of vaccination. But these factors alone cannot thoroughly account for such a low epidemicity of the disease in the hills, particularly when the infection is constantly present. It has been found that the intensity of ultraviolet Region is stronger at high altitude than at sea level. (Coblentz and Stairs, 1931). The stronger ultraviolet intensities and the clearer atmosphere in the hills, appear to be the factors mainly responsible for the low epidemicity of the disease in these areas. It would be of interest to determine the intensities of ultraviolet radiations in hill stations for the different seasons of the year.

Mode of action of Ultraviolet Radiations:

The ultraviolet radiations have germicidal as well as inactivating action (Produce loss of infectivity) on the free virus particles (Hollaender 1955), and the high intensities during June-September have a restraining effect on the spread of infection, by their action on the infective dust particles in the air, and also on bed clothes and other infected articles in the patient's surroundings when exposed to sunlight. The restraining influence on direct transmission of infection through projected droplets and droplet nuclei depends on the extent to which sunlight is allowed to get access to the near surroundings of the infected host.

TABLE No. IV.

Smallpox Mortality in certain Hill Stations of U.P.

Sl. No.	Name of Hill Station	Period	No. of years	No. of deaths registered	1951 Census population	Approximate altitude in ft.
1.	Almora ...	1935-54	20	15	12,116	5,200
2.	Bhowali ...	"	20	1	1,895	6,000
3.	Dogadda ...	1945-54	10	—	1,241	2,000
4.	Lansdown ...	1935-54	20	—	4,419	6,000
5.	Mussorrie ...	1921-54	34	4	7,133	6,940
6.	Nainital ...	1921-54	34	45	12,350	6,400
7.	Pauri	1935-54	20	1	5,250	5,500

Smallpox, Ultraviolet intensities and Absolute Humidity:

From the foregoing paragraphs, it would be seen that small-pox prevalence is closely associated with the variation in the intensities of ultraviolet radiations not only during the different seasons of the year, but also with different altitudes, though the date available at present are too meagre for statistical analysis. Absolute humidity. i.e. the amount of aquoeus vapour as measured by its pressure, is a convenient measure of combined humidity and temperature. Rainfall during the period when the mean temperatures are high, i.e. during June-September, is responsible for high absolute humidities during these months. The factors responsible for high intensities of ultraviolet radiations during these months as pointed out earlier are exactly the same. The intensities of solar radiations including ultraviolet radiations are naturally higher during the seasons when temperatures are high, but the ultraviolet rays suffer a great deal of reduction in intensity due to atmospheric pollution from dust during the dusty summer months; but once the atmosphere is cleared of its dust pollution as a result of heavy rainfall, the ultraviolet intensities become stronger. Thus it would be seen that the high ultra violet intensities during June-September are closely associated with high absolute humidities during the same period.

Low Monsoon Absolute Humidities and Smallpox:

Low absolute humidities during the South West monsoon in the states in which the greatest epidemics of smallpox occur, are also of considerable importance. 4/5th of the epidemics have been shown to follow immediately on low absolute humidity in the previous monsoon. (Rogers, 1926 and 1948). But this is no hard and fast rule, since occurrence of epidemics depends entirely on the availability of enough susceptible material. Low monsoon absolute humidities after a severe epidemic which has exhausted most of the susceptible material may not result in any increase of the disease, and several years of high monsoon absolute humidity may even be followed by increased small-pox. An explanation as to how low monsoon absolute humidity could possibly lead to increased smallpox in the ensuing dry season, can be offerred on the basis of ultra violet intensities. Low monsoon absolute humidities are as a result of poor rainfall. Since ultraviolet rays suffer a great deal of reduction in intensity due to atmospheric pollution from dust, and since poor rainfall during the hot season will not ease the situation in respect of atmospheric dust pollution to the same extent as after a heavy rainfall, the ultra violet radiations are bound to be weaker, resulting in less effective germicidal and inactivating action. A comparatively heavier, 'quantum' of infection is left behind in the month of October, when the yearly seasonal small-pox wave comes usually to an end; and with the availability of sufficient susceptible material, the chances for increased small-pox, in the ensuring dry season, stand much higher. Hallaender (1955) stressed the need to explore into the possibilities of reactivation phenomena, a known feature for bacteriophages, occuring also in the cases of viruses exposed to ultraviolet irradiations of longer wave lengths of 3300A° and above, under suitable conditions. This phenomena, designated 'Photo-reactivation' is a reversal of the inactivition produced, by exposure to ultra violet radiations of short wave lengths. Does failure of monsoon produce, in any way, favourable conditions for the occurrence of this phenomena? Further work in the role played by photo-reactivation in the causation of smallpox and other epidemics is suggested.

Forecasting of Epidemics:

Rogers has suggested the possibility of forecasting of small-pox epidemics 2 or 3 months ahead by watching the absolute humidities during the monsoon period (June-September). But since the only determining factor in the occurrence of epidemics is availability of sufficient susceptible material, it is very doubtful, if the epidemics could be forecasted with any reasonable degree of accuracy, on the basis of monsoon absolute humidities alone. We mention here a few examules of recent epidemics in U.P. which have not been preceded by low monsoon absolute humidities.

Epidemic of 1935:

There was a fairly big epidemic of Smallpox in U.P. during the winter and summer months of the year when 26,032 deaths were registered. The epidemic was widespread and affected both the eastern and western parts of the State. Nine districts of western U.P. and nine districts of eastern U.P. recorded death rates of more than 0.50 per mile. But during the previous south-west monsoon period viz. June-September, 1934, rainfall was widespread in the province with a percentage of departure of nearly +10 from normal. The humidities also were normal during these months.

Epidemic of 1940:

This was another epidemic year in U.P. when 15,361 deaths were registered. Though not so widepread as the 1935 epidemic, it equally affected the eastern and western districts of the State. The humidities during the previous monsoon period (June-September, 1939) were normal. Rainfall was also normal in the eastern U.P. whereas it was defective by 10% in the western region.

Epidemic of 1951:

This was the biggest in living memory, and was widespread in nature affecting almost all districts of the State. The registered mortality figure of 49,195 is considered too low compared to the actual state of affairs because of the severe set back which the registration system had suffered on account of transfer of responsibility for registration to panchayats during the year. The rainfall during the previous monsoon June-September, 1950, was

TABLE No. V.

Monthly Small-pox Mortality in Uttar Pradesh 1901-1956

ar	January	February	March	April	May	June	July	August	Sept'ber.	October	Nov'ber.	Dec'ber.	Total
	2	3	4	5	6	7	8	9	10	11	12	13	14
01	54	44	73	142	150	161	140	67	28	16	40	66	981
02	113	105	288	599	923	874	566	430	244	120	194	520	4,976
03	917	1,158	2,205	3,721	4,225	4,166	3,083	1,316	482	224	133	320	21,950
04	388	394	706	984	1,256	1,285	920	484	220	83	99	179	6,998
05	167	149	195	316	492	475	337	231	155	86	207	463	3,27
06	724	906	1,358	1,789	2,564	2,156	1,470	708	378	188	256	705	13,202
07	801	919	1,557	2,782	3,482	3,634	3,073	1,533	594	448	982	2,840	22,645
08	4,738	4,677	7,225	11,641	12,478	9,325	5,733	2,204	804	250	400	521	59,996
09	487	618	1,017	1,257	1,104	693	386	158	54	39	37	57	5,907
10	67	38	61	115	99	127	124	81	27	27	36	71	873
11	67	87	164	230	244	214	218	102	28	17	47	61	1,479
12	71	65	218	458	475	585	400	170	58	38	147	416	3,101
13	547	771	921	1,191	1,254	960	637	225	123	136	354	1,037	8,156
14	1,319	2,142	2,802	3,601	3,630	2,377	1,303	393	139	40	83	125	17,954
15	186	246	354	404	454	281	149	83	55	40	15	37	2,304
16	41	78	126	210	229	318	202	116	61	25	21	88	1,515
17	139	139	273	368	371	323	162	90	33	28	37	48	2,01
18	53	91	178	259	405	249	150	84	77	31	187	1,144	2,90
19	1,034	850	1,084	1,772	2,283	1,949	999	460	177	71	98	216	10,993
20	334	443	719	1,039	1,018	1,102	766	491	185	111	70	76	6,354
21	175	132	191	227	204	215	128	77	26	35	16	13	1,439
22	17	18	22	41	37	32	31	12	7	2	11	12	242
23	9	16	42	89	115	254	101	35	14	17	16	39	747
24	50	98	142	298	392	666	419	166	70	59	100	264	2,724
25	273	412	930	1,861	2,216	1,573	820	298	156	122	141	571	9,373
26	918	944	1,603	1,745	2,251	1,864	1,142	555	268	118	165	447	12,020
27	529	785	939	1,131	1,243	1,191	1,047	477	222	102	82	146	7,894
28	177	197	279	449	606	553	311	96	44	25	76	199	3,012
29	460	650	1,189	2,410	2,496	1,495	805	305	142	92	246	1,435	11,725
30	1,504	1,009	1,148	2,091	1,840	1,434	997	382	189	96	132	259	11,071
31	353	308	377	589	558	470	305	200	81	31	28	55	3,355
32	135	153	289	367	467	564	312	175	48	28	59	182	2,779
33	422	687	1,011	1,787	2,268	1,614	737	295	113	91	208	611	9,844
34	783	969	1,555	1,978	2,562	2,362	1,427	716	266	191	580	1,428	14,817
35	1,617	1,876	2,572	4,891	5,264	4,106	2,198	1,242	516	260	492	998	26,032
36	1,393	1,687	2,027	2,683	3,081	1,947	1,011	451	144	74	89	262	14,849
37	323	291	345	447	501	490	251	130	66	60	126	170	3,200
38	379	296	510	688	901	551	258	121	53	31	136	487	4,411
39	725	756	1,079	1,494	2,055	1,564	707	381	153	134	179	978	10,205
40	1,317	1,364	1,249	2,151	3,094	2,633	1,624	737	367	161	328	836	15,861
41	910	820	1,403	2,672	2,494	1,788	1,231	722	374	152	227	368	13,161
42	476	448	426	641	859	770	309	156	107	75	56	156	4,479
43	299	281	555	899	1,034	874	662	375	180	124	141	504	5,928
44	841	993	1,208	1,187	1,443	1,398	1,071	497	249	115	257	807	10,066
45	1,112	1,256	2,446	3,875	4,907	3,912	2,486	1,017	459	205	139	314	22,128
46	566	624	613	1,173	1,028	645	404	164	95	45	59	192	5,608
47	340	353	556	887	1,242	1,048	806	317	318	132	114	324	6,437
48	452	408	899	1,436	1,701	1,686	1,178	702	355	324	226	262	9,629
49	368	404	852	1,354	1,358	939	834	508	237	141	257	984	8,236
50	1,727	1,818	2,351	3,962	4,981	4,812	2,872	1,452	779	490	638	1,266	27,148
51	3,651	3,867	6,373	7,156	7,950	7,311	4,777	2,835	1,685	1,140	1,122	1,328	49,195
52	1,439	1,597	2,583	3,186	2,863	2,244	1,604	893	554	284	567	681	18,495
53	1,206	870	1,657	2,352	2,274	1,471	607	397	316	267	817	1,391	13,625
54	2,041	1,388	1,830	2,312	2,671	2,760	1,010	426	430	158	480	899	16,405
55	1,075	1,055	1,668	2,432	3,548	2,620	1,351	546	283	222	148	314	15,262
56	400	478	603	746	1,259	1,029	510	270	152	102	70	123	5,742
ge	727	772	1,162	1,724	1,980	1,645	1,021	492	240	138	214	505	10,620

however normal and the humidities were even above normal. It may also be pointed out that small-pox exhibits characteristic short-term and long-term periodicities in partially immunised countries, and those exhibited by the disease in Uttar Pradesh during a period of 78 years have been fully discussed in our earlier paper (Lal et al, 1958). The most common interval between epidemic peaks was found to be 5-6 years, but a few epidemics did recur as early as three years and as late as seven years. Apparently these periodicities occur on account of the lowering of herd immunity due to accumulation of susceptible persons in sufficient numbers. Low monsoon absolute humidities could therefore only be expected to usher in an epidemic earlier than normally scheduled, provided that sufficient susceptible material is available. From a close scrutiny of table V, which presents monthly mortality figures of U.P. for a number of years, it may be observed that the rise and fall in small-pox prevalence is more or less dependent on the trend of disease in the post-monsoon months of October and November, a rising trend in successive post-monsoon periods resulting in a further increase in disease prevalence and vice versa. The year 1951 is the only exceptional one when the disease prevalence was unusually high during these months and was not followed by a further increase in disease during the next year. As a matter of fact, the trend of disease during these months may be taken as generally suggestive of the herd immunity status of the community. We are therefore of the opinion that the extent of prevalence of disease during the months of October and November in relation to those of the previous few years, along with the monsoon absolute humidities would give a nearly accurate indication of the likely pattern of disease prevalence during the ensuing cold and dry seasons. Any unduly high incidence of small-pox during the months of October and November, particularly following on low monsoon absolute humidities should be viewed with the gravest concern, and all possible precautions taken by the Public Health authorities.

SUMMARY

The role of germicidal and inactivating action of the ultraviolet solar radiations on the variations of smallpox prevalence during the different seasons of the year has been discussed.

The close association of smallpox prevalence with the intensities of ultraviolet radiations and the high ultraviolet intensities during the south-west monsoon months (June-September) have been pointed out.

An explanation as to how high absolute humidities during the south-west monsoon period bring about a remarkable decline in smallpox prevalence has been offered on the basis of ultra-violet intensities.

The role played by photo-reactivation phenomena in the occurrence of small-pox epidemics has been discussed, and further work on this phenomena has been suggested.

The possibilities of accurately forecasting the likely trend in smallpox prevalence during a particular year, on the basis of absolute humidities in the previous monsoon, and on the trend in disease prevalence during the post-monsoon months of October and November of the previous years, have been discussed.

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ON THE VALUE OF COMPLEMENT-FIXATION TEST IN THE DIAGNOSIS OF RABIES

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THE present method for the diagnosis of rabies in suspected animals consists of (1) the microscope examination of impression smears of sections of the brain for the presence of Negri bodies (Negri, 1903 & 1907); (2) the intracerebral inoculation of white mice (Webster and Dawson, 1935) for the isolation of the virus.

The limitations of the smear or section examination of the brain has been repeatedly pointed out by the Expert Committee on rabies (1954, 1955, 1957) of the W.H.O., in that 10-15% of the known positive brain specimens do not show Negri bodies. The biological test in mice takes about 10-15 days for the finalisation of results and this period is too long for a bitten person to wait in suspence and anxiety to know the results for diagnosis. Moreover the presence of virus in the salivary glands is detected only by mice inoculation.

Recently the intracerebral inoculation of syrian hamsters has been tried (Kaprowski, 1949, Reagan et al, 1951 and 1952) and found to give results in 4-6 days.

The complement-fixation test for the diagnosis of rabies in suspected animals tried in the past, mostly gave non-specific reactions and sometimes the tests were carried out in the absence of proper controls. According to Ando et al (1953, i and ii) the immunological diagnosis of rabies was first attempted by Heller and Tomarkin in 1907, Friedberger in 1907, Nedrigailloff and Sawtchenco in 1910, Kraus and Takaki in 1929, and Kondo and Obana in 1930. Ando et al in 1953 claimed to have successfully developed this test. However, Depoux and Merville in 1956 reported that the test was non-specifically positive in one-third of the cases.

The present paper records the results of complement-fixation tests on 101 brains and 50 salivary glands, carried out on the lines suggested by Ando et al (loc. cit). Some modifications have been made in the technique of the test. The results of complement-fixation tests are compared with those of mice inoculation and smear examination. The results of the study of various factors which influence the sensitivity and specificity of the complement-fixation test have also been recorded.

MATERIAL AND METHODS

Principle of the test:

The brain or salivary gland suspension was used as an unknown antigen against a known positive hyperimmune rabies serum.

Antigen:

The method of preparing antigen from brain and salivary glands, followed throughout the work was the one recommended by Ando et al., (loc. cit).

The infected brain was thoroughly washed in buffer-saline to remove traces of glycerine and ground in a sterile mortar-pestle with sterile glass powder to a 40% suspension in phosphate buffer-saline (M/10) of pH 7.2. The suspension was then heated in a water-bath at 40°C. for 1 hour and centrifuged at 10,000 r.p.m. for 15 minutes (International Refrigerated Centrifuge, Model PR-1). The supernatent was used as the antigen. For the use in the test the antigen was diluted to 20% with saline.

Salivary gland:

In the case of salivary glands, a 33% suspension was prepared in buffer-saline and treated in the same manner as the brain. For the actual use in the test it was diluted with equal volumes of saline.

Anti-serum:

The method followed to prepare the immune serum was that recommended by Ando et al. (loc. cit).

Immune serum in guinea-pigs:

Healthy male guinea-pigs weighing 400 gms. each were given intraperitoneally, every week, 2 ml. of a 10 per cent suspension of infected guinea-pig brain. Eight injections of killed fixed virus were given followed by 2-3 injections of live street virus. The fixed virus suspension was prepared in saline and inactivated with 0.5% carbolic acid and incubated at 37°C. for 24 hours. The live street virus suspension was made in physiological saline only. The guinea-pigs were bled by cardiac puncture at three-weekly intervals. Immunisation was continued whenever necessary. The serum was titrated against a known positive sheep brain (fixed virus) antigen. Sera showing a complement-fixing titre of less than 1/16 were not used in the test.

Anti-serum was also prepared in rabbits by similar immunisation. The injections (3 ml. each) were given twice weekly. However low titres were obtained after repeated immunisation, and thus the sera could not be utilised in the tests.

Control negative serum:

Since immunisation with infected brain suspension involves the use of two antigens viz. the brain protein and the virus protein, a control negative serum was prepared in a separate set of guinea-pigs by similar immunisation with a suspension of normal guinea-pig brain.

Complement:

Fresh or preserved (Richardson, 1941) guinea-pig serum was used as complement. Two full units were added in the test.

Hemolytic system:

Consisted of 3% washed sheep cells sensitized with equal amount of suspension containing 3 units of anti-sheep cell amboceptor.

Diluent:

The diluent used in the test was normal physiological saline.

The complement-fixation test:

The technique recommended by Ando et al (loc. cit.) was followed throughout the work. For some time 0.9 ml. volume tests were done, but later on the volume was reduced to 0.6 ml. The 0.9 ml. volume test consisted of 0.15 ml. anti-serum dilution, 0.15 ml. antigen (1:1), 0.3 ml. complement (2 full units) and 0.3 ml. of Hemolytic System (after primary incubation). The 0.6 ml. volume test consisted of 0.1 ml. anti-serum dilution, 0.1 ml. antigen (1:1), 0.2 ml. complement and 0.2 ml. Hemolytic System.

The primary incubation was for two hours at 37°C. and the secondary incubation for 1/2 hour at 37°C. The test results were recorded after the secondary incubation. No hemolysis was recorded as four fixation and complete hemolysis as 0. The intermediate degrees of hemolysis were recorded as 3, 2, 1 and ±. Three and four fixation was considered as a positive reaction.

Controls:

In order to know the titre of the positive serum a sheep brain fixed virus antigen (known positive) was always put up with the routine test. The following controls were also included in the main test: antigen control, positive nad negative serum controls, complement controls for 2, 1, 1/2 unit and the sheep cell control.

RESULTS AND DISCUSSION

A total of 101 brain specimens were tested by smear examination for Negri bodies, by mice inoculation and by the complement-fixation test. Mice inoculation was done only on Negri-negative specimens.

The 101 brain specimens consisted of 77 from suspected animals, 5 putrefied specimens, 10 specimens from experimental animals, 6 from dogs dead of diseases other than rabies and 3 specimens from bats.

The results of complement-fixation test on 77 suspected brain specimens is shown in Table I.

Table I.

Results of C. F. Test on 77 brain specimens

Total	Negri+ C.F.+	Negri Virus C.F.	−ve +ve +	Negri Virus C.F.	−ve −ve −ve
77	44/44	7/9		24/24	

Numerator: denotes the number of complement-fixation tests carried out.

Denominator: denotes the number of virus isolations carried out.

Thus it will be seen that all Negri positive specimens are positive in the complement-fixation test and all virus negative specimens are negative in the complement-fixation test. While out of 9 specimens in which smears were negative and the virus was demonstrated by mice inoculation, only 7 were positive in the complement-fixation test.

These two cases in which the results of complement fixation test were in disagreement with those of mice inoculation, had also very low titre of virus in mice. With one of them (a dog brain), when a 10% suspension was inoculated into 5 mice, only two died showing Negri bodies. The remaining mice survived for three weeks. Similarly in the case of the other brain (human), only one mouse died out of six. Thus it appears that the discrepancy was due to the presence of low titre of virus. Ando et al. (loc. cit.) in their experiments actually did not encounter any such case but they have remarked that such cases are possible particularly when the suspected animals are autopsied in their incubation period.

Although a limited number of brain specimens have been tested by the complement-fixation tests the results appear to be quite comparable with those obtained by Ando et al. Only in regard to two specimens the complement-fixation test was found to be not sensitive enough to give positive results, probably because of low virus content. Not a single case of non-specific positive reaction was observed throughout the work.

All the 10 brain specimens from experimental animals were Negri-positive and complement-fixation test positive. Depoux and Merville (1956) have reported that the complement-fixation test in rabies was effective with intracerebrally inoculated laboratory animals. This is in conformity with our findings.

The six specimens from dogs that died of diseases other than rabies were negative by smear examination, mice inoculation and the complement-fixation tests. These results show that the complement-fixation test is specific so far as the diagnosis of rabies is concerned. Similarly the 3 brain specimens from bats were negative by all the three tests.

During preliminary work it was observed that with some specimens, repeatedly (3-4 times) tested by complement-fixation test, the results varied. Such variations suggested that perhaps some portions of the brain might be more antigenic than the others or may be completely non-antigenic and this was a matter for further study. Besides others factors such as the different concentrations of the antigen used in the test, the effect of heat on the antigen etc. were also studied.

The distribution of complement-fixing antigen in the different parts of the brain of animals.

The study of the distribution of virus antigen using different parts of the brain such as the ammon's horn, cerebral cortex, cerebellum and medulla oblongata was carrid out on 15 specimens by doing the complement-fixation tests. These 15 specimens includes seven from dogs, four from monkeys, two from human, one from a rabbit experimentally inoculated with street virus and one from sheep brain infected with fixed virus. From each brain four portions were selected and tested by complement-fixation test using 20% suspension as antigen.

It was revealed that the antigen was always present in the ammon's horn, cerebellum and medulla oblongata in the concentration that was used in the test, while it was not always so in the cerebral cortex (Table II). This finding could easily explain the variable results mentioned above, which might have been due to the using of non-antigenic or less antigenic portions of the brain.

It is therefore suggested that the portions of the brain to be used for antigen preparation should include the ammon's horn, cerebellum, and the medulla oblongata.

Ando et al. have also shown that the medulla oblongata, corpora quadrigemina have the highest and the thalamus a little lower antigencity.

Table II: Showing the distribution of virus antigen in the different portions of the brain.

Part of brain	Number of times tested for Negri bodies and C.F. tests.	Number of times Negri bodies were found in smear examination.	Number of times positive by C.F. test and percentage.
Ammon's horn	11	11 (100%)	11 (100%)
Cerebral cortex	14	10 (71%)	9 (64%)
Cerebellum	14	13 (93%)	14 (100%)
Medulla oblongata	13*	5 (83%)	13 (100%)

Note.—The smear examination on the medulla oblongata was performed only on six cases.

The suitability of different concentrations of brain suspension as used in the test.

In the study of the distribution of complement-fixing antigens in the different parts of the brain, it was observed that the cerebral cortex was occasionally negative by the complement-fixation test in the usual concentration of 20 per cent. Thus this particular portion of the brain was tested by complement-fixation a number of times using different concentrations of brain suspension. The undiluted 40 per cent. suspension of brain after centrifugation at 10,000 r.p.m. for 15 minutes was considered the 40 per cent. antigen. This antigen when diluted 1:1 was the 20 per cent. antigen, the same 40 per cent. antigen diluted 1:3 was considered the 10 per cent. antigen. The 40 per cent. antigen diluted 1:7 was considered the 5 per cent. antigen. In this investigation four street virus brain specimens and one fixed virus brain specimen were studied.

The results showed that the complement-fixing antigen may not always be detected in a concentration of 20 per cent. Forty per cent suspension when used gave higher positive results.

It is therefore suggested as a practical measure to include both 40 per cent. and 20 per cent. brain suspensions as antigen in the test especially when the suspension is prepared from cerebral cortex alone. Forty per cent. suspension alone should not be used as it may sometimes give anti-complementary results.

The preparation of suspension more concentrated than 40 per cent. is technically difficult and cannot be considered.

The effect of heat on the preparation of the antigen:

Ando et al. had mentioned that the 40 per cent. suspension should be heated at 40°C. for one hour for the elution of the virus from the cells. It was decided to study the effect of heat at various temperatures on the suspension and to find out whether the recommendation was justified.

Three different portions of a 40 per cent brain suspension were exposed to water-bath temperature at 60°C., 50°C. and 40°C., respectively, and the fourth portion left unheated at room temperature (29-30°C.) for one hour. After centrifugation at 10,000 r.p.m. for 15 minutes, each of the suspensions were tested by complement-fixation test (after diluting to 20 per cent as recommended). Three street virus and one fixed virus brain specimens were studied.

Although hte number of observations made is very small, it became evident from the results that heating at 40°C. for one hour was not necessary for the elution of virus, the room temperature in this part of the country varying between 29°C. and 30°C. was suitable for the purpose.

However to maintain a uniform technique for the test, and to avoid day to day fluctuation it is recommended that the suspension be heated at 37°C. for one hour.

The development of virus infectivity and complement-fixing antigens in white rats after intramuscular inoculation of street virus.

An experiment was performed to find out how virus infectivity and complement-fixing antigens would develope in albino rats following intramuscular infection with street virus.

Fifteen white rats (males, 2-3 months old) were inoculated with a 10 per cent suspension of a Negri-positive rat brain (strain 26/56, passage one), 0.5 ml. being inoculated into each rat in the right-hand leg. From the sixth day onwards, two rats were sacrificed every alternate day, whether they showed

symptoms of rabies or not, and their brains were tested by smear examination, by mice inoculation and complement-fixation tests. The complement-fixation tests were done with 40 per cent and 20 per cent antigen concentrations.

Two rats were sacrificed on the sixth day (without symptoms) and their brains were found to be negative in smear examination, mice inoculation and the complement-fixation test. Four rats (two on the 8th day, one each on the 12th and 13th day) were paralysed and their brain found to be positive by smear examination and complement-fixation tests. While in one rat killed on the 10th day without symptoms, the brain was found to be Negri-negative, complement-fixation test negative but mice inoculation positive. Similarly one rat was found with both hind legs paralysed on the 13th day and the brain was found to be Negri-negative, complement-fixation test negative and mice inoculation test positive. The results on these two brains indicate that a stage of infection may exist, with or without symptoms, in which the virus infectivity may be present but complement-fixing antigens have not developed. It appears from the experiment that active multiplication of the virus is indispensable for the complement-fixing antigens to develope. These results may possibly explain the two discrepancies which occurred when the suspected brains were being examined.

Ando et al had performed a similar experiment in guinea-pigs and obtained similar results, i.e. some guinea-pigs showing no symptoms, were dissected and their brains were found to be Negri-negative, complement-fixation test negative but mice inoculation positive.

Studies with putrefied brain specimens:

During the course of routine diagnostic work, occasionally putrefied specimens (brains) are received for diagnosis. Thus it was thought desirable to test a few of such specimens and see whether these could be diagnosed by compement-fixation test, since smear examination for Negri-bodies was an impracticable procedure.

As mentioned previously, five putrefied brain specimens were studied by mice inoculation and by the complement-fixation tests.

Out of these five putrefied brain specimens examined, one was negative by the complement-fixation test and mice inoculation test, one proved to be anti-complementary by complement-fixation test, which however was positive by virus isolation, two were complement-fixation test negative but virus isolation positive and one specimen was complement-fixation test positive and also virus isolation positive. In the latter case the medulla oblongata was intact and unputrefied (while the whole brain was liquified) and was used as antigen in the complement-fixation test.

These few observations suggest that it may not be advisable to accept such specimens for diagnosis by complement-fixation test. But Ando and co-workers, found that even putrefied brains could be successfully diagnosed by the complement-fixation test and moreover they thought that the brains become more antigenic on putrefaction probably due to the release of virus from the lysed cells. However the findings here are not in agreement with those of Ando and his colleagues and rather supports the findings of Depoux and Merville (1956).

Detection of virus in salivary glands:

The transmission of rabies in nature can take place only if the virus is present in the saliva of the biting animal i.e. if the salivary glands of the animal are infected. It is known that in all positive brain specimens, the corresponding salivary glands are not always positive. Thus is the importance of detection of virus in the salivary gland.

As mentioned previously a total of 49 salivary gland specimens were tested in parallel by mice inoculation and by complement-fixation test. Thirty-nine specimens were from suspected animals, four monkeys experimentally infected with stret virus and six from dogs that died of diseases other than rabies.

Out of 49 salivary glands specimens tested, 29 were negative by complement-fixation test and by virus isolation, 20 were positive by virus isolation but only 15 positive by complement-fixation test. Thus the complement-fixation test results on 5 salivary glands were in disagreement with those of mice inoculation (*See* Table III).

Table III : Summarizing the results of complement-fixation test and virus isolation on salivary glands.

Total	Virus −ve C.F. −ve	Virus +ve C.F. +ve
49	15/20	29/29

Numerator : denotes the number of complement-fixation tests carried out.

The results obtained by testing salivary glands for complement-fixation tests do not appear to be as encouraging as those obtained with brains. Out of 20 salivary glands in which the virus was demonstrated, only in 15 the complement-fixation test was positive.

The results of testing salivary glands by complement-fixation test as reported by Ando et al. are in close agreement with those presented in this work. He had tested about 60 glands by the complement-fixation test and by mice inoculation. Out of these, 15 were positive for virus isolation but only 10 were diagnosed as positive by the complement-fixation test. The remaining 45 were negative. Thus he had five disagreements. He attributed the discrepancy to the presence of mucin in the salivary glands which inhibited the complement-fixation reaction. It appears that this may be so, and is a matter for further investigation.

It is most essential to know whether a bite has entailed the risk of exposure to rabies virus and this can be only known either by inoculating the salivary gland suspension in mice or by doing the complement-fixation test with the gland itself. The test reported here is quite rapid and simple. From the small data collected it may not be advisable to draw any conclusions regarding its specificity. Further work will be necessary.

CONCLUSIONS

The results of complement-fixation tests on specimens of brain have proved that the test is of definite value in the rapid diagnosis of rabies in suspected animals, especially the Negri-negative brain specimens, although the last word could only be obtained by virus isolation.

The performance of the test takes about five hours and thus the results of diagnosis by complement-fixation test can be communicated in 24 hours to the person affected. The test is also economic and easy to perform.

No definite conclusions can be drawn from the small data on complement-fixation tests carried out with salivary glands. Further work would be necessary to suitably modify the technique.

The study of the antigen content of the various parts of the brain of rabid animals has indicated that the antigen is always present in the ammon's horn, the cerebellum and the medulla oblongata, while it is not always so in the cerebral cortex. Thus it is suggested that the portions to be used as antigen in the test should be the ammon's horn, cerebellum and the medulla oblongata in order of preference or the pool of all the four portions.

Although the Japanese workers have recommended 20 per cent suspension of brain in the complement-fixation test, it is found that the use of 40 per cent suspensions have given more consistent results than the use of 20 per cent suspension. However for practical purposes it is recommended that 40 and 20 per cent brain suspensions should both be included in the test especially when the cerebral cortex alone is available for the test.

The study of the effect of heat (30°C.-60°C.) on the preparation of the antigen has shown that heating at 40°C. for one hour is not essential in Bombay on account of the high day temperature (29°C.-30°C.). However to maintain a uniform technique for the test, it is recommended that the brain or salivary gland suspension should be heated at 37°C. in a water-bath or incubator for one hour.

The possibility of the complement-fixation technique being advantageously used for the study of the antigenic analysis of street virus strains, should be further explored.

SUMMARY

(1) A complement-fixation technique has been studied in which the brain or salivary glands could be used as complement-fixing antigen against a known positive anti-rabies serum.

(2) Hundred and one specimens of brain when tested by complement-fixation tests, by

smear examination or mice inoculation, showed complete agreement of the results in 97 (96 per cent) specimens. The possible causes of the disagreements have been indicated after further investigation.

(3) Out of 49 salivary glands tested in parallel by complement-fixation tests and mice inoculations, the results of C.F. tests on 44 (89 per cent) glands were in complete agreement. The disagreements would require further investigations.

(4) The complement-fixation test has been shown to have a definite place in the rapid diagnosis of rabies in animals, the results being obtained within 24 hours, especially on Negri-negative brain specimens. The last word however could only be obtained by virus isolation which would require at least 8-12 days, a period of anxiety and suspense for the bitten person.

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CONTROL OF BEDBUGS
And The Problem Of Resistance

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INTRODUCTION

General:

The tropical bedbug Cimex hemipterus (*Cimex rotundatus*) is ubiquitous all over India. It is a highly offensive insect which, though not a regular disease carrier, is objectionable on account of the unpleasant irritation, and consequent loss of sleep caused by its bites. Bug infestation is usually associated with low hygienic standards. This is important as the spread of bugs into new housing estates drives away the more squeamish house-holders and depresses the standards of hygiene (Busvine, 1951). For the troops, bugs are a source of great nuisance, robbing men their rest and sleep resulting in general deterioration of health and lowered efficiency.

Control methods:

It is generally agreed that bug infestations do not develop to any serious extent in houses where a high degree of domestic hygiene prevails. For serious or chronic infestations, recourse must be made to insecticides. Since bugs spend most of the day time in inaccessible places, the only type of insecticide which can effect an immediate extermination is an efficient fumigant with good penetrating power. The bedbug was formerly controlled in sleeping quarters by fumigating them with hydrogen cyanide, methylbromide, or ethylene oxide and even sulphur dioxide from burning sulphur (Metcalf and Flint, 1939). Sprays containing rotenone or thiocyanates gave a fair degree of control and pyrethrum was effective but its persistance did not exceed 9 days (Brown, 1951).

The advent of DDT provided a new weapon to attack bugs. It was found that DDT sprays, and dusts, applied to the crevices of buildings and bedding gave excellent control of bedbugs (Twin, 1945). A 5% DDT solution in kerosene sprayed rather liberally to the walls and furniture killed the bugs only after they had come out of their crevices and walked over DDT deposits. However, these deposits remained insecticidal for many months and finally exterminated the bugs. Suspensions and solutions of 5% DDT showed residual toxicity for nearly 200 days, while 20% sprays gave highly effective protection to dwellings for 11 months; even DDT aerosols gave deposits sufficient to protect for 2 months (Madden, Lindquist and Knipling, 1945). Experimental treatment of a village and a town near Moscow with 5% emulsion of DDT at 5 ml per sq. meter gave complete control which persisted for at least 3 months (Nabokov and Potikha, 1947). The use of DDT in metropolitan centres such as New York eliminated bedbugs (Pomerantz, 1947).

Bedbugs were considered one of the more common and annoying pests in military installations and investigations of its control were therefore undertaken by the Army authorities in U.S.A. At Orlando, in April and May 1943, more than 100 barracks containing about 6000 beds were throughly treated with DDT. Close checks on results were made for at least 6 months without finding any bedbug. The tests not only demonstrated the value of DDT against the bedbug but were of even greater importance in establishing the potential value of the principle of residual treatment against more important insects, particularly mosquitoes and flies (Knipling, 1952).

Methoxychlor is equally effective as DDT and is superior to the other analogues (Busvine, 1946). Toxaphene is less toxic than

DDT as a residual deposit, but more toxic by direct contact (Parker and Beacher, 1947). Both lindane and p-chlorophenyl chloromethyl sulphone are more toxic than DDT to the bed-bug as to the body louse (Busvine 1945, 1946).

Control and eradication of bed bugs in the Armed Forces:

Prior to the introduction of insecticides the routine practice for the control of bedbugs in the Armed Forces used to be the boiling of beds and clothing of personnel in infested areas for which facilities were provided in every unit line. When the effectiveness of DDT as a residual insecticide was established, the Army issued orders for the control of bedbugs which laid down working instructions for spraying with DDT against bugs. These instructions are summarised in the Manual of Hygiene for the Armed Forces (1953). Later, in 1955 Station Commander, Poona Station, under advice from SEMO, issued instruction for spraying BHC Gammexane P 520) in the area as DDT was found to be no more effective against the bugs. However, in the majority of military stations DDT is still being used for debugging programmes though there are now persistant reports that bugs have become resistant to DDT and that they are not appreciably affected by the insecticides.

This paper reports the results of experiments conducted in the Armed Forces Medical College laboratory and in the field to assess the nature and degree of tolerance developed by the bedbug in Poona Cantonment area to hydrocarbon insecticides and the use of alternative insecticides for its control.

Resistance of bedbugs to insecticides:

The extensive use of insecticides has led to the production of resistant strains in certain species of arthropods and this problem of resistance of insects to insecticides has been reviewed elsewhere (Karani, Menon and Ganguli, 1958). Reports of resistance of bedbugs to insecticides have come from various parts of the world. One of the reasons that the onset of resistance in bedbugs is serious is because it reduces the acceptability of house spraying for vector control. Resistance to DDT was first observed in *Cimex lectularious* at Pearl Harbour, Hawaii in 1947 (Brown, 1958). Subsequently it was observed in certain populations of this species in Korea, Japan, U.S.A., French Guiana, Israel, Labanon and Iran (W.H.O., 1956). BHC-resistance of this species was discovered in Israel in 1956 and Cwilich *et al* (1957) found that the Beth Shaan strain of bugs reared in the laboratory retained a high degree of resistance to gamma BHC for several months, being 20-40 times as resistant as the laboratory strain. With the tropical species, *Cimex hemipterus*, DDT-resistance was discovered in 1953 in southern Taiwan, and subsequently encountered in Hong Kong, Singapore, Bengal and Somalia (Brown, 1958). Rao and Halgeri (1956) found the bugs to have developed a high degree of resistance to DDT between 1952 and 1955 in Poona City in which DDT had been sprayed as an indoor residual spray for five years. By 1956, resistance to BHC and dieldrin was becoming superimposed on DDT-resistance in Bombay State, and in 1957 dieldrin resistance developed *ab initio* in this species on the Kenya-Tanganyika border (Brown, 1958).

The failure of chlorinated hydrocarbons to give control of houseflies in many parts of the world led to an intensified search for new materials to be used against this species which resulted in the development of the organophosphorus compound Diazinon, an ester of Thiophosphoric acid, with a wide range of efficacy. Hansens and Bartley (1953) reported on house-fly control afforded during the 1952 season in New Jersey to this insecticide. Their tests showed that Diazinon gave remarkable control of flies that had become resistant to chlorinated hydrocarbon sprays. Karani and Menon (1957) reported that Diazinon could be effectively used for the control of houseflies and mosquitoes. It is now considered possible to control insects which have developed resistance to the chlorinated hydrocarbon insecticides by the use of organophosphorus compounds.

EXPERIMENTAL.

Laboratory tests on resistance of bedbugs:

As there were persistent reports that bedbugs in India have become or were becoming resistant to DDT and BHC, and in view of

the fact that DDT has been in continuous use for more than twelve years in Military Stations in India, it was considered necessary to investigate the problem in order to enable us to revise the present ideas of bedbug control by the use of insecticides and to formulate suitable alternative methods.

Bedbugs (*Cimex hemipterus*) used in these experiments were all collected in Poona Cantonment area from human dwellings, especially military barracks. The bugs used were all fully developed adults. A series of experiments were conducted to evaluate the resistance of bedbugs to DDT. The bugs were exposed to different concentrations of DDT for a fixed period of itme and then transferred to clean recovery dishes and examined after 24 hours for mortality.

Experiment I :

Talcum powder—DDT mixtures containing 5, 10, 20, 30, 40, 50, 60, 70, 80 and 90 percent DDT were prepared manually. A quantity of the mixture (containing about 50 mg of DDT) was placed in petri dishes (3 inches diameter), the bottom of which was lined with filter paper. The filter paper was turned over several times so that it acquired a thin coat of the dust on either surface. About ten bugs at a times were transferred to each dish and exposed to the powder for 10 minutes. Dusts have been used in these experiments solely with a view to get data which would be comparable with the base line data from unsprayed areas obtained by Rao and Halgeri in 1956 as it is difficult to find unsprayed areas in Bombay State now. The tests were repeated a number of times. The bugs usually crawl on the DDT dusts and pick up the dust on all parts of the body. As explained by Rao and Halgeri (1956), the quantity of dust placed in the dish is not important so long as an adequate quantity is used to cover thinly and evenly the eitire bottom of the dish. Nevertheless the concentration of DDT and, to a lesser extent, the period of exposure are important because they together determine the actual quantity of DDT picked up and retained on the body. The bugs were then transferred to clean petri dishes lined with fresh filter paper, by two transfers, so that no DDT, other than what the bug had actually picked up was transferred to the recovery dish. The bugs were examined 24 hours later and the mortality noted. Controls were kept for each experiment with talcum powder alone without DDT and were also similarly studied. The results of these tests are summarised in Table I. It is apparent from the table that 50 per cent mortality could not be obtained by concentrations of 40 per cent and below.

The LC 50 based on the data works out to 46%.

Table I

Mortality at the end of 24 hours in bedbugs from Poona Cantonment exposed to different concentrations of DDT powder in talcum for 10 minutes, December 1957.

Dosage	No. tested	No. died	Percent mortality	
			Actual	Adjusted
5 per cent	32	3	9.4	2.9
10 „ „	40	8	20.0	14.3
20 „ „	20	3	15.0	8.9
30 „ „	30	7	23.3	17.8
40 „ „	30	8	26.7	21.4
50 „ „	40	21	52.5	49.1
60 „ „	50	29	58.0	55.0
70 „ „	40	32	80.0	78.6
80 „ „	40	37	92.5	92.0
90 „ „	30	30	100.0	100.0
Control (Powder without DDT)	60	4	6.7	—

Experiment II :

Another set of experiments were carried out to determine the period of exposure required to give a 50 per cent mortality amongst the bugs exposed to a 5% concentration of DDT in order to compare with the data available for bedbugs from an unsprayed area. For this purpose the figures obtained by Rao and Halgeri (1956) on bugs collected from Chiplun Town (Ratnagiri District, Bombay State) have been made use of, as it is now difficult to find an unsprayed area in Bombay State. Bugs were exposed to 5% DDT powder using the same technique as in the previous experiment, but for varying lengths of time. Controls were maintained for each of these and the control mortality was found to be nil. The results

are set out in Table II and the base line data for bugs from an unsprayed area (Chiplun Town) collected by Rao and Halgeri (1956) are presented in Table III for comparison.

Table II

Mortality at the end of 24 hours in bed bugs from Poona Cantonment exposed to 5% DDT in talcum for varying intervals of time, February 1958.

Exposure period	No. exposed	No. dead	Percent mortality	
			Actual	Adjusted
2 hours	64	14	21.9	21.9
3 ,,	112	26	23.2	23.2
4 ,,	115	42	36.5	36.5
5 ,,	50	20	40.0	40.0
6 ,,	48	40	83.3	83.3

Table III

Mortality at the end of 24 hours in bedbugs from Chiplun Town (unsprayed area) exposed to 5% DDT in talcum, January 1956 (Rao and Halgeri, 1956).

Exposure period	Percent mortality	
	Actual	Adjusted
2 minutes	33.3	25.9
4 ,,	33.3	33.3
6 ,,	43.3	43.3
8 ,,	46.6	46.6
10 ,,	66.6	66.6

It is clear from the above results that bedbugs have developed a high degree of resistance to DDT in Poona Cantonment area where extensive DDT indoor residual spray (bi-monthly) has been in practice for over 12 years now. It is significant that in Chiplun Town in Ratangiri District the bedbugs still (as late as 1956) show a fairly high degree of susceptibility. In Ratangiri district there is no malaria pervalence and therfore no DDT spraying had been undertaken (Rao and Halgeri, 1956). The nearest sprayed towns from Chiplun are 80 miles away and resistance to DDT had been noticed in them even after only 2 years of spraying.

Experiment III :

Though BHC was effective against bedbugs that had developed resistance to DDT, recent reports indicated that BHC was also losing its effectiveness in the control of bugs. Barracks which used to remain free of bugs after spraying with BHC (Gammexane P 520) when it was initially undertaken, continued to harbour bugs indicating clearly that effectiveness of BHC is slowly wearing off. Hence laboratory experiments were conducted to test the efficacy of BHC against bedbugs in the area. The tests were carried out in exactly the same manner as with DDT. BHC dusts were prepared in concentrations of 0.2, 0.5, 1.0, 2.0, 5.0 and 10.0 per cent by mixing BHC (technical) with talcum powder and the bugs were exposed in batches of 10 each in petri dishes lined with filter paper at the bottom. The bugs were exposed for 10 minutes and then removed to clean recovery dishes and examined 24 hours later for mortality. Controls were also kept side by side exposing bugs to the powder only without any BHC. The results of these tests are presented in Table IV.

Table IV

Mortality at the end of 24 hours in bedbugs from Poona Cantonment exposed to different concentrations of BHC powder in talcum for 10 minutes, January 1958.

Dosage	No. tested	No. died	Percent mortality	
			Actual	Adjusted
0.2 percent	40	12	30.0	26.3
0.5 ,,	40	26	65.0	63.2
1.0 ,,	40	30	75.0	73.7
2.0 ,,	30	24	80.0	78.9
5.0 ,,	30	25	83.3	82.4
10.0 ,,	30	29	96.7	96.5
Control (Powder without BHC)	40	2	5.0	—

It may be noticed that a mortality of 96% could be obatined only be exposure to a 10% BHC dust (which is a fairly high dosage) for a period of 10 minutes in a confined space. The LC 50 works out to 0.41%. Since we have no base line data for bugs from unsprayed areas for comparison, it is not

possible to have a definite idea as to the amount of resistance developed by the bugs in our area to BHC. However, when taken along with the result of field trials reported below, it appears that BHC is losing its effectiveness in controlling the bug nuisance.

EXPERIMENT IV.

Laboratory trials with Diazinon:

A few laboratory trials were also conducted to test the efficacy of Diazinon as compared with DDT and BHC against bedbugs in our area. Cement blocks 6 inches square were sprayed separately with the different insecticides. Wettable powders were used in each case to give a deposit of 100 mg per sq. ft. in the case of DDT, 20 mg/sq.ft. in the case of BHC and 20 mg/sq.ft. in the case of Diazinon. The slabs were allowed to dry and bedbugs were exposed to the treated surfaces for 10 minutes by releasing the required number of bedbugs and covering them with a petri dish. After exposure they were removed to clean dishes and their mortality observed after 24 hours. The bugs used in this experiment were all collected from the Poona Cantonment area. A control was maintained by exposing an equal number of bugs to untreated blocks. The details of these tests are given in Table V.

Table V

Showing comparative efficacies of water wettable powder of Diazinon, DDT and BHC on cement surfaces against bedbugs exposed for 10 minutes:

Test No.	DIAZINON			DDT			BHC			CONTROL		
	No. tested	No. died	Per-cent mortality	No. tested	No. died	Per-cent mortality	No. tested	No. died	Per-cent mortality	No. tested	No. died	Per-cent mortality
1	10	8	80	10	4	40	10	4	40	10	0	0
2	20	15	75	20	6	30	20	10	50	20	2	10
3	20	20	100	20	6	30	20	8	40	20	0	0
4	10	10	100	10	2	20	10	4	40	10	0	0
	60	53	88.3	60	18	30	60	26	43.3	60	2	3.3

The percentage mortality with diazinon is significantly higher than those with DDT or BHC. It may be seen from the above that Diazinon was far superior to DDT or BHC, in the doses applied, against bedbugs in our area. Whereas Diazinon gave a kill of about 88 per cent, DDT and BHC gave only kills of about 30 and 43 per cent respectively. The results of these experiments together with the field observations reported below, showed that only Diazinon was cabable of eliminating the bug nuisance, presumably because the bugs in this area have developed a fairly high degree of tolerance to DDT and BHC.

Field trials on the control of bedbugs:

In order to confirm by field trials that DDT spraying is no more effective against bedbugs and to investigate the efficacy of BHC treatment as laid down by the Poona Station Order for the control of bugs, two barracks occupied by troops were selected for experimental purpose. As oganophosphorus compounds are suggested as alternative insecticides to be used against insects that have developed resistance to the chlorinated hydrocarbons, a third barrack was used for testing Diazinon, one of the newer organophosphorous insecticides, moderately toxic to human beings but reported to be highly effective against a large number of arthropods. A fourth barrack which was not sprayed was kept as control. In order to have some base line data on the density of bedbugs in these barracks, the available bugs were collected from the charpoys for one hour in each

barrack and their density worked out per man hour (PMH).

The barracks were then treated separately with the different insecticides. Barrack No. 2 was thoroughly sprayed with DDT, a 5% solution in kerosene to give a dosage of 100 mg./sq.ft. Likewise, barrack No. 3 was treated with BHC a 50% water wettable powder (Gammexane P 520) by mixing 12 oz in one gallon of water to give a dosage of about 20 mg./sq.ft. These two barracks received a second application of the insecticide after a week. Barrack No. 1 was treated with Diazinon, 20% emulsion concentrate in water, mixing 2 ozs. of the E.C. in one gallon of water giving a dosage of 20 mg./sq.ft. Barrack No. 4 was not treated and remained as control.

Bugs were collected from all the barracks three days after the final treatment and kept in the laboratory and their mortality observed after 24 hours. Thereafter weekly collections were made from these barracks and the observations continued. The results of these field trials are tabulated in Table VI.

Table VI

Showing result of spraying military barracks with DDT, BHC and Diazinon and their effect on bedbugs.

Barrack No.	Insecticide sprayed	Formulation	Density PMH before spray	Density PMH after	No. of bugs tested	No. died	Percent mortality
2	DDT	5% solution in kerosene ...	9.0	8.5	25	3	12.0
					16	2	12.5
					16	2	12.5
					57	7	12.3
3	BHC	50% wettable powder (Gammexane in P520) in water	8.2	7.0	45	25	51.7
					73	42	57.5
					72	38	52.6
					190	105	55.3
1	Diazinon	20% emulsion concentrate in water	9.8	1.2	6	6	100.0
					4	3	75.0
					1	1	100.0
					11	10	90.9
4	Control	(Unsprayed)	8.0	7.8	20	1	5.0
					24	4	16.7
					20	2	10.0
					64	7	10.9

It is seen from the table that DDT and BHC sprays did not materially reduce the density of bedbugs and that the mortality of bugs collected from the treated barracks remained low, though BHC gave a much larger percentage of kill than DDT but not enough to eradicate the bug nuisance. On the other hand the density of bugs dropped suddenly in the Diazinon treated barracks and their mortality observed was as high as 90.9 per cent. On the days following the spray a number of dead bugs were found on the floor and charpoy. It was also observed that it was difficult to collect bugs from the Diazinon sprayed barrack. Sometimes no bug could be collected even after long search.

It is clear that Diazinon proved to be very effective against bedbugs that have developed resistance to DDT and BHC, and that the bug nuisance could be completely eradicated by a single application of Diazinon spray.

SUMMARY

Since DDT had been in use as an indoor residual spray for more than twelve years continuously as an antimosquito measure and for the control of bedbugs in Poona Cantonment and other military stations in India, and in view of reports from different parts of the world including India that bedbugs have developed resistance to hydrocarbon insecticides like DDT and BHC, a series of experiments were conducted both in the laboratory and in the field, to find out the nature and degree of resistance developed by these insects and the effectiveness of using an organophosphorous compound, Diazinon, in controlling them.

In experiments carried out with different concentrations of DDT dusts in the laboratory, it was seen that 50 per cent mortality of bugs could not be obtained by concentrations of 40 per cent and below. Analysis of the data indicated a high degree of resistance developed by the bedbug in Poona Cantonment area as in the various tests the LC50 could be obtained only with a concentration of 30 to 70 per cent DDT. From further tests it was noticed that an exposure of more than five hours to a 5% DDT dust was required to kill 50 per cent of the bugs from our area whereas the bugs from an unsprayed area (Chiplun town in Ratnagiri dist.) required only less than 10 minutes exposure to the same concentration of DDt to give the that the bedbugs in Poona Cantonment area 50 per cent kill, thus proving conclusively have developed a very high degree of resistance to DDT.

In laboratory trials with BHC it was noticed that a 96 per cent kill of bugs from the Cantonment area could be obtained only by exposure to a 10 per cent BHC dust for a period of 10 minutes in a confined space, which is considered a high dose for BHC. The LC50 worked out to 0.4 per cent. However, taken along with the results of observations conducted in the field, it appears that BHC is also proving ineffective in eradicating bug nuisance.

In field trials three barracks occupied by troops were treated seperately with DDT, BHC and Diazinon and kept under observation along with a fourth unsprayed barrack as control. It was seen that DDT and BHC sprays did not materially reduce the density of bedbugs and that mortality of bugs collected from the barracks treated with these insecticides remained low though BHC did give a much larger percentage of kill than DDT, but not enough to eradicate the bug nuisance. On the other hand, the density of bugs dropped suddenly in the Diazinon treated barrack soon after spray and the mortality of bugs collected from this barrack was about 90 per cent. A few days after the spray it became difficult even to collect a few for observation.

Laboratory tests on the comparative efficacy of DDT, BHC and Diazinon against bedbugs confirmed the field observations that Diazinon was more effective. Bedbugs exposed for 10 minutes to cement blocks treated with diazinon at a dosage of 20 mg. per sq. ft. gave a 88% kill whereas those exposed to DDT 100 mg. per sq. ft. and BHC 20 mg. per sq. ft. in identical conditions gave a 30 per cent mortality with DDT and 43 per cent with BHC. Diazinon proved to be very effective against bedbugs that have developed resistance to DDT and BHC and a single application of Diazinon to the affected buildings could completely eradicate the bug nuisance.

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RESULTS OF DIETARY SURVEYS IN UTTAR PRADESH 1949—1957

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Marrack (1948-49) in reviewing surveys of nutritional status carried out in United Kingdom from the beginning of the Second World War upto 1945 said that 'we need base lines, from which to make comparisons' and 'we need to study groups of individuals not only by making laboratory investigations, but also by finding out what they eat, how well they are, and what happens to them in the future'. Every State interested in the welfare of its people should have such base-lines not only for the whole unit but also for its different components to enable the administration to formulate their future food and agricultural policies.

In Uttar Pradesh, dietary surveys have been undertaken on a systematic basis, since the establishment of the Nutrition Section in 1948 in the Public Health Department. For the period before 1948 no adequate data is available. According to the special report series of the ICMR "Results of Diet Surveys in India—1935-38" only two diet surveys including 40 families of Tehri-Garhwal in U.P. were carried out. Data of such small sample surveys can hardly be considered useful for the purpose. In earlier communications (Prasad 1949, Govil 1952, Govil *et al*, 1953) the dietary habits of school boys in U.P. were correlated to their nutritional state. In a later communication (Govil *et al*, 1956) dietary intakes of families in U.P. were calculated in relation to the income. Such piece-meal studies though useful in their own way, are not very helpful in giving a correct picture. The importance of correct data on the consumption of foodgrains is stressed by the Superintendent, Census Operations in the 1951 Census Report of Uttar Pradesh (Chapter IV, Section 9). He points out that based on the figures of the Agriculture Department and of imports and exports of foodgrains, the average net consumable grain available for human beings *per adult* per day in the State in the quinquenium ending 1951 was 15.2 oz., while in the National Sample Survey (1952) in Uttar Pradesh, the *per capita* intake worked out in 1949-50 to be 21.0 oz. per day. This further shows the great need for conducting diet surveys in the various regions of the State and reporting the same. The present communication, therefore, is an attempt to put on record the data of dietary surveys that have so far been collected for various parts of the State. The data for other areas is being collected and as it becomes available will be duly communicated.

The territory dealt with in this report was formerly known as the United Provinces of Agra and Oudh but has been renamed as the State of Uttar Pradesh in January 1950 on the inauguration of the new constitution of the Indian Republic. It has a total area of 113,409 square miles with about 64 million population. 86.4 per cent of the population lives in rural areas. The density of population is 557 persons per sq. mile, 74.18 per cent of the population is agricultural and 25.82 per cent non-agricultural. Area of cultivation per capita is 0.63 acre. The proportion of food crops to the total cropped area is 88.3 per cent (1951 census). Uttar Pradesh is divided into 51 districts which are grouped into five natural divisions:—

(a)	Himalayan	...	5 districts
(b)	East Plain	...	10 districts
(c)	Central Plain	...	12 districts
(d)	West Plain	...	19 districts
(e)	Hills and Plateau	...	5 districts

THE SURVEYS

Diet surveys of 596 school boys living in boarding houses and of 581 families includ-

ing 3451 persons were undertaken during the period 1949-1957. The results of these surveys according to the physiographical region of the State are presented in Tables I-III.

METHODS OF SURVEYS

Diet surveys among school boys and families were carried out according to the methods reported previously by Govil *et al*, (1953 and 1956). The food consumption figures refer to food "as purchased" and the nutrient values of the diets were calculated for the various nutrients according to the Manual of Hygiene for the Armed Force (1953) and the Health Bulletin No. 23. In the analysis of the diets average values have been taken wherever possible and allowance has not been made for destruction of nutrients by cooking. Losses vary greatly according to the method of preparation, cooking and serving. There is little loss in cooking, other than vitamins being destroyed by heat, or extracted into washing or cooking water which is not consumed. Calorie coefficients as mentioned in Health Bulletin No. 23 were used to calculate the consumption units. The intake of various classes of food per consumption unit in different districts is shown in Tables II and III. In Table I the consumption of different groups of foodstuffs have been worked out. The families have been divided into (a) those not consuming certain particular foodstuffs and (b) those consuming particular foodstuffs but with the average intake being below or above the desired level. Classes of foodstuffs consumed and their average daily consumption per 'adult unit' in different physiographical regions are summarised below.

CLASSES OF FOODSTUFFS CONSUMED

Cereals:—The average daily intake of cereals was found to be high in almost all the diets of the family groups and, to a certain extent in the diets of school boys. In 96.9 per cent of the families (vide Table I) the average daily intake of cereals was well above the recommended level of 14 oz. (Nutrition Advisory Committee 1944). It ranged from 13.4 oz. to 25.3 oz. in the different districts, the figures being above 20 oz. generally. A mixed cereal diet con-

TABLE No. I.

Table showing differential consumption of foodstuffs in family groups. 581 families.

Classes of Foodstuffs	Groups of families not consuming particular foodstuffs.		Groups of families consuming particular foodstuffs			
			Below desired level.		To desired level and above	
	Actual number	Percentage	Actual number	Percentage	Actual number	Percentage
Cereals	—	—	18	3.1	563	96.9
Pulses	—	—	237	40.8	344	59.2
Green leafy vegetables ...	6	1.0	531	91.4	44	7.6
Other vegetables	—	—	515	88.6	66	11.4
Ghee and vegetable oil ...	—	—	574	98.8	7	1.2
Milk and milk products ...	24	4.1	557	95.9	—	—
Meat, fish and eggs	36	6.2	545	93.8	—	—
Fruits and nuts	84	14.5	490	84.3	7	1.2
Sugar and Jaggery	24	4.1	398	68.5	159	27.4
Condiments	—	—	—	—	—	—

sisting of wheat, rice and cheap grains was consumed by nearly all the family groups. However, in Eastern districts comprising the East Plain and in the Hills and Plateau of Vindhya and the Himalayan regions, more rice than wheat was eaten and *vice versa* in the Central and the West Plains. Since 95 per cent of the families surveyed belonged to rural areas of the State with low incomes, consumption of millets amongst them was also fairly high in them. The low economic status tended to alter their characteristic preference to either of the two major cereals (wheat and rice).

Rice consumed was mostly parboiled (home pounded) type. *Arwa* machine milled rice was also taken. Rice water was either thrown away or taken along with pulse gruel depending upon the liking of individual families. Cheap grains commonly consumed were *Juar* (Sorghum vulgare), *Bajra* (Pennisetum typhoideum), Maize (Zea mays), Barely (Hordeum vulgare). Other uncommon millets consumed were *Sanwa* (Echinochloa colona) and Kodu (Paspalum scrobiculatum). In Himalayan districts of Uttar Pradesh *Ragi* (Eleusine coracana) or *marua* was also eaten.

Pulses:—The average daily intake of pulses was fairly high in most of the districts surveyed. In about 60 per cent of the family groups studied, the average consumption per unit was above, and in above 40 per cent below, the recommended levels of the Nutrition Advisory Committee. In school boys' diets pulse intake was more in places where both wheat and rice were consumed such as the East Plain, but where wheat alone formed the principal cereal as in the West Plain the intake of pulse tended to decrease. In family diets, however, there was no definite correlation between higher intake of a particular type of cereal or cereal mixture and pulse intake. From the records of surveys carried out in India (Indian Council of Medical Research, special Report .No. 20) it is evident that people in Northern India consume pulses in larger quantities than people in the South probably because there is a larger production of pulses in North India. The proteins from the pulses and the cereals constitute the major portion of the total protein intake of the population.

The types of pulses taken in different regions varied. In the East Plain red-gram was usually consumed. Another pulse resembling red-gram called Khesari (Lathyrus sativus) was also eaten in sandy areas near the river banks (Majha area). Lathyrus sativus is a hardy crop which requires no manure, no irrigation and only one ploughing. It gives good yields with minimum labour. Cases of lathyrism are not uncommon in these areas. In other regions black-gram, green-gram, lentil and red-gram were the pulses usually taken. Bengal-gram was also taken as *dhal*. *Gehat* (Dolicos biflorus-Linn) is another pulse consumed in hill areas and in the East Plain.

Leafy vegetables:—The intake of leafy vegetables was unsatisfactory. In 91.4% of the family groups surveyed, the average consumption fell short of the recommended levels and in only 7.6 per cent it was at the desired level, while in 1.0 per cent no consumption of green leafy vegetables was found at all. In school boys' diets, green leafy vegetables were absent in 12 out of 17 kitchens visited. In some of the Eastern districts it was noticed that night blindness was mainly prevalant during dry summer season when green leafy vegetables could not be easily grown. The villagers, however, associate the night blindness with the heat of the sun which they think affects the head and causes night blindness. Leafy vegetables consumed in the different regions were spinach, cabbage, radish leaves, gram-leaves, *Bathua, Methi* (Fenugreek), *Sarson Sag*, Amarnath. During rainy season *Nari Sag* (Ipomea-acquatica Forsk) is available and was consumed. In certain places in Dudhi Tehsil of Mirzapur district green leaves of plant known locally as 'Chakaond' (Cassia-tora Linn) are dried during the time of their plentiful availability (usually rainy season) and consumed during the winter. Before cooking they were soaked in water and then fried in little oil as is usual for the preparation of *Bhuji*. Aboriginies and poor class families resorted to this practice. Another unusual food of the area is red flowers of a plant called *Lakra* (Hibiscus-cannabinus-Linn) used for making chutney. The flowers taste sour and hence serve the purpose of an appetiser.

Non-leafy vegetables:—Pulses, leafy vegetables and non-leafy vegetables including

tubers are eaten along with cereal preparations to make the latter more palatable. In poor man's diet they serve as a sort of liquid medium to mix with the cereal preparations. The average daily intake recommended per consumption unit is 6 oz. However, in 88.6 per cent of the family groups surveyed, the figure was lower than this. Roots and tubers generally consumed were potatoes. onions carrots, radish, turnip, colocasia etc. Other cheap seasonal non-leafy vegetables taken were brinjal, pumpkin, Ridge gourd, broad beans etc. Sweet potatoes (Ipomea batatas) boiled and peeled are usually consumed during winter. They undoubtedly serve to provide cheap source of energy for the poor classes.

In some parts of District Mirzapur (Dudhi Tehsil) the aboriginies take roots of plants locally known as *'Sataiwar'* (Asparagus-racemosus-wild) and *Gethikanda* (Gioscorea-versicolor well). The latter is cut into pieces and is put in a shallow pit made in the bed of a running stream to remove the bitter juices before it is cooked. *Sataiwar* roots are said to increase the milk yield in lactating mothers.

Fruits and nuts:—No regular intake of fruits and nuts was found in the diets of the units surveyed (*i.e.* families and school boys). In 14.5 per cent of the family groups surveyed, no intake of fruits was found. However plenty of cheap seasonal fruits are produced in the State. During summer months large quantities of mangoes of different varieties are available and are eaten by all sections of the community. During winter, guavas, raspberry (cap goose berry) and *Ber* (Zizyphus mauritiana) are eaten. These are available cheaply. Among nuts roasted ground nuts were generally popular during winter.

Fats and oils:—Fats as such were consumed in low quantities. Except in a few places in the Western Plain where ghee was taken in small quantities along with pulse gruel by the school boys residing in boarding houses, the fats and oil used were generally vanaspati (hydrogenated oil) and mustard oil, the latter being the only source of fat for the poor class rural families. In certain districts notably Mirzapur and Jhansi, gingelly oil was also taken. The average daily intake of pure fat fell short of the desired levels in 98 per cent of the families.

Milk and milk products:—Even though rural families own cows and buffaloes, the quantity of milk and milk products consumed in their own families is just negligible. Whatever is produced, is sold in the market to supplement their income. Even Co-operative Milk Dairies in the bigger cities have opened their collection depots in the interior of the districts. The consumption of this nutritionally important food was, therefore, much below the desired levels. In 95.9 per cent of the families surveyed, the average intake was below the recommended levels. In 24 families (4.1 per cent) no intake of milk or milk products was found at all. Milk is a very important article of diet for growing children. Diets of school boys were, however, extremely deficient in this respect. Except for a boarding house investigated in District Jhansi in which milk intake was registered as 11.0 oz. per consumption unit per day, in no other district was its intake found adequate for the school boys.

Flesh foods:—This class includes foods of animal origin such as meat, fish and eggs. These were conspicuous by their absence in school boy's diet. However, they were taken to a small extent by the family groups having no religious taboo. These were consumed once in a week since they were obtainable on weekly market days alone.

Sugar and Jaggery:—*Gur* was usually consumed in rural areas, the average intake of sugar and jaggery was lower than the recommended level, only 27.4 per cent of the family groups consumed it to the recommended level. In cane growing districts which are spread below the Himalayan foot hills and form the Terai belt, cane juice known as *'Ras'* was consumed in abundance during the cane crushing season. In some other families particularly in Eastern districts sugar-cane products such as molasses were also consumed. These formed a significant source of carbohydrate.

Miscellaneous prepared-articles of food:—Different types of prepared articles of food are popular in the State. Amongst sweet preparations jalebi, barfi, pera were taken. These contain a significant proportion of concentrated carbohydrate (sugar). Both

gur and sugar are employed in preparation of these articles. In rural areas *laddus* prepared from some seeds such as *roasted ram dana* (amaranthus-frumentaceus-Buch) soaked in concentrated *gur* solution to act as a binder, were commonly taken by poor classes. Other sweet preparations taken were Tilpatti, Gajak etc. made from white til seeds (Gingelly) and *gur*.

Amongst salted preparations *samosa, sohal* (made from refined wheat flour) *pakori* made from *Besan* or Bengal-gram flour, fried vermicelli (made of besan), were usually consumed.

A very popular recipe amongst the rural population in the State, was a mixture of roasted Bengal-gram, puffed rice and puffed maize commonly known as 'Bhunja'. It was partaken of by the school boys during their school interval and by the labourers and agriculturist who work in the fields, as an early morning breakfast before leaving for their work. Some *gur* or green chilies and salt was also taken along with it to make it more palatable.

Condiments and spices:—Their intake is small and variable. It was difficult to assess the quantities consumed. They were used for flavouring food and to increase its appetising quality. The common spices used were turmeric, coriander, rape seeds, fenugreek seeds and chillies.

NUTRITIVE VALUE OF THE DIETS

The nutritive value of the diets when compared to the daily allowances recommended by the Nutrition Advisory Committee of the Indian Council of Medical Research (1944) appear unsatisfactory for both the type of population surveyed.

The calorie intake per day in case of school boys comes to 2863 gross calories. School boys may be considered moderately active and as such should get a diet of net caloric value of 3000 calories or 3,300 gross calories per consumption unit (Govil *et al*, 1953). Average calories in case of family groups amounts to 3079 per C. U. The average value of 3079 may be adequate when one considers that it includes men and women of all ages engaged in different types of activitty and children of varying ages. However, for an adult male such as a cultivator who may be classified as "moderate worker", a diet of 3300 gross calories may be considered adequate.

The requirement of proteins for an average male adult has been put as 82 gm. Growing children like school boys require more of first class proteins which should be not less than 1/3rd of their total protein intake. However, in the present survey animal protein intake was found to be deficient in the diets of school bays. In 8 out of 17 districts surveyed no animal protein was taken by them while in the rest its intake was grossly deficient. A similar case was found in the diets of family groups. Whereas total proteins. In India protein requirements have deficient and proteins of vegetable origin were mainly consumed. Cereals and pulses contributed the largest source for these proteins. In India protein requirements have been put at a higher level than the National Research Council U.S.A. recommendations because weight for weight, proteins from animal sources are better tissue builders. It has increasingly been realised that the actual requirement of protein may be less than the present accepted figures and that suitable vegetable protein mixtures could replace the animal proteins (Phansalkar and Patwardhan). The dietary habits in this State are such that a variety of cereal mixtures and cereal and pulse mixtures are consumed by the population and with the present concept it may be possible that these cereals and cereal-pulse mixtures would provide the necessary protein element in diets of the people. Unlike the poor rice diets of South India, the diets here have enough supplementation of cereals and pulses. The average daily intake of calcium appears to be less than the recommended levels of 1.0 gm. for adults and 1.5 gm. for growing children. But as the figures pertain to averages of a number of families each-having individuals of varying age and sex, no uniform scale of consumption unit could be applied and figures therefore imply a wide margin of variability. However, on their face value the figures are on the lower side. The habit of chewing betel leaves smeared with slaked lime is fairly common in both urban and rural areas of the State but the practice is confined mostly to adults. Children require more calcium for their growing bones.

TABL

Diet surveys of school boys living in hoste

		EAST PLAIN					
Name of districts		Basti	Gonda	Gorakh-pur	Ghazi-pur	Ballia	Deoria
Year of Surveys		1949	1949	1950	1951	1951	1953
No. of Boys Messing		23	20	59	10	17	27
Average daily intake of foodstuff in ounces per C.U.	Cereals: Wheat flour	12.0	9.6	8.8	4.2	14.2	4.1
	Cereals: Rice	10.0	10.6	7.4	15.5	5.0	16.3
	Cereals: Cheap grain	4.2	—	1.6	—	—	1.8
	Pulses	4.0	4.4	3.6	4.1	4.0	4.2
	Vegetable: Leafy	—	—	0.1	—	—	—
	Vegetable: Non-leafy including tubers	3.8	4.6	2.4	6.0	9.4	10.1
	Fruits	2.2	1.6	Neg.	—	—	—
	Fats and oils	0.5	0.5	0.5	2.4	1.4	0.3
	Milk and milk products	—	2.6	0.5	—	—	1.0
	Flesh foods	—	—	—	—	—	—
	Sugar and Jaggery	4.0	0.5	0.4	—	—	1.3
	Miscellaneous and prepared articles of food	—	2.6	—	—	—	—
Average daily intake of nutrients per C.U.	Calories	3,644	3,011	2,328	2,999	2,748	3,022
	Proteins: Animal	—	2.7	0.5	—	—	1.0
	Proteins: Vegetable	105.2	88.8	73.8	69.2	84.9	85.4
	Proteins: Total	105.2	91.5	74.3	69.2	84.9	86.4
	Fat (G)	30.1	29.7	24.9	73.9	49.7	19.3
	Carbohydrate (G)	736.1	591.8	450.3	511.9	488.5	622.0
	Calcium (MG)	603.0	561.8	417.3	321.4	410.4	540.1
	Fe (MG)	54.0	40.4	37.2	29.7	44.7	29.7
	Vitamin A (IU)	1,012	955	665	1,280	1,180	483
	Thiamin (MG)	3.2	2.5	2.2	2.0	2.7	2.3
	Riboflabin (MG)	1.39	1.03	0.93	0.88	1.02	0.95
	Niacin (MG)	33.4	27.9	23.6	25.6	28.7	17.3
	Ascrobic acid (MG)	34.4	25.0	18.5	26.1	37.6	26.3

C.U. = Consumption unit, I.U. = International unit.

TABLE II.

in various districts of U.P. (1953-57).

	CENTRAL PLAIN					EAST PLAIN					
rdoi	Kanpur	Lucknow	Lucknow	Bahraich	Gonda	Basti	Ballia	Gorakh-pur	Azam-garh	Ghazi-pur	Deoria
956	1956	1956	1952, 1953, 1956	1956	1956 and 1957	1954 and 1956	1953, 1954	1954	1953	1953	1953
29	20	6	34	93	89	51	55	47	6	6	6
R	R	U	R	R	R	R	R	R	R	R	R
219	137	23	214	457	560	306	247	275	47	78	68
5.6	5.6	3.2	4.8	4.2	5.1	5.2	5 2	9.2	6.4	8.8	92
124	124	66	183	62.5	76	77	98	162	148	170	96
C	C	C	Service	C	C	C	C	C	C	C	C
11.5	8.3	8.3	11.6	1.9	4.6	4.9	4.4	5.9	2.6	3.3	1.4
3.3	1.9	3.1	3.8	11.7	14.1	11.1	8.2	13.5	4.0	5.4	9.5
1.1	11.3	13.5	0.7	10.6	4.5	4.4	9.0	1.7	15.9	9.9	13.6
3.6	3.4	5.6	2.6	2.3	4.5	3.1	4.0	4.1	4.4	3.7	2.3
2.2	0.4	—	2.4	1.8	2.5	3.6	2.3	0.9	2.6	1.7	2.1
6.0	3.9	3.6	5.8	2.1	4.3	3.6	3.3	6.1	3.8	1.9	2.3
0.2	0.3	—	2.2	0.1	0.5	0.3	0.6	0.4	—	—	0.7
1.1	0.3	0.6	1.7	0.3	0.3	0.8	0.9	1.0	0.7	0.5	0.2
3.9	7.6	1.9	6.9	1.5	2.0	2.6	5 3	3.1	1.3	3.2	0.1
0.8	0.1	—	1.1	0.3	0.5	1.0	0.5	1.2	1.6	—	1.0
2.2	2.5	1.3	1.6	0.2	1.2	1.9	2.2	1.7	2.7	2.6	1.1
0.3	0.3	—	0.8	—	—	2.6	2.1	1.3	2.5	0.1	—
708	3,098	4,395	2,892	2,881	3,156	3,187	3,333	3,316	3.547	1,315	2,464
7.3	7.4	1.9	11.1	2.2	4.3	7.3	7.4	8.0	8.0	3.2	4.3
8.9	83.0	102.2	74.0	72.3	85.9	71.9	26.0	85.0	95.3	82.2	64.7
6.2	90.4	104.1	85.1	74.5	90.2	79.2	103.4	93.0	103.3	85.4	69.0
9.1	27.0	38.7	74.8	22.9	29.1	65.8	52.9	46.7	45.0	31.7	22.2
7.9	596.3	656.8	469.3	591.4	629.5	606.5	609.0	623.5	670.8	615.8	536.9
7.1	905.8	793.3	854.0	594.1	664.5	883.1	1,000	661.9	925.5	675.0	543.1
3.1	53.4	59.9	42.0	39.2	46.1	52.3	53.3	45.2	61.9	38.1	38.4
401	1,374	946	2,935	1,612	2,128	2,998	2,405.5	15.9	24.27	1,399	1,747
3.0	2.4	2.8	2.3	2.0	2.4	2.2	2.4	2.3	2.3	2.0	1.7
1.5	1.3	1.4	1.1	1.0	1.2	1.0	2.2	1.1	1.3	1.0	0.9
0.2	21.9	23.8	22.8	16.3	20.3	25.5	28.8	21.9	21.3	17.4	22.8
9.1	20.8	14.0	71.6	46.4	55.8	69.9	60.1	43.0	67.4	34.1	51.3

l, U.=Urban, G.=Gram, M.G.=Milligram. I.U.=International unit,

LE III

els in various districts of U.P. (1949-56).

CENTRAL PLAIN				WEST PLAIN					HILLS AND PLATEU	
Allaha-bad	Hardoi	Lucknow	Morad-abad	Buland-shahr	Budaun	Muzaffar nagar	Meerut	Farrukh-abad	Jhansi	Mirza-pur
1950	1950	1956	1949	1950	1950	1951	1951	1951	1950	1953
23	47	107	9.4	25	44	19	11	24	18	28
12.4	18.7	16.0	13.2	18.4	14.6	11.0	16.0	22.9	11.0	—
9.2	—	7.7	—	—	0.2	1.0	—	—	2.4	16.0
—	—	—	7.2	—	3.6	—	—	—	1.2	—
5.4	4.2	5.4	2.6	2.0	3.0	3.2	2.0	3.8	3.8	4.0
—	—	5.5	—	1.4	—	0.2	—	—	—	4.0
—	0.6	4.5	0.9	4.8	1.2	8.9	6.0	—	6.4	8.0
Neg.	—	1.1	1.0	2.1	Neg.	Neg.	Neg.	Neg.	Neg.	1.1
1.0	1.2	1.5	0.34	1.4	1.0	2.2	2.2	2.0	0.7	1.0
—	—	2.0	—	5.6	Neg.	2.4	—	—	11.0	4.5
—	—	—	0.9	—	—	—	—	—	—	—
—	—	1.3	—	0.6	Neg.	0.9	—	—	1.5	0.1
Neg.	—	1.4	Neg.	1.0	—	—	—	—	2.5	—
2,918	2,586	3,802	2,457	2,792	2,393	2,323	2,416	3,164	2,776	2,448
—	—	2.0	3.7	5.8	—	2.5	—	—	11.5	4.5
91.5	89.4	112.5	96.1	81.2	80.5	62.1	68.7	101.0	81.1	62.8
91.5	89.4	114.5	99.8	87.0	80.5	64.2	68.7	101.0	92.6	67.3
39.0	46.0	59.4	31.5	60.5	42.5	73.9	71.2	70.2	56.2	40.6
549.3	453.6	697.9	442.7	474.2	423.2	348.5	374.5	532.1	471.8	449.7
417.8	407.1	638.3	668.2	694.1	362.2	444.4	300.0	430.5	923.6	737.4
45.5	50.5	57.5	25.2	47.4	47.8	33.8	39.7	57.8	39.2	30.9
741	934	4,333	781	2,332	881	1,580	1,267	1,206	1,372	3,487
2.8	2.9	3.4	2.9	2.8	2.7	2.0	2.4	3.3	2.3	1.7
1.04	1.05	1.3	1.36	1.13	0.86	0.85	0.77	1.06	1.05	0.81
30.1	29.0	31.3	26.5	27.7	25.3	18.8	24.3	33.9	21.9	11.7
5.4	2.3	46.2	29.8	44.4	7.8	37.8	23.0	3.8	27.4	102.6

Neg. = Negligible, G. = Gram, M.G. = Milligram.

TABLE

Family diet surveys in various d

	Physiographic Regions	HIMALAYAN HILLS AND PLATEAU		WEST PLAIN			CENTRA
	Name of districts	Almora	Mirza pore	Bijnor	Bareilly	Hardoi	Kanpur
	Year of Surveys	1953	1953, 1956 1957	1957	1957	1956	1956
	No. of families surveyed	6	92	24	24	29	20
	Rural or urban	R	R	R	R	R	R
	Total No. of persons	43	496	159	125	219	137
	Average consumption units per family	5.8	5.6	5.2	4.3	5.6	5.6
	Average income per family per month in rupees	150	90	163	88	124	124
	Occupation	C	C	C	C	C	C
Average daily intake of food stuffs in ounces per C.U.	Wheat flour	9.4	1.6	12.5	4.4	11.5	8.3
	Rice	11.5	7.4	4.2	7.5	3.3	1.9
	Cheap grain	3.5	12.8	4.7	7.9	11.1	11.3
	Pulses	1.6	2.5	4.2	3.7	3.6	3.4
	Vegetable Leafy	0.8	2.8	2.6	6.0	2.2	0.4
	„ Non-leafy (including tubers)	1.9	3.3	3.0	5.6	6.0	3.9
	Fruits	0.1	0.1	0.9	0.5	0.2	0.3
	Fats and oils	0.9	0.4	0.8	0.9	1.1	0.3
	Milk and milk products	5.7	1.5	7.6	1.8	3.9	7.6
	Flesh foods	0.5	0.1	0.1	1.3	0.8	0.1
	Sugar and Jaggery	0.6	0.03	2.8	2.7	2.2	2.5
	Miscellaneous and prepared articles of food	—	0.1	0.8	—	0.3	0.3
	Calories	3,138	2,672	3,423	1,325	3,708	3,098
Proteins	Vegetable	7.8	2.6	8.0	8.4	7.3	7.4
	Animal	76.3	67.3	92.7	79.1	98.9	83.0
	Total	83.8	69.9	100.7	87.5	106.2	90.4
Average daily intake of nutrients per C.U.	Fat (G)	50.4	27.9	51.9	45.4	59.1	27.0
	Carbohydrates (G)	570.0	534.9	637.7	590.2	577.9	596.3
	Calcium (MG)	625.4	713.1	106.3	892.9	927.1	905.8
	Fe (MG)	40.3	40.6	57.8	48.2	93.1	53.4
	Vitamin A (IU)	1,456	2,742	2,806	4,325	1,401	1,374
	Thiamin (MG)	2.3	1.8	2.8	2.2	3.0	2.4
	Riboflarin (MG)	0.9	1.0	1.5	1.3	1.5	1.3
	Nicacin (MG)	22.9	15.1	25.5	20.1	30.2	21.9
	Ascorbic acid (MG)	22.6	65.6	58.8	12.9	59.1	20.8

C.U. = Consumption unit , C. = Cultivator, R. = Rural, U. = Urba

ABLE III

ostels in various districts of U.P. (1949-56).

CENTRAL PLAIN				WEST PLAIN					HILLS AND PLATEU	
Allaha-bad	Hardoi	Lucknow	Morad-abad	Buland-shahr	Budaun	Muzaffar nagar	Meerut	Farrukh-abad	Jhansi	Mirza-pur
1950	1950	1956	1949	1950	1950	1951	1951	1951	1950	1953
23	47	107	9.4	25	44	19	11	24	18	28
12.4	18.7	16.0	13.2	18.4	14.6	11.0	16.0	22.9	11.0	—
9.2	—	7.7	—	—	0.2	1.0	—	—	2.4	16.0
—	—	—	7.2	—	3.6	—	—	—	1.2	—
5.4	4.2	5.4	2.6	2.0	3.0	3.2	2.0	3.8	3.8	4.0
—	—	5.5	—	1.4	—	0.2	—	—	—	4.0
—	0.6	4.5	0.9	4.8	1.2	8.9	6.0	—	6.4	8.0
Neg.	—	1.1	1.0	2.1	Neg.	Neg.	Neg.	Neg.	Neg.	1.1
1.0	1.2	1.5	0.34	1.4	1.0	2.2	2.2	2.0	0.7	1.0
—	—	2.0	—	5.6	Neg.	2.4	—	—	11.0	4.5
—	—	—	0.9	—	—	—	—	—	—	—
—	—	1.3	—	0.6	Neg.	0.9	—	—	1.5	0.1
Neg.	—	1.4	Neg.	1.0	—	—	—	—	2.5	—
2,918	2,586	3,802	2,457	2,792	2,393	2,323	2,416	3,164	2,776	2,448
—	—	2.0	3.7	5.8	—	2.5	—	—	11.5	4.5
91.5	89.4	112.5	96.1	81.2	80.5	62.1	68.7	101.0	81.1	62.8
91.5	89.4	114.5	99.8	87.0	80.5	64.2	68.7	101.0	92.6	67.3
39.0	46.0	59.4	31.5	60.5	42.5	73.9	71.2	70.2	56.2	40.6
549.3	453.6	697.9	442.7	474.2	423.2	348.5	374.5	532.1	471.8	449.7
417.8	407.1	638.3	668.2	694.1	362.2	444.4	300.0	430.5	923.6	737.4
45.5	50.5	57.5	25.2	47.4	47.8	33.8	39.7	57.8	39.2	30.9
741	934	4,333	781	2,332	881	1,580	1,267	1,206	1,372	3,487
2.8	2.9	3.4	2.9	2.8	2.7	2.0	2.4	3.3	2.3	1.7
1.04	1.05	1.3	1.36	1.13	0.86	0.85	0.77	1.06	1.05	0.81
30.1	29.0	31.3	26.5	27.7	25.3	18.8	24.3	33.9	21.9	11.7
5.4	2.3	46.2	29.8	44.4	7.8	37.8	23.0	3.8	27.4	102.6

nit. Neg. = Negligible, G. = Gram, M.G. = Milligram.

TABLE III

Diet surveys of school boys living in hostels in var

		EAST PLAIN						CENTR
Name of districts		Basti	Gonda	Gorakh-pur	Ghazi-pur	Ballia	Deoria	Allaha-bad
Year of Surveys		1949	1949	1950	1951	1951	1953	1950
No. of Boys Messing		23	20	59	10	17	27	23
Average daily intake of foodstuff in ounces per C.U.	Cereals: Wheat flour	12.0	9.6	8.8	4.2	14.2	4.1	12.4
	Cereals: Rice	10.0	10.6	7.4	15.5	5.0	16.3	9.2
	Cereals: Cheap grain	4.2	—	1.6	—	—	1.8	—
	Pulses	4.0	4.4	3.6	4.1	4.0	4.2	5.4
	Vegetable: Leafy	—	—	0.1	—	—	—	—
	Vegetable: Non-leafy including tubers	3.8	4.6	2.4	6.0	9.4	10.1	—
	Fruits	2.2	1.6	Neg.	—	—	—	Neg.
	Fats and oils	0.5	0.5	0.5	2.4	1.4	0.3	1.0
	Milk and milk products	—	2.6	0.5	—	—	1.0	—
	Flesh foods	—	—	—	—	—	—	—
	Sugar and Jaggery	4.0	0.5	0.4	—	—	1.3	—
	Miscellaneous and prepared articles of food	—	2.6	—	—	—	—	Neg.
Average daily intake of nutrients per C.U.	Calories	3,644	3,011	2,328	2,999	2,748	3,022	2,918
	Proteins: Animal	—	2.7	0.5	—	—	1.0	—
	Proteins: Vegetable	105.2	88.8	73.8	69.2	84.9	85.4	91.5
	Proteins: Total	105.2	91.5	74.3	69.2	84.9	86.4	91.5
	Fat (G)	30.1	29.7	24.9	73.9	49.7	19.3	39.0
	Carbohydrate (G)	736.1	591.8	450.3	511.9	488.5	622.0	549.3
	Calcium (MG)	603.0	561.8	417.3	321.4	410.4	540.1	417.8
	Fe (MG)	54.0	40.4	37.2	29.7	44.7	29.7	45.5
	Vitamin A (IU)	1,012	955	665	1,280	1,180	483	741
	Thiamin (MG)	3.2	2.5	2.2	2.0	2.7	2.3	2.8
	Riboflabin (MG)	1.39	1.03	0.93	0.88	1.02	0.95	1.04
	Niacin (MG)	33.4	27.9	23.6	25.6	28.7	17.3	30.1
	Ascrobic acid (MG)	34.4	25.0	18.5	26.1	37.6	26.3	5.4

C.U. = Consumption unit , I.U. = International unit. Neg. =

TABLE II.

in various districts of U.P. (1953-57).

	CENTRAL PLAIN					EAST PLAIN					
rdoi	Kanpur	Lucknow	Lucknow	Bahraich	Gonda	Basti	Ballia	Gorakh-pur	Azam-garh	Ghazi-pur	Deoria
1956	1956	1956	1952, 1953, 1956	1956	1956 and 1957	1954 and 1956	1953, 1954	1954	1953	1953	1953
29	20	6	34	93	89	51	55	47	6	6	6
R	R	U	R	R	R	R	R	R	R	R	R
219	137	23	214	457	560	306	247	275	47	78	68
5.6	5.6	3.2	4.8	4.2	5.1	5.2	5 2	9.2	6.4	8.8	92
124	124	66	183	62.5	76	77	98	162	148	170	96
C	C	C	Service	C	C	C	C	C	C	C	C
11.5	8.3	8.3	11.6	1.9	4.6	4.9	4.4	5.9	2.6	3.3	1.4
3.3	1.9	3.1	3.8	11.7	14.1	11.1	8.2	13.5	4.0	5.4	9.5
11.1	11.3	13.5	0.7	10.6	4.5	4.4	9.0	1.7	15.9	9.9	13.6
3.6	3.4	5.6	2.6	2.3	4.5	3.1	4.0	4.1	4.4	3.7	2.3
2.2	0.4	—	2.4	1.8	2.5	3.6	2.3	0.9	2.6	1.7	2.1
6.0	3.9	3.6	5.8	2.1	4.3	3.6	3.3	6.1	3.8	1.9	2.3
0.2	0.3	—	2.2	0.1	0.5	0.3	0.6	0.4	—	—	0.7
1.1	0.3	0.6	1.7	0.3	0.3	0.8	0.9	1.0	0.7	0.5	0.2
3.9	7.6	1.9	6.9	1.5	2.0	2.6	5 3	3.1	1.3	3.2	0.1
0.8	0.1	—	1.1	0.3	0.5	1.0	0.5	1.2	1.6	—	1.0
2.2	2.5	1.3	1.6	0.2	1.2	1.9	2.2	1.7	2.7	2.6	1.1
0.3	0.3	—	0.8	—	—	2.6	2.1	1.3	2.5	0.1	—
,708	3,098	4,395	2,892	2,881	3,156	3,187	3,333	3,316	3.547	1,315	2,464
7.3	7.4	1.9	11.1	2.2	4.3	7.3	7.4	8.0	8.0	3.2	4.3
98.9	83.0	102.2	74.0	72.3	85.9	71.9	26.0	85.0	95.3	82.2	64.7
06.2	90.4	104.1	85.1	74.5	90.2	79.2	103.4	93.0	103.3	85.4	69.0
59.1	27.0	38.7	74.8	22.9	29.1	65.8	52.9	46.7	45.0	31.7	22.2
77.9	596.3	656.8	469.3	591.4	629.5	606.5	609.0	623.5	670.8	615.8	536.9
27.1	905.8	793.3	854.0	594.1	664.5	883.1	1,000	661.9	925.5	675.0	543.1
93.1	53.4	59.9	42.0	39.2	46.1	52.3	53.3	45.2	61.9	38.1	38.4
401	1,374	946	2,935	1,612	2,128	2,998	2,405.5	15.9	24.27	1,399	1,747
3.0	2.4	2.8	2.3	2.0	2.4	2.2	2.4	2.3	2.3	2.0	1.7
1.5	1.3	1.4	1.1	1.0	1.2	1.0	2.2	1.1	1.3	1.0	0.9
30.2	21.9	23.8	22.8	16.3	20.3	25.5	28.8	21.9	21.3	17.4	22.8
59.1	20.8	14.0	71.6	46.4	55.8	69.9	60.1	43.0	67.4	34.1	51.3

l, U.=Urban, G.=Gram, M.G.=Milligram. I.U.=International unit,

TABLE

Family diet surveys in various d

		HIMALAYAN HILLS AND PLATEAU		WEST PLAIN			CENTRA
Physiographic Regions							
Name of districts		Almora	Mirza pore	Bijnor	Bareilly	Hardoi	Kanpur
Year of Surveys		1953	1953, 1956 1957	1957	1957	1956	1956
No. of families surveyed		6	92	24	24	29	20
Rural or urban		R	R	R	R	R	R
Total No. of persons		43	496	159	125	219	137
Average consumption units per family		5.8	5.6	5.2	4.3	5.6	5.6
Average income per family per month in rupees		150	90	163	88	124	124
Occupation		C	C	C	C	C	C
Average daily intake of food stuffs in ounces per C.U.	Wheat flour	9.4	1.6	12.5	4.4	11.5	8.3
	Rice	11.5	7.4	4.2	7.5	3.3	1.9
	Cheap grain	3.5	12.8	4.7	7.9	11.1	11.3
	Pulses	1.6	2.5	4.2	3.7	3.6	3.4
	Vegetable Leafy	0.8	2.8	2.6	6.0	2.2	0.4
	„ Non-leafy (including tubers)	1.9	3.3	3.0	5.6	6.0	3.9
	Fruits	0.1	0.1	0.9	0.5	0.2	0.3
	Fats and oils	0.9	0.4	0.8	0.9	1.1	0.3
	Milk and milk products	5.7	1.5	7.6	1.8	3.9	7.6
	Flesh foods	0.5	0.1	0.1	1.3	0.8	0.1
	Sugar and Jaggery	0.6	0.03	2.8	2.7	2.2	2.5
	Miscellaneous and prepared articles of food	—	0.1	0.8	—	0.3	0.3
	Calories	3,138	2,672	3,423	1,325	3,708	3,098
Proteins	Vegetable	7.8	2.6	8.0	8.4	7.3	7.4
	Animal	76.3	67.3	92.7	79.1	98.9	83.0
	Total	83.8	69.9	100.7	87.5	106.2	90.4
Average daily intake of nutrients per C.U.	Fat (G)	50.4	27.9	51.9	45.4	59.1	27.0
	Carbohydrates (G)	570.0	534.9	637.7	590.2	577.9	596.3
	Calcium (MG)	625.4	713.1	106.3	892.9	927.1	905.8
	Fe (MG)	40.3	40.6	57.8	48.2	93.1	53.4
	Vitamin A (IU)	1,456	2,742	2,806	4,325	1,401	1,374
	Thiamin (MG)	2.3	1.8	2.8	2.2	3.0	2.4
	Riboflarin (MG)	0.9	1.0	1.5	1.3	1.5	1.3
	Nicacin (MG)	22.9	15.1	25.5	20.1	30.2	21.9
	Ascorbic acid (MG)	22.6	65.6	58.8	12.9	59.1	20.8

C.U. = Consumption unit, C. = Cultivator, R. = Rural, U. = Urba

In diet surveys among the school children, the average intake of calcium was found to be grossly under the recommended level. Vitamin A was found deficient in the diets of both family groups and of the school boys. The average intake per Consumption Unit recommended for good health is 3000-4000 I. U. per day. Diet of school boys were more deficient in this nutrient element than those of the familie.s Vitamin A is necessary for growth and for the health of the eyes. School children should therefore get an adequate supply of these. Clinical nutritional studies among school boys in this State (Govil, 1952) have shown incidence of Xerosis Conjunctiva to the extent of 11.2 per cent and of dull dry and rough skin to 11 per cent.

Thiamin intake was adequate. Clinical cases of Beriberi are not generally reported from this State. The consumption of a mixture of cereals particularly of rice along with wheat and millets and the use of home-pounded parboiled rice have obviated the problem of thiamin deficiency so characteristic of a rice eater. Riboflavin intake is on the lower side in the diets of both school boys and the families. If 1.5 to 2 mg. be taken as the requirement for good nutrition, all the diets are deficient in this nutrient. Vitamin C is lost in process of cooking. Unless raw vegetables and fruits are eaten it is difficult to depend on cooked products as a source of Vitamin C. However, if 50 per cent be deducted for loss in cooking, only few diets provide 30 mg. considered necessary for the maintenance of good health (Medical Research Council, U. K., 1948). The intake of iron and niacin were adequate in the diets of all the family groups and the school boys.

SUMMARY

1. Data of dietary surveys carried out during the period 1949-57 among 581 families mainly from rural areas and and 596 school boys living in boarding houses in rural areas in different physiographical regions of the State are reported.
2. The classes of foodstuffs eaten and the general pattern of diets in different physiographical regions of the State are given. More rice than wheat was eaten in East Plain and vice versa in Central Plain and West Plain. However mixed cereal diet was generally eaten. Pulse intake was generally higher than recommended in a balanced diet. Of the total families surveyed 4/5th did not consume protective foods such as leafy vegetables, milk and milk products, meat, fish, eggs, fruits and nuts to the desired level.
3. The nutritive value of the diets is discussed. The adequacy or otherwise of diets has been judged from the recommended allowance of the Nutrition Advisory Committee (1944) of Indian Council of Medical Research.

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AN EPIDEMIOLOGICAL APPROACH TO THE CONTROL OF BILHARZIASIS IN EGYPT

By

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HISTORICAL

Haematuria was known in Pharaoic Egypt, as evidenced by a good clinical account of the disease found in a papyrus (Pfister, 1912). Proof of its occurrence is shown by the presence of ova in mummies from 3,000—4,000 years old (Puffer, 1910). It is yet doubtful if the physicians of ancient Egypt recognized haematuria as an endemic disease caused by a helminth, and accordingly that the disease "A—A—A" mentioned in Ebers papyrus is Schistosomiasis (Pfister).

Haematuria was recognized and described by the Arabian Physicians in their medical works, but it is not yet clear whether they realized the type that is endemic in Egypt and its relation to a worm infection (Khalil 1927).

Renoult (1808) was the first to refer to a peculiar endemic haematuria in the Nile Valley, Larry in 1812 referred also to this disease occurring in Egypt, and Pruner in 1847 recorded a peculiar haematuria in the same country.

The first published record of the discovery of the causative agent is dated 1852. It was one year after the post-mortem discovery of the worm in the mesenteric veins of a patient in Kasr el aini Hospital, Cairo, Egypt, by Dr. Bilharz. But the life history of the worm and prophylactic measures remained controversial for several decades.

The presence of a molluscan host was disputed, and neither the route nor the nature of the infective form was recognised. Although Allan (1880) and Bock (1895), in South Africa, pointed out the connection between river bathing and the incidence of bilharziasis in boys, the theory of oral infection prevailed.

Leiper's discovery (1915-1918) of the life history of *Bilharzia haematobium* and *Bilharzia mansoni* and their intermediate hosts in Egypt, *Bullinus truncatus* and *Planorbis boissyi*, respectively, was responsible for the development of the progressive study of all the phases of the disease.

DISTRIBUTION IN THE WORLD

Schistosomiasis is one of the most widespread and important human diseases, incapacitating many millions of people and causing irreparable economic loss. The disease is an international problem. Faust (1931) estimated that in China alone probably more than 100,000,000 are infected. Almost the whole continent of Africa suffers from the disease and much of the Old and New World between latitudes 38°N and 35°S, but within these latitudes there are areas free from the parasite.

International Importance of the disease:

The clinical picture of schistosomiasis, with its symptomatology of anaemia, underdevelopment, undernourishment, asthenia, and general debility, is stark and terrible. Still worse, its complications lead to further disabilities. Its international importance is more appreciated when one considers that it spreads itself over a vast part of the world and involves over 150,000,000 people (Shousha, 1949).

Not only human but some animal schistosomiasis is of great economic importance. Schistosomiasis of cattle is so important that it has received the attention of the Bureau of Animal Husbandry in the U. S. A. and other countries. Fortunately, this form is not prevalent in Egypt.

Schistosomiasis in India:

Recently Shah and Gadgil (1952) reported the existence of endemic focis of (free) Schistosomiasis in the Ratnagiri district of

Bombay State in India, where in the village Gimvi they found 278 out of 603 persons affected with bilharziasis the probable intermediate host being the snail—*Ferrisia tenius.*

Bilharziasis in the United States Army and Navy :

The U. S. A., although it has no schistosomiasis within its borders, came sharply up against the problem in its military operations in China, Philippines and the islands of the Pacific. The mortality in the initial or acute stages of the disease is very low. There were only 2 deaths in over 1,700 cases in American forces on Leyte following the invasion of the island in October 1944. Yet it is estimated that the disease resulted in a loss of over 3,000,000 dollars. Failure of treatment on production of ova was responsible for the retention of these patients in hospitals and convalescent camps for many months and thus added to the loss of their services and to the cost of their care.

The United States Army, Navy and Health Department took immediate and vigorous steps to combat the disease. At one time, over 3,000 soldiers from the Pacific theatre of war were involved & invalidated home to the U. S. A. with acute *Asiatic schistosomiasis.* The existence of a suitable snail host in the U. S. A. would constitute an active danger and a real possibility that schistosomiasis would become endemic.

To-day, in recent times, the danger of its spread has increased due to better travel facilities.

Bilharzia in Egypt :

In 1938, Hilmy Bey, on behalf of the Egyptian Government made an attempt to organise a Commission of the League of Nations to undertake work on schistosomiasis similar to that undertaken by its Malaria Commission, but the negotiation failed.

Relation between Bilharziasis Incidence, & the Irrigation Systems in Egypt :

With occasional rain fall, Egypt depends on the Nile for its life. At present, there are 6,000,000 acres under cultivation. The development of irrigation schemes during the past and present century has resulted in the prosperity of the country and the increase of the population to 1,400 people per square mile of the inhabited areas.

In ancient times a system of dykes divided the fields into large basins, which were flooded from September to October, when the flood water was drained back to the river. This system is called basin irrigation. Under basin irrigation only a single crop could be raised.

The modern system of perennial irrigation ensures a water supply all the year round, and an unbroken succession of crops. It entails storage of water in huge reservoirs and the digging of large distributory canals which ramify all over the country. A similar drainage system is now under development to prevent the water logging of the soil.

Upper Egypt, from Assiut, to Asswan, with the exception of small districts is still mostly under basin irrigation. The remaining part of the valley and the delta are under perennial irrigation. The permanent canals, in which water almost runs throughout the whole year, furnish an ideal environment for the breeding of the snail vectors of bilharzia, while their proximity to the village exposes them to pollution and makes them a source of infection. Thus perennial irrigation is responsible for a high incidence of bilharziasis in areas where it has been established. Future changes from basin to perennial irrigation will increase the spread of bilharzia unless control measures go hand in hand with the development of the new irrigation schemes.

The Irrigation Schemes & Bilharziasis in Bait-Dawoud :

Bait-Dawoud, the locality of Upper Egypt which was my last field of work, is one of the examples mentioned above. Fifteen years ago, when the agricultural land was under basin irrigation, bilharziasis was very uncommon among its population. This population was about 18,000. By the time this irrigation scheme was changed to perennial system, bilharziasis spread very rapidly and involved the majority of this population.

The newly built hospital in Bait-Dawoud was opened in August 1954. Our laboratory examination of urine and stools for the out- and in-patients proved to be 99 per cent positive for living ova of *Bilharzia hematobium* or *mansoni* or both species. This was our experience in the first three months in this field. During the following months the rates

among the hospital attendances were slightly lowered. Infection with *Bilharzia hematobium* was much commoner.

Bilharzia and the Al-tahreer Province :

Al-tahreer Province, a desert area under reclamation to the West of the lower part of the Nile Delta is provided with irrigation and drainage systems. The type of irrigation of choice from the agricultural point of view is the perennial type. The hazard of infestation with bilharzia should be borne in mind in the process of settlement of new comers to this province. Otherwise, this new province will be entangled into the same vicious circle under which rural Egypt suffers and endemicity with bilharziasis will be certain.

The writer of this paper would like to stress on the importance of the preventive measures that can be taken to ensure safety of the inhabitants, streams and canals of this new agricultural land. These measures can be summarised as follows :

(1) No infected person with bilharziasis should be allowed to migrate, inhabit or even to visit this new province. Certificates for freedom from bilharziasis should be very strict.

(2) Waters for irrigation coming from endemic areas should be thoroughly controlled to the level of eradication of the subsceptible snails. This should be achieved far distant from the province.

(3) Selection of the inhabitants of the province, priority being given to the educated class of the population, or at least illiterates are not to be encouraged.

This will have a double benefit ;

(*a*) The educated immigrants will appreciate and understand the risk of infection more easily than the illiterate or uneducated people.

(*b*) It will stimulate the people to be educated and inhibit the tendency to illiteracy as the people will feel rapidly the direct economic benefit or loss through attaining or not attaining a degree of education.

The land under reclamation in this province is 2,000,000 acres.

CONTROL MEASURES.

The chain of events in the life cycle of the parasite can be attacked chronologically at various points, namely :

I. Preventing the development of the eggs of the parasite by preventing the access of urine and faeces to natural waters, *viz.*, guarding the streams against pollution.

II. Killing the miracidia.

III. Killing the cercariae or protection of man against them.

IV. Destruction of snail hosts of the parasites.

V. Keeping human beings far from contact with infected waters and health education.

VI. Killing the parasite in the human body, *i.e.*, treatment.

I. Prevention of Pollution :

There are numerous factors which have a bearing on the control of the disease by prevention of pollution. The complexity of the problem is increased because it is intimately linked with agricultural methods, the economy of the people, and the sanitary and hygienic practices.

In the Far East :—In nearly all endemic areas, bilharziasis is to a great extent an occupational disease associated with rice farming. The necessity of maintaining the fertility of the soil by the use of human excreta contributed materially to the cycle of transmission in China and possibly in certain areas in Japan. Rice is the staple diet of this part of the world. It is highly impracticable that the use of night-soil can be avoided or that expensive commercial fertilizers can be substituted to obviate disease hazard. Moreover there are many animal reservoir hosts for human bilharziasis, making it impossible to prevent pollution.

In Egypt :—Bilharziasis is an occupational disease concerning farm workers where perennial irrigation is the rule. Man alone is the definitive host, yet the problem is not easy. Since bilharzial infection is trasmitted under field conditions, it is hardly to be expected that household sanitation would affect it in significant manner. It is possible that,

after having become accustomed to sanitation in the villages, the people may be taught to accept the use of latrines. With the absence of sanitary facilities it is impossibe to prevent pollution when ablutions after defecation and urination are ritual. Laws have been passed for the prevention of pollution but they are not duly respected. Extensive propaganda by all modern means will have to be applied together with education, before a marked reduction in the pollution of streams could be attained. It may be mentioned that in the Katayama area of Japan, a real measure of control has been accomplished largely through education of the people to an awareness of the disease.

II. Killing Miracidia :

Attempts to destroy the miracidia are conceivable. It would be much better to prevent their presence in the water by adequate disposal of human dejecta than to attack such a short-lived and constantly supplied organism.

III. Protection of man against cercariae :

Several investigations have been carried out on cercaricidal substances and their potent concentrations. Repellent ointments, as well as chemically impregnated clothing against cercarial penetration, have been developed.

In South Rhodesia, Mosley, suggested for Europeans living there, the use of a mixture of chlorine in lime and bicarbonate of soda powder or tablet form, for use in bath water in heavily infested areas where pure water is not available.

These measures, though of value for temporary protection when dealing with highly and trained and well equipped groups, do not solve the problem where low level social groups are concerned.

In Bait-Dawoud and many other poor villages, the use of elementary manual instruments as the Tamboor or the Shadoof for irrigation, exposes the farm worker to the highest risk of infection (see diagrams). These instruments are used to raise the waters from the low level of the canals, streams, ponds or wells to the level of the cultivated lands. During the use of these primitive tools the worker is almost covered by the rising water, This is the case with the use of the tamboor. (Fig. 1). Using the shadoof, the limbs are mostly exposed to waters (Fig. 2).

IV. Snail Control :

The human species of bilharzia in different parts of the world infect a variety of snail hosts, some of which are operculate and amphibious.

The Egyptian species, *Bulinus truncatus* and *Planorbis boissyi,* are non-operculate and entirely aquatic, which makes them particularly open to attack. Their successful destruction would cut the bilharziasis problem at its root, and it is the method of choice for the control of the disease. It is expected that the reduction in the snail population will diminish the number of new infections and make them milder.

Because Egypt is not a rainwater country, and the water supply is under control of the irrigation department, its snail-life can be controlled. Given sufficient money and men, and really effective snail killing chemicals, the snail vectors of Egypt could be completely eradicated.

With the present means the goal is not complete eradication, but a control so nearly complete as to render it difficult, if not impossible, for a single miracidium to find its specific snail within the short period of its ability to penetrate its molluscan host and so carry on its life cycle. The aim should also be, to effect such a reduction in the number of infected snail vectors that the escaping cercariae would stand a poor chance of finding a human host within the few hour period of their penetrative ability.

It would be interesting to study the bearing of snail control on the incidence of bilharziasis over a long period of time, and to find out if bilharzial pollution would cause a heavier infestation among the reduced snail population, with consequent higher snail mortality.

DISTRIBUTION OF THE SNAIL VECTORS.

Planorbis boissyi :

This is present in the Sud Region. It has been reported also from numerous places on the White and the Blue Nile, being common

in the Gezira area below Sennar Dam. In the Egyptian territory, it is nearly absent in Upper Egypt as far down as Cairo while it is present in the Delta especially in the low parts where they thrive in ponds and sluggish irrigation and drainage canals. A definite explanation for this distribution is not yet understood.

Bullinus truncatus :

This is common in the source of the Nile and its widespread might be broadcast by the Nile at certain times of the year.

THE SNAIL DESTRUCTION SECTION.

In 1939, Dr. C. H. Barlow, working with the Rockfeller Foundation, suggested that the Egyptian Government be asked to established a Bilharzia Snail Destruction Section. Mr. J. C. Carter, Director of the Rockfeller Foundations work in Egypt presented the scheme to the Egyptian Ministry of Public Health, and the Ministry proceeded with the formation of the Section. This is the first time any government has established a separate section to deal with the control of molluscan intermediate hosts.

From small beginnings, the Snail Destruction Section has grown into a department with a large organisation, operating over 320 permanent centres and employing 10,000 workers and staff. It has its own workshops. It makes its own tools used in the field, and maintains its fleet of vehicles. It is a more or less self-contained department of the Ministry of Public Health.

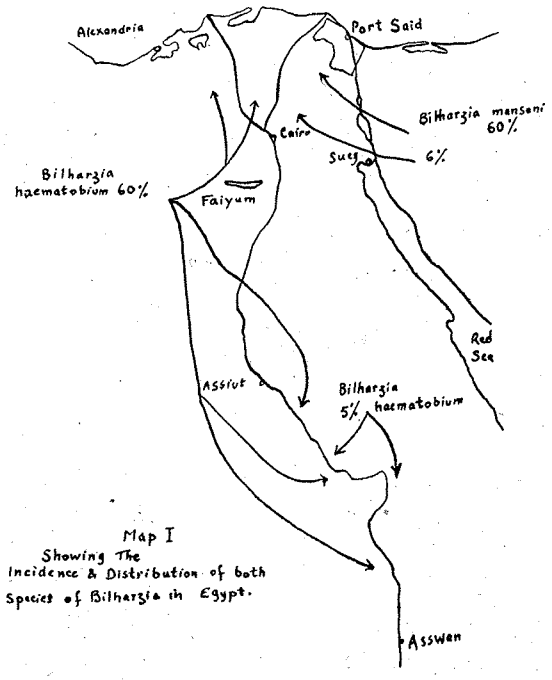
Research has proceeded continuously on the snails of Egypt, the Sudan and Cyprus.

Relation of Snail Distribution in Egypt to the incidence of Bilharziasis.

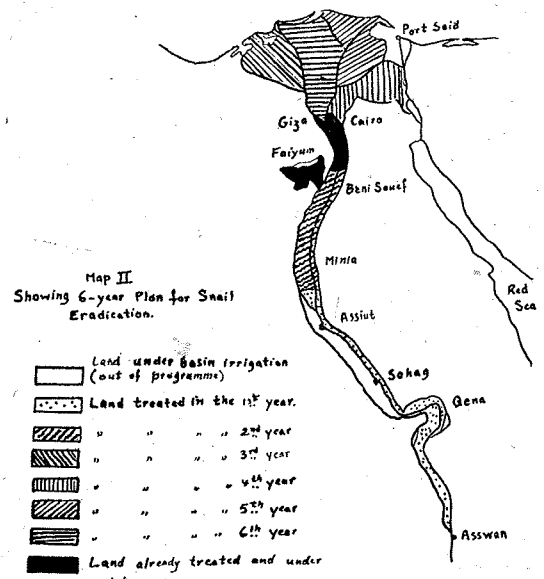
Scott (1937) found four distinct regions differing in intensity and character of infection with either one or both species:

(1) The infestation with *Bilharzia haematobium* in areas under perennial irrigation averages 60% while the basin irrigation areas of Upper Egypt have only an infestation of 5%.

(2) *Bilharzia mansoni* occurs only in the Delta, amounting to 6%. in its southern part and to 60% in the northern part, where at least 84% of the people are infested with one or both species of bilharzia (Map I).



Map I
Showing The Incidence & Distribution of both Species of Bilharzia in Egypt.



Map II
Showing 6-year Plan for Snail Eradication.

Scott pointed out that the variation in the incidence of the disease could not be explained without reference to the snail vectors.

METHODS OF SNAIL DESTRUCTION.

1. Canal clearance and weed control:

One part of the work is clearance of canals, drains and ponds of their weeds and snails. After removal of weeds by hoes and sickles, dipping out snails and floating plants or reuse takes place. Nets used are provided with stout wooden handle 125 cms. long to which is attached a frame of hexagonal steel bars. Wire neting of galvanised iron is soldered to the frame. A belly 8 cms. deep is formed at the base of the heel of the frame while the front edge is flush with the bottom of the frame and thus meets the weeds and the bottom of the streams with the least resistance. Snails caught by the net drop into the belly and are held even against a strong current. The front edge of the net is .33 meterwide and three dips in a straight line are counted to correspond to one linear meter length of stream.

The nets are of two mesh, sizes "coarse nets" with netting of 4 meshes to the linear inch for collecting letter, weeds and large snails. The fine nets covered with wire-netting of 16 meshes to the linear inch for very fine plant refuse, little snails, egg-cluches and ooze. The fine nets are used also for the purpose of surveys.

The chemicals recommended as aquatic herbicides are costly and the technique of their application needs improvement.

Clearance, if done at regular intervals of two months, which is the period of snail reproduction, could control snails but unfortunately the employment of these methods on a large scale is difficult and impracticable.

2. Drying:

Leiper suggested killing snails by drying the canals for period of ten days to one month, supplemented by poisoning of residual pools. This did not work in Egypt. Barlow (1932) showed that a large proportion of the vector snails are capable of withstanding gradual desication for periods of from 9 to 12 months. Moreover, it will not be practicable to dry up a farmer's land for such long periods.

3. Canal alternation:

Here a canal is dug alongside an existing canal, and all the earth dug out of the new one is thrown into the old canal after emptying it from its water. The next year or the year after, it is thrown back. Results of this method were shown to have marked effect upon snail control and it can be applied where few canals are involved as it is expensive.

This method was applied to some parts of the Egyptian oasis in the Lebian Desert. It proved a success in the canals and streams which failed to respond to clearance and sulphation.

4. Underground irrigation and drainage:

The Agricultural Society Experimental station in Egypt tried this method and succeeded to exterminate the snails. Its initial expense precludes its use, but land set free for agricultural use by removing open canals and drains would pay for the initial cost in 3—5 years and show a real credit.

In the Nile Valley, this method is adopted very occasionally by some of the well-to-do farm owners who are interested in applying prophylactic measures against bilharziasis. As an example, is Dr. Afifi's ezba (a big farm) in Imbaba, near Cairo, where about 400 acres are almost irrigated by underground canals. It has proved a great success.

5. Molluscicides:

A molluscicide to be of use on a large scale campaign against bilharzia must fulfil the following requirements:

(I) It must be poisonous to snails even in very small concentrations but harmless to man and beast.

(II) It must not have a deterious effect upon cultivated plants or substances which are used for domestic purposes.

(III) It must be cheap and of relatively little bulk.

(IV) It must be of such a nature that its application to infected waters is easy and takes little time.

Mozley (1941) highly recommended the use of malachite (mineralised basic copper carbonate). When ground finely enough to pass through a 200-mesh seive, the solubility

of this substance was increased by mixing it with fresh brewer's waste (fermented barley) or with the powdered pods of a common Rhodesian tree (Swartzia madagascarienois). This yields an effective concentration of 0.5 parts of copper per million. Solutions in natural river waters containing as little as the equivalent of I p.p.m. regularly produced a 100 per cent kill (present in true solution and in colloidal or quasi-colloidal suspension).

In this connection we notice that Mozley's work was performed on the Rodesian molluscan vectors and not on Bulinus truncatus and Planorbis boissyi which are the intermediate hosts of bilharzia in Egypt.

As a result of experiments carried out in the U. S. A., and by workers in Egypt, copper sulphate was selected as the molluscicide having the least drawbacks. When taken with water the dose deleterious to the snails is quite safe for man and domestic animals. The solution can also be used quite safely for irrigation purpose.

The greatest of its many drawbacks is the fact that its effect is dissipated in about 200 m. flow of water. It has to be applied from downstream up. More expensive drugs are still under trial.

6. Palm-leaf Traps :

This method originated in Egypt. On account of the scarcity of snails in the main canals and drains it is often not possible to catch snails by nets.

Palm-leaves are placed in the streams near either banks about 200 meters apart and fixed at the bottom. Where there is no vegetation the snails collect on the palm-leaves to feed. The traps are left for 3—4 days after which time they are removed and the snails as well as the eggs en masse are destroyed.

7. Enemies of molluscs :

Ducks :—This should be adopted as an intergral part of the program of the anti-bilharzial campaign. In a restricted area a flock of ducks is effective in destroying snails.

Fishes :—Certain fishes especially clarias is known to feed on bilharzial snails. In small steep-sided pools, they appear to be capable of reducing the snail fauna to a minimum but not elsewhere.

SURVEY.

All areas are covered twice yearly. A detailed survey is made on all streams during the months of April and October to locate centres of snail infestation, in order to give such areas careful attention. A special system has been devised for a quick and summary evaluation of the snail population in the streams, by making stations at suitable intervals along the banks and taking 3 dips by net at each station with a net which is 1/3 m. wide. The incidence of infestation with larval schistosoma is also determined, and it appears that some areas show foci of extreme infestation while others show none, in spite of great abundance of snails. Both types of areas, however are equally important in a scheme of snail control.

TREATMENT OF INFESTED STREAMS.

In September 1942 the Bilharzia snail Destruction Section came into existence as a permanent and independent Section of the Ministry of Health In Egypt.

From 1942 to 1946 work started in the province of Faiyum and in the Giza Province from 1943—1946. Surveys, treatment of infested streams and maintenance were accomplished.

RESULTS.

In Faiyum and Giza, the success of control measures was remarkable in all areas where they have been applied for a certain length of time.

At the begining of the snail control campaign in Faiyum, 25% of the streams surveyed were infested with a significant number of snails. After 4 years of control work, only 2% were infested, and the snail population in infested streams has been greatly reduced. (see Table I and Chart I).

In Giza Province, in 3 years of work, the percentage of infested streams fell from 39% to 12%. At the same time, the snail population remaining in infested streams fell from 63 to 5 snails per 100 dips. (see Table II and Chart. II).

Table I.

Fayum Province. Number of infested streams and density of snail population, 1942-46.

Year	No. of Streams Surveyed	No. of Streams Infested	Percentage infested	Lengths infested in Km.	Number of snails (Bulinus) in 100 dips.
1942	27,370	6,806	25	4,618	—
1943	45,234	5,318	12	3,588	—
1944	92,241	7,263	8	3,009	32
1945	139,723	5,706	4	4,365	20
1946	141,744	2,785	2	2,621	12

Table II.

Giza Province. Number of infested streams and density of snail population, 1943-46.

Year	No. of Streams Surveyed	No. of Streams Infested	Percentage infested	Lengths infested in Km.	Number of snails (Bulinus) in 100 dips.
1943	4,111	1,616	39	1,743	63
1944	10,934	2,040	19	1,455	42
1945	12,978	2,010	15	1,626	27
1946	14,756	1,811	12	1,533	5

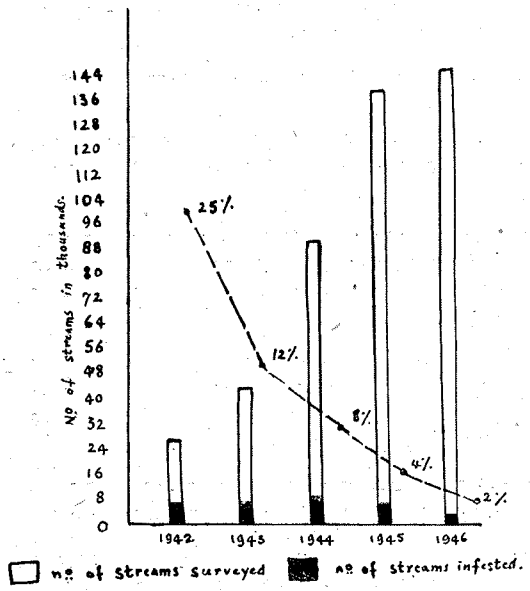


Chart I

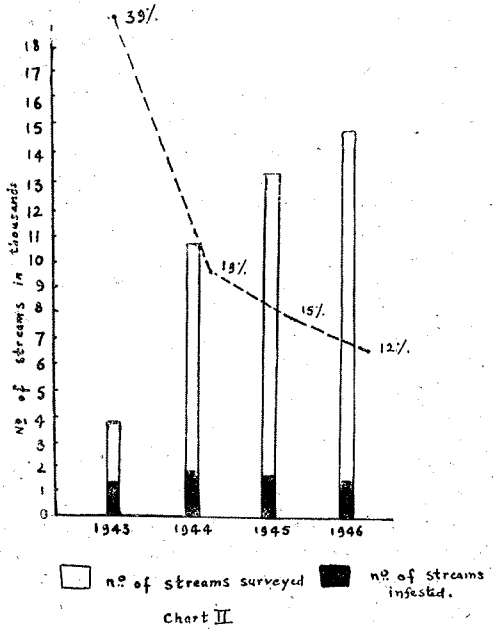


Chart II

V. Control by keeping human beings away from infected waters:

Neither the mode of transmission nor the seriousness of Bilharziasis is understood by the Egyptian population. In rural Egypt, urinary bilharziasis is frequently regarded as a sign of puberty.

Still a large proportion of the Egyptian villages which count to about 4,000, are without any safe source of pure water supply. Till 1952 only 25% of rural Egypt was provided with pure water supply. Now still about 50% of the rural population have to wait 3-4 years more to get safe water for drinking and domestic use. Meanwhile, their only source of water is either from the streams and canals which are mostly infected or exposed to infection, or from private wells which are not in any way safe or under any sanitary control.

In many parts of the agricultural land in Egypt, irrigation machines used as well as ploughing tools are still primitive. In this way the majority of fellaheen are exposed to the risk of infection.

Health Education:

There are several Ministries involved in this part of control, aiming at educating the people and attracting their attention and interest to the ways of protection from this disease and prevention of pollution of the

waters. The Ministry of Public Health contributes through its Department of Health propaganda, the Department of Endemic diseases and the Rural Health Department. The Ministry of Social Affairs and the Ministry of Education have separate programs for the same purpose. Many different ways are adopted such as posters, cinemas, lectures, discussions and wireless talks.

Patients and groups of people are lectured daily. As an example, a total of 28,268 lectures were delivered during 1941. Inspectors questioned patients at random to find out how much they have benefited by the lectures and discussions.

In Bait-Dawoud, we seized all chances to arrange discussions and talks to the local residents. Mosques on Fridays and Churches on Sundays were frequent sites of meetings and discussions, relating sanitary and prophylactic measures, to the principles and regulations of the religious beliefs. This proved to a certain extent and in certain conditions of some help. In some other conditions, people seemed to have lost interest in life, through chronic ill-health and chronic poverty.

VI. Treatment :

Since the discovery of the aetiology of endemic haematuria in Egypt many attempts were made to treat the disease.

For a long time, the most successful treatment was surgical interference to cure complications as papillomata, fistulae, stones ... etc.

The first attempt to kill the worms was made by Fouquet in 1885 who employed the Filix mass and he reported cures. This method of treatment continued in vogue for nearly 30 years. It was modified as regards dosage and time of administration by many workers.

The first step towards specific treatment of Bilharziasis was the introduction of Emetine by Tsamin (1913).

After introduction of Tartar Emetic, the use of emetine was restricted to those cases in whom tartar emetic, for one reason or another, could not be employed.

Christopherson (1918) and McDonagh (1918) published a series of articles on the therapeutic value of tartar emetic in schistosomiasis. A copious literature on the subject soon followed. Treatment campaigns on a large scale were begun in Egypt in 1919 and soon came to be used in other territories where this disease occurred such as Africa, South and Central America and the Far East.

After discovery of Fuadin and similar drugs, emetine is now hardly, if ever, used in the treatment of bilharziasis.

Results with emetine treatment were 33% cure. Relapses were common.

McDonagh (1918) was the first to employ intravenous antimony injections for the treatment of Schistosomiasis.

Brahmachari in 1922 prepared Urea Stibamine.

The research of French and Belgian investigators led to the production of Anthiomaline, Trystibine and Stibilase.

Hans Schmidt in collaboration with Eichholty, Rohl, Kikuth, and Weese prepared Neo-stibosan, Neo-antimosan (Fuadin), and Solu-stibosan.

According to Kikuth, the importance of finding an organic compound active against bilharziasis by the oral route was suggested by Khalil Bey in 1930.

Recently, Miracil D hydrochloride, a drug to be taken by oral route, is still under trial.

Miracil D (Bayer), Tixantone (Union Chimique Belge) and Nilodine (Burroughs and Wellcome) are the same drug under different proprietory names.

Administrative :

Not only all the departments under the Ministry of Public Health contribute to the treatment of bilharziasis patients but the Ministry of Social Affairs and medical departments of the Ministries also co-operate in the scheme.

In addition to the above mentioned Statutory Bodies, the Medical Sections of the different factories as well as private hospitals and clinics share in the treatment schemes.

Kasr el Aini Hospital Cairo introduced intravenous antimony injections of tartar emetic into Egypt in December 1919. In quick

succession more antihelminthic units were instituted, and from 1924 onwards a uniform method of cure-registration was adopted. The number of these units was increased in successive years, and their administration was attached to the General Hospitals Section of the Ministry of Public Health.

In 1928, a special Endemic Diseases Section was created to direct the antihelminthic units. In 1949, each of Egypt's 97 districts, averaging a population of 150,000 had a treatment unit. Of these units, 7 were stationery, 31 were branches of the general and district hospitals, and 59 travelling units.

Drugs in use :

1. Treatment usually given is, intravenous injection of 2 c.c. of a 6% solution of tartar emetic, potassium antimony tartarate in a series of 12 injections, one injection being given every other day.

2. Some units give other drugs.

Intramuscular injection of 5 c.c. of a 6.5% solution of Fuadin or Reprodral or Stibophen in a series of 10 injections, one injection every other day.

The above mentioned doses are for patients 60 kilograms body weight or more.

Statistics :

Statistical data are available since 1924. The number of cases treated annually increased from 46,945 patients in 1924 to 388,485 in 1945. The total number of injections given in 1924 was 35,9147; and increased to 3,800,868 in 1945. This means that the average number of injections per patient increased from 7.7 in 1924 to 9.8 in 1945. These figures illustrate the extensive efforts at general treatment of the population (Shousha, 1949).

Legislation and Treatment :

A law for the compulsory treatment of bilharziasis was promulgated in 1941 (Law 58), and during 1943 it was applied for the first time in the province of Faiyum.

Inducing patients to continue treatment :

Attempts to encourage the patients to receive treatment and follow it till the end were tried out by a variety of ways. The following two ways are examples of these attempts :

(1) Providing patients with sandals : —

In 1941, a few thousand sandals were obtained from the committee in charge of the scheme for issuing to barefooted persons or for distribution to patients on completion of their treatment. Distribution of sandals was begun in the endemic diseases units at Helwan and Hawamdia.

(2) Free mid-day meals :

In 1942, in Shebin el Kanater Endemic Diseases Hospital and Endemic Diseases Clinic No. 6 at Tala, free mid-day meal was provided to patients attending after the 6th injection. Results observed indicated that absenteeism was most observed in the intervals between the first and 6th. injection, *i.e.* before the meal was due. 37% of all patients continued treatment until the 6th injection. From the 7th injection up to the 12th the ratio of attendance rose to 60%. A marked general increase in attendance of both new and old patients was observed during this experiment. In the light of these results, it was decided to provide free meals throughout the course of treatment.

Results of treatment :

In 1945, the Minister of Public Health pointed out that during the last 20 years treatment was established en masse in Egypt. Every year about half a million people were treated while the total number of bilharzia cases was about 9.5 millions. Among the people treated only 1/5 completed the course of injections, and 1/3 of even those who completed their treatment failed to be cured. It is to be kept in mind that infection does not confer immunity against re-infection and that in spite of the fact that 5.5 millions of the cases were treated during the last 22 years prior to 1945, the incidence of the disease was still the same.

Effect of Treatment on the Incidence of Surgical Complications :

Extensive treatment of bilharziasis was successful however in diminishing both the number and the severity of the complications, and they are now much rarer.

Statistics collected from the in- and the out-patients of general and district hospitals

are available from 1925 to 1933. They show that surgical cases, which in 1925 was 50.7 per 10,000 fell to 2 per 10,000 in 1933. The incidence of vesical calculi dropped from 10.4 to 6 per 10,000 and that of urinary fistulae from 31 to 1 per 10,000 (Shousha, 1949).

Intensive Courses of Antimony:

As treatment of bilharziasis requires the attendance of patients to reecive a course of injections extending over a period of 20-30 days, an appreciable number of the patients do not compete the whole course of treatment. Therefore a great deal of money, effort, and days of labour are wasted. This fact induced workers to concentrate on shortening the period of treatment. Obviously the advantages are two fold, firstly, the patients will be induced to complete the treatment and secondly, many labour days will not be wasted.

Several workers like Alves and Blair, Halawani, Talaat, Shoaib and others tried different schemes using different drugs. Results were not encouraging. The intensity of the bilharzial infection, lack of proper nutrition, liver involvement and anaemia, render Egyptian patients unfit for such treatment in the outpatient departments. Hospitalisation of all Bilharzia patients for intensive treatment is not a practical proposition. The number of patients who can tolerate this form of intensive treatment does not exceed 10% of the total number of patients seeking treatment.

DISCUSSION

The primary attack of the problem must be upon the snail. It is interesting to note that although it is considered that the snail destruction program is producing results which warrant its continuance, we still emphasise the need of molluscicidal chemicals which are better than the copper sulphate in use now. It would seem that in this direction lies our great hope of successful control.

The method in use now for snail destruction described before, has the drawback of exposing the labourers carrying out the work to heavy bilharzial infection. This happens in the process of using the palm-leaf traps and while removing the weeds and vegetations from streams and canals by the naked hands. The whole procedure is clearly laborious and fatiguing, being all accomplished by man power without any mechanised tool.

No consideration was made to the possible continuous flow of Bulinus vector from the upper Nile to the Egyptian territory. Even if the Bulinus snails were eradicated completely from Egypt, there is no evidence that other snail crops are not flushed in the Nile waters from the Sudan. So, in my view the first line of defence should be on the Egyptib-Sudanese frontiers in the Nile waters

The proposition concerning this problem, is to add other precautions of control to the well established work of the snail destruction scheme. The idea is to trap the snails through very narrow porous metallic seives made on the openings of the present Asswan Dam and the other dams and barrages which are situated on the Nile and its branches. Snails then have to be crushed behind these barriers mechanically. The egg clumps and the young offsprings escaping these seives are to be immediately sulphated and pentachlor-phenated in lethal doses.

An improving living standard will undoubtedly result in better sanitation, both personal and environmental, which in turn should reduce the prevalence of this disease. Human habits are however modified slowly especially among the poor illiterate groups.

Although it is claimed that health education in some parts of Japan is effective, its effect in Egypt is still doubtful. The circumstances in both countries are different so comparison of results must be variable. The prevalence of illiteracy, disease and long term exposure to the lowest possible standard of living and the complete absence of any voluntary effort in Rural Egypt for centuries, all these factors share in aggravating the problem.

Health propaganda in Rural Egypt is always expected to produce minor influence so long as the standard of living is low and the facilities are impracticable or even impossible. For example, the people have no choice to use except the old fashioned irrigating tools as they cannot afford to pay for modern machines. Also it is in vain to talk

about the merits of pure water supply where there is no source for it.

Treatment:

It was estimated in 1949 that about 10,000,000 people out of 20,000,000 suffer from bilharziasis in Egypt. It is hopeless to try to eradicate the disease by treatment. Many sufferers never attend clinics at all, despite the existence of a law which makes treatment compulsory. Of those who do attend treatment, many do not complete the course, and of those who complete the course some are not cured, others show recurrence and many are re-infected. Even a course of 14 injections of Tartar Emetic is no guarantee of cure. No eggs are passed for a certain time, but viable eggs often reappear, though in reduced numbers, in cases known not to have been exposed to re-infection. Cases have been seen which still showed viable eggs after seven complete courses of potassium antimony tartarate.

Even though treatment has been established for 30 years in Egypt, there is more schistosomiasis at the present time than even before. So treatment of the human host with the present drugs is of little or no value as a means of control.

Treatment has just lowered the incidence of complications.

The need is for a more specific drug that can be safely taken by mouth and that can be dispensed with ease to these sick human masses. The next best thing would be a drug that can be safely injected over a shorter period, with no or less toxic effects and an efficient curability.

Epidemiologically, there is a definite risk to the proposed introduction of perennial irrigation into 1,000,000 acres in Upper Egypt, still under the ancient system of basin irrigation. I believe this change will inevitably create 1,000,000 new cases of schistosomiasis and greatly increase the death rate from this disease.

The new province al-Tahreer, located on the Western side of the lower part of the delta, will be subjected to the risk of being rapidly infested with bilharzia if the infected immigrants and snailed waters be allowed freely to inhabit that newly cultivated area.

It is high time that international effort be organised for the study of bilhariziasis under all its different aspects.

SUMMARY

1. Haematuria was known in pharaonic Egypt as evidenced by the presence of ova in mummies 3,000-4,000 years old. It was also described by Arabian physicians. In 1851, Bilharz discovered the worm in Cairo.

Leiper (1915-18) discovered the life history of *B. haematobium* and *B. mansoni* and their intermediate hosts in Egypt, Bulinus truncatus and Planorbis boissyi, respectively.

2. Bilharziasis has wide distribution mostly between latitudes 38°N. and 35°S., involving over 150 million people. Also schistosomiasis of cattle is of great economic importance. The American Army and Navy came sharply up against the problem in its military operations in the World War II, in the Far East. Many soldiers were invalided home with acute Asiatic schistosomiasis. The existence of a suitable snail-host in the U.S.A. would constitute an active danger of endemicity. Now, better travel facilities increase the danger of its spread.

3. There is definite relation between bilharziasis incidence and the modern perennial irrigation scheme in Egypt. This scheme ensures a water supply all the year round.

Upper Egypt, from Asswan to Assiut mostly under basin irrigation with permanent canals show absence or very low incidence of the disease. The perennial irrigation is responsible for a high incidence of bilharziasis, as the permanent canals furnish an ideal environment for the breeding of the snail vectors, while their proximity to the villages exposes them to pollution.

Change from basin to perinnial irrigation introduced the disease to many parts Bait-Dawoud.

4. Control Measures:

I. Prevention of pollution.

II. Killing miracidia.

III. Protection against cercariae.

IV. Snail control.

V. Keeping human beings from contact with infected waters and Health propaganda.

VI. Treatment.

Prevention of pollution:

In the Far East, the use of human excreta as fertilizer of the soil and the presence of many animal reservoir hosts make it impossible to prevent pollution.

In Egypt, although man is alone the definitive host, yet the problem is not easy. People are not accustomed to sanitation neither in villages nor in fields while ablutions after defecation and urination are ritual. Laws and extensive propaganda did not produce appreciable effect.

Protection against cercariae:

Cercaricidal substances have been investigated. These though of value for temporary protection cannot be of help when applied on large scale on groups of low social level.

5. Snail Control:

Because Egypt is not a rainwater country, and the water supply is under the control of irrigation department, its snail-life can be controlled. The Egyptian species, Bulinus truncatus and Planorbis boissyi, are non-operculate and entirely aquatic which makes them particularly open to attack.

With the present means the goal is not complete eradication, but a control so nearly complete as to render it difficult for a single miracidium to find its specific snail within a short period.

In 1939 Barlow suggester that the Egyptian Government be asked to establish a Bilharzia Snail Destruction Section. This section grew to operate 320 permanent centres and employing 10,000 workers and staff. It has its own workshop and makes its own tools. Surveys carried out in Egypt showed a definite relation between snail distribution to bilharziasis incidence.

Methods of Snail Destruction:

1. Canal clearance and weed control.

This is done by hoes, sickles and nets. Clearance, if done at regular intervals of two months, which is the period of snail reproduction, snails could be controlled.

2. Drying.

Leiper suggested drying of canals from 10 days to one month, supplemented by poisoning of residual pools, for killing snails. Barlow (1932) showed that snails can stand desication for 9-12 months.

3. Canal alternation:

Results of this method are effective but expensive.

4. Underground irrigation and drainage:

This proved to exterminate the snails but expensive.

5. Molluscicides:

As a result of experiments carried out in U.S.A. and Egypt, copper sulphate was selected as having the least drawbacks. More expensive drugs are still under trial.

6. Palm-leaf Traps:

Palm leaves are placed in the streams in the main canals and drains for 3-4 days. Snails and egg masses collecting on the leaves can be easily destroyed.

Enemies of molluscs: as ducks, certain fishes as clarias can be used for small scale contorl as they feed on snails.

Results of clearance and sulphation:

These were encouraging. In Faiyum 25 per cent. of streams were infested. After 4 years only 2 per cent. were infested and snail population in infested streams has been greatly reduced. In Giza Province, in 3 years of work, the percentage of infested streams fell from 39 per cent. to 12 per cent.

In 1945 a 6 year plan was initiated for the Snail Destruction Section to cover most of the country. The work was concentrated in a division for one year, with complete survey and treatment of streams and maintenance during following years by the units.

6. Control by keeping human beings away from infected waters:

This is carried out in the major part of rural Egypt infested with bilharziasis by many different ways as lectures, discussions, posters, wireless talks. This although was

claimed to show success in some endemic areas of Japan does not seem to be very successful in Egypt. The low standard of living, absence of sanitary conveniences, illiteracy and ignorance and absence of sources of pure water supply in about half of rural Egypt may be factors responsible for failure of control by this method. Human habits also change slowly, so rapid results of control by this way are not expected.

7. Treatment:

(i) For a long time surgical interference was the only treatment for complications of bilharziasis.

(ii) Fouquet (1885) employed Filix mass and reported cures.

(iii) Emetine was used (1913) after being tried by many workers with 33 per cent cure.

(iv) Christopherson (1918) and McDonagh (1918) discovered the therapeutic value of Tartar Emetic and treatment campaigns on large scale began in Egypt in 1919. Others discovered Faudin and Anthiomaline and other drugs.

(v) Many Departments of various Ministries contribute to the treatment of bilharziasis.

A uniform cure-registration was adopted from 1924 onwards. In 1928, a special Endemic Diseases Section was created to direct anthelminthic units. In 1949, each of Egypt's 97 districts, averaging a population of 150,000 has a treatment unit. Of these units, 7 are stationery, 31 are branches of general and district hospitals, and 59 are travelling units.

(vi) Drugs in use:

(a) Intravenous injection of 2 c.c. of a 6 per cent solution of tartar emetic, in a series of 12 injections, 1 injection being given every other day.

(b) Some units use other drugs as fuadin, repodral or stibophen, given as intramuscular injection of 5 c.c. of a 6.5 per cent solution in a series of 10 injections, 1 injection every other day.

N.B. These doses are given to patients of 60 kilograms body weight or more.

(vii) The number of cases treated annually increased from 46,945 patients in 1924 to 388,485 in 1945. A law for the compulsory treatment was promulgated in 1941 (Law 58) as it was found that many patients do not continue their treatment. Other attempts were tried to encourage patients to complete treatment by providing free sandals (1941) or by providing free meals.

(viii) Results of treatment:

Treatment does not seem to affect the incidence of the disease due to absenteeism, re-infection and inefficacy of drugs in use. Treatment was successful in diminishing both the number and severity of complications. In the period between 1925 to 1933 treatment showed a drop of surgical complications from 50.7 per 10,000 (1925) to 2 per 10,000 (1933). The incidence of vescical calculi dropped from 10.4 to 6 per 10,000 and that of urinary fistulae from 3.1 to . per 10,000.

The need is for a more specific drug that can be safely taken by mouth and that can be dispensed for shorter periods with better cure rates.

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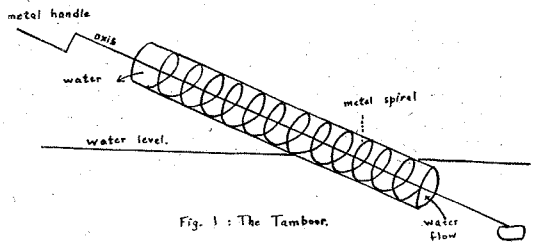

Fig. 1 : The Tamboor.

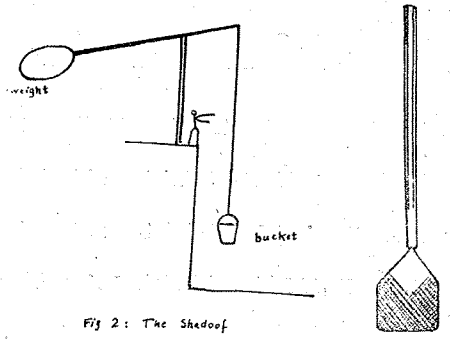

Fig 2 : The Shadoof

The Dipper

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POSTGRADUATE PUBLIC HEALTH EDUCATION

In our conference issue of January 1958 we had occasion to refer to the symposium held on the teaching of preventive and social medicine in the undergraduate medical course. We now propose to refer to the conference recently held in the All India Institute of Hygiene at the invitation of Dr. Jungalwalla, the Director of the institute. The conference was attended by eminent educacationists, Indian and Foreign, teachers of preventive and social medicine, health administrators, representatives of international agencies such as the WHO, UNICEF, TCM, representatives of the Armed Forces Medical College and Directors and Dy Directors of Public health of various states. It was a representative gathering and their views and discussions lent considerable strength to the final decisions that have been arrived at. We congratulate Dr. Jungalwalla on having brought into being such a conference on this momentous issue.

The conference discussed the problem from four main angles (i) the manpower needs of trained postgraduate public health personnel, (ii) the objective of a postgraduate diploma in public health (iii) training of specialists in different branches of Public Health. (iv) Training of teachers in preventive and social medicine. It will be observed that the main burden of the theme was personnel—its quantity and quality and personnel constitutes the lynch pin of the wheel of any organisation. Hence the deliberations on the various aspects of the task of securing properly trained personnel were indeed of vital importance.

In regard to the manpower needed in the country—whatever statistics we have in hand indicate a wide gap between the needs of the country and the availability of manpower. Most of the persons available are already in service and with the increasing demand created by the community development projects and expansion of integrated health services through health centres in the rural areas this gap is widening every day instead of being bridged. The outturn of the solitary institute in India—the All India Institute of Hygiene—varying from 50-60 a year can hardly meet the requirements of the whole country beyond replacing people either retired or dead.

This poses a second question closely connected with this aspect of the issue. We hold, as every sensible person will, that a single institute like the All India Institute of Hygiene cannot serve the whole country's need. Two more institutions equally equipped with teachers, laboratories and field practice areas should be provided, one for the south and one for the west and north—the present institute serving the needs of the east. This will liquidate the fragmentary courses now given in some universities, the standards of which are very poor, principally for want of adequate number of trained teachers, lack of equipments and what is of extreme importance, for want of field practice areas essential for such training.

As for the objectives of a postgraduate diploma in Public Health it may be stated that before deciding on them there should be a full appreciation of the fact that public health is a specialised branch of medicine and that the main objective in giving the training is not to make specialists but to evolve a basic public health worker who by virtue of the training received in the different disciplines of preventive medicine can be reasonably expected to carry out the routine public health practices in the various fields. In giving this basic training it is necessary to bear in mind that greater stress need be laid on such fields of studies as form the most pressing problems the trained personnel will have to face such as, environmental sanitation, epidemiology, maternal and child health, health education, vital statistics, to mention of a few. It is also desirable that a close association with hospital should be established with a view to giving the requisite clinical experience, particularly in relation to certain fields such as industrial health, maternity and child health, epidemiology and nutritional diseases etc. This will also eliminate the impression often given that public health training is given in isolation from clinical medicine and establish instead a closer liaison with hospital administration in these different aspects. If hospital administration has not been included in the curriculum of studies it should be incorporated into it particularly in view of the future role that these specially trained Public Health graduates will have to play in the health administration of the country. We hold the view that there should be no attempt made to give specialised intensive training at this stage when the basic Public Health worker is being evolved. Expert teachers who are specialists in their own disciplines are, however, sometimes apt to load the curriculum with far too much of their own subject. In the interest of the student and that of training itself they should attempt to prune such parts as are too intensive and detailed and provide a balanced course for students in which the basic knowledge in each discipline is well retained without the course being lopsided owing the undue emphasis on any.

Training of specialists in different branches of Public Health is an urgent need. Here of course the training should be intensive and fully detailed in its finer implications—the object being the creation of such workers who would be experts in their own speciality and also provide the spearhead of research in the subject. While the country is short of personnel trained in basic public health practices it is even more so in regard to specialists. The only institute in the country where these specialists could be trained is the All India Institute of Hygiene and Public Health, Calcutta. Each head of the various departments should train a few specialists every year and the states should make it a routine to send annually a few from the respective directorates of Health Services for training in one or the other speciality as the problems of the state would indicate. One urgent need of the states is to have trained epidemiologist in their respective directorates. In most instances they are not trained specialists even if there are offices available for routine control of communicable diseases. It has also been observed that owing to this lapse on the part of the states professors from the All India Institute of Hygiene have been prevailed upon to visit such states—some times repeatedly, to investigate and tackle situations to which it should have been the state's duty and obligation to give the first aid.

Having thrashed out the issue of the urgency of teaching preventive and social medicine in the undergraduate course of medical studies at several conferences it was rational that the question of finding teachers for undertaking the task of training undergraduates should have exercised the minds of the educationists. For want of facilities within the country and to save time the practice followed so far to meet the need, even though in part only, has been to send students with necessary qualification and experience abroad for further training

as prospective teachers of preventive and social medicine in the medical colleges of India. This however can not be a permanent solution. On the one hand, this is an expensive way of facing the issue and on the other it is much more desirable to offer training against the background of conditions and the community problems in the country intimately connected with preventive and social medicine.

For proper training of such teachers it should therefore be desirable to establish institutions in the country. The Central Government should subsidise, if necessary, one medical college in each state and provide the Professor of Preventive and Social Medicine and his full complement of medical and auxilliary staff. The medical college and the hospital wards will serve the purpose of practice classes for the teachers to be trained while the Professor of Preventive and Social Medicine and other professors of the colleges will give necessary guidance.

If, in the alternative, it is suggested that the existing institute in India like the All India Institute of Hygienc and Public Health should be entrusted with the task—a senior Professor entirely in charge of this course of training should be provided. The institute itself may provide the necessary training in teaching the basic subjects of preventive and social medicine and the manner in which the lessons should be impated. Final processing of such lessons should however have to be carried out in close consultation with and under the guidance of the teachers of the medical college which provides the field practice centre for the course. The institute will therefore have to work in close liaison with a medical college specially manned and equipped for teaching of preventive and social medicine.

If the institute is to be the agency for imparting all these advanced course of Public Health Education, for training of specialists and for research it appears to us almost imperative that it should be relieved of all training of ancillary and paramedical workers now carried out there. For these separate regional institutions in the various parts of the country can be found without difficulty and certainly without any detriment to the training.

We shall hopefully await the publication of the decisions of the conference and trust that when published they will receive due attention from the Governments both at the centre as well as in the states.

PLANNING FOR THE CONTROL OF RADIATION HAZARDS

Recent developments of Atomic Energy researches and their probable repurcussions on health of the people have been the subject of study and discussion in many countries of the world. The problem is equally applicable to India who is now an active partner of the World Nations actually engaged in atomic energy development for peaceful uses. In fact, people of many countries have already considered it a truism that people of the World must now learn to leave with nuclear energy and its consequences. The question arises on which official agencies, organisations or services that the responsibility of state-wide programme for prevention or control of radiation hazards should develope. The question is easy to answer. Since radiation definitely causes health hazards, it should be the responsibility of the Health Departments at both Central and State levels to undertake the organisation of programmes for the control of ionizing radiations. Health departments have no choice but to

prepare now to meet what may become, one of the most important environmental problems of the future.

So far, no attemps have been made on a state health level to reduce the existing occupational exposure to radiation. This has been left entirely to individuals or the local authorities concerned, and little has been thought of to reduce public exposure. We have no means to make atomic wastes innocuous and these wastes will continue to accumulate in our environment. More and more hazards are now associated with polluted water, contaminated food (animal and vegetable) and milk supplies. Therefore health authorities must make certain that these contaminations are so reduced or prevented that these cannot become detrimental to our welfare. Improved diagnostic techniques utilising more powerful X-radiation are coming up for widespread use. Although it is not desirable to curb the proper and beneficial use of these radiations or of atomic energy it is our duty to see that their benefits may not outweigh the damages that might result. It might be reminded in this connections that the radiation damage is peculiar in its nature, since the injury may not become evident for a considerable time after the exposure accurs, and for a long time to come we may not know the real incidence of these injuries such as damage to the genes and mutations of populations, effects on life span, production of disease like severe anaemia, leukaemia, cancerous growths of bone and lungs and certain skin diseases etc. Besides we have not yet got adequate knowledge of the types and intensities of damage that may occour although all of us are exposed to a certain amount of natural background radioactive substances besides being sometimes exposed to chest or some other routine diagnostic x-ray procedures. Furthermore, we are receiving an increasing degree of exposure from fall-outs due to nuclear tests now being carried out in many parts of the world.

Recently criticisms have been made regarding the routine use of X-rays by physicians, dentists and other licensed practitioners and particularly against mass miniature X-ray surveys. On the other hand, the benefits derived from the early detection of diseases of heart and lungs justifies the continuation of this programme. Thus there is a great need that their benefits be currently evaluated in terms of the hazards involved. The risk is undoubtedly much more greater for the persons who handle the radiation equipment than the individual patients.

Radiological Health and Air Sanitation Programmes:

Before launching any radiation protection programme a number of practical questions requires to be answered. For instance, we must know the nature, extent and distribution of radiation hazards, the group of people particularly affected and the degree of affection and so on. A technical survey of the problem is therefore necessary. We can then estimate what benefits can be expected from the possible control programme and what role the Health Department should play. A tentative scheme for Radiological Health and Air Sanitation may be suggested here as an immediate measure at this stage.—

(a) Formation of an Ad Hoc committee consisting of the following personnel to discuss and draw up the preliminary programme of action including the legislative and regulatory needs and promulgation of standards and to function as an advisory council attached to the Central Health Ministry on the subject of radiation hazards and their prevention and control:

Representatives from:

1. Health Ministry and the Office of the Director General of Health Services.

2. Medical, Dental, and Veterinary Societies whose members use radiation in their daily work.
3. The Atomic Energy Commission of the Government of India and Atomic Units or Industries.
4. From the National Institute of Sciences of India and the Council of Scientific and Industrial Research.
5. University Research Centres for the production and use of radio-isotopes and nuclear materials.
6. Radiation Health Survey Units.
7. The State Health Departments.
8. The Indian Armed Forces.
9. The Ministry of Labour, and
10. One Industrial Hygienist, one Sanitary Engineer and one Legal Adviser.

(b) Establishment of a Department of Radiological Health and Air Sanitation under the Central Health Ministry to discharge the following functions:—

(i) determine the extent and character of the problem, by locating all detectable sources of ionisable radiation through Surveys.

(ii) train personnel to deal with the problem effectively.

(iii) obtain information on new developments, their practical application with particular reference to possible new hazards which might be created.

(iv) reduce exposure to radiation by supervising installation and providing assistance to state health departments to carry out the supervision work.

(v) encourage research on the radiation hazards and their prevention.

(vi) develop better methods of control by research and evaluation studies.

(vii) establish public education programmes on radiologtcal health including the preventive aspects and gain support of various professional societies and general public for the programme.

(viii) encourage self-discipline among personnel authorised to use radiation by establishing Radiation Safety Committees and regulatory laws at various stations and institutions.

(c) Planning for the prevention of mass massacre and the devastating residual effects of atomic weapons, if and when used, though the probablity is considered at present most unlikely.

The first need, however, is the fact-finding survey by proparly trained technical personnel simultaneously with the launching of training of staff needed to start the operational programmes on prevention and control. Also active research programme should be immediately started at different centres with a view to study the hazards and a evolve practicable prevention and control measures in collaboration with the atomic industries.

The need for protection of the public against the radiation hazards, radio-isotopes, radio industrial wastes, atomic weapons and fall-outs can no longer be by-passed, because the action taken now will take years to be really effective and we should not allow ourselves to be taken unware midstream and to find that irreparable damage to the nation has already been done due to inaction The Health Department should share the responsibility to keep people away

and safe from radiation hazards although it must be admitted that the task is an enormously difficult one and extends far beyond the scope and jurisdiction of the associated medical and health knowledge. But this is the proper department to take the initiative, to institute collaborative work and efforts to deal with the problem and to act as the executive of the advisory council proposed to be set up.

We men of modern age and particularly the scientists are directly or indirectly responsible for the creation of this problem either for good or for bad. It is the interent human desire and the inquisitive search for knowing the unknown that culminated in the atomic fission and fusion in the first half of the 20th century and there is no gainsaying that it has radically changed the environment for every living creature on the face of the earth and unless we take preventive action now and keep a continuous vigilance in the future, the human race as a whole would stand the risk of the devastating effects of the unnecessary exposure to atomic radiation. We drew the attention of the health authorities of the Government of India about this growing problem through this journal in January 1957 and we have brought it up once again to reemphasize the importance of the need of early action in the matter, as some countries in the world have already done.

THE PROBLEM OF VIRUS INFECTIONS

Last few years an increasing trend in virus infections has been noted in many countries of the world including India. These are enteroviruses such as polio, Coxsackie, infective hepatitis, ECHO (enteric cytopathogenic human orphan), adenoviruses—RI—APC—ARD, and insect-borne neurotropic (encephalitic) viruses. Up to the present three serological types of polio viruses, 24 (19 group A and 5 group B) Coxsackie, 20 ECHO, 14 adeno and a large number of neurotrophic viruses causing encephalitis or encephalomyelitis have been discovered. In 1957, Influenza reappeared to regain its lost vigour and swept the world with a pandemic outburst, the virus being called Asiatic A57.

The common virological diseases in India are smallpox, chickenpox, measles, mumps, rabies, influenza and dengue, but following the outbreak of poliomyelitis in the Nicobar islands[1] in 1947—8, this disease occurred in epidemic form in Bombay and its suburbs[2], in the Andaman islands in 1957[3] and a rising trend has been noted in many Indian cities. Since 1954 epidemics of encephalitis have been reported from various cities including Jamshedpur, Lucknow, Delhi and Nagpur[4]. In 1955, a large scale water-borne epidemic of infective hepatitis, perhaps for the first time in the recent Indian history, occurred in Delhi. Lately a new tick-borne virus infection akin to the Russian spring summer encephalitis virus (R.S.S.E.) was detected in the Kyasanur forest of the Mysore State[5], Also, in a few instances evidence of infection with Coxsackie and ECHO viruses have been obtained.

It appears from the recent observations that ECHO group of viruses is playing an increasing role in causing epidemics of aseptic meningitis [6], [7], and probably of diseases resembling nonparalytic poliomyelitis (collectively called aseptic meningitis syndrome). Although the significance of the various types as etiological agents has not yet been thoroughly elucidated, most of the well-defined epidemics were due to type 9 and a few to types 4 and 6, but many of these types have been isolated only from the healthy individuals. In some instances it has been isolated from some paralytic patients from whom no poliovirus could be isolated[8]. Already attempts have been made in U.S.A. to remove the Coxsackie and bacterial viruses[9] from water by two stage floccula-

tion process and plans are ahead to prepare an ECHO vaccine with the three types viz., 4, 6 & 9 which have been found to cause disease.

Although the pathogenecity of the Coxackie viruses has not yet been fully established it appears to be capable of causing quite a number of diseases, including asceptic meningitis, pleurodynia (Bornholm disease), herpangina and infantile myocarditis as well as some forms of ferbrile pharyageal and gastro-intestinal diseases. In fact, some of the epidemics which have already occurred have caused inconvenient public health problems and loss of man-hours.

The Adeno viruses (RI—APC—ARD) constitute another group of viruses affecting respiratory tract and are responsible for a good portion of acute illness among the army recruits in U.S.A.[10], Fortunately its existence in India has not yet been reported. The American workers have already prepared Adenovirus vaccine[11] and used it successfully in controlling the disease among the military population.

In regard to the insect-borne neurotropic viruses, in addition to equine encephalomyelitis and St. Louis encephalitis, there is an increasing trend in the incidence of Japanese B encephalitis and probably of other types particularly the tick-borne encephalitis which have been reported from Australia, Bulgaria, Czechoslovakia, Finland, Germany, Great Britain, Hungary, Poland, Sweden, the U.S.S.R. and Yugoslavia. The incidence depended upon the possibilities of contact between the population and infected ticks, although big local outbreaks have also been caused by the consumption of raw milk from infected goats as in Czechoslovakia. Prophylactic immunization with formolized mouse-brain vaccine has been used successfully in the U.S.S.R.

As mentioned earlier, there has already been several outbreaks of encephalitis in India. The first severe outbreak was reported in Jamshedpur in 1954[12] and the recent ones (1958) mainly affected the cities of Nagpur and Lucknow. A short note on this outbreak will be found in the 'Reports and Reviews' section of this issue of the Journal. In Nagpur the physicians also noted a rise in encephalitic complications among the measles cases. Among the etiological virus agents involved in these outbreaks Japanese B virus was isolated and serological evidence of such infection was obtained in connection with one outbreak in South India near Vellore. In other outbreaks no virus etiological agent has so far been isolated or otherwise established. Mention has already been made about the tick-borne Kyasanur disease.

In view of this rising trends in virological diseases in India, as in other countries, the problem has already assumed great public health importance and it sufficiently warrants an immediate set up of an organisation for continuous epidemiological studies to elucidate the causes and the various factors involved in this rise, so as to evolve effective measures of prevention and control. The most essential prerequisite for such studies is the establishment of properly equipped virological isolation and diagnostic laboratories with all facilities for tissue culture work, serological and animal tests etc. These laboratories are required not only in connection with the isolation of the virus agents and epidemiological investigations or surveys but also for preparation of vaccines and helping in evaluating the specific control measures. In general, the laboratories should be in close relationship with the places of occurrence of these epidemics and the major treatment centres. But in view of the complicated nature of the facilities and the specialized personnel required, it is advisable to have at least a few (five or six) full-fledged Virus Laboratories located at important medical centres in India with collateral scientific facilities. Arrangements for serological tests alone would not help much. Isolation and identifica-

tion of visuses have become of essential importance in India as the etiological agents of encephalitis outbreaks (except in one instance) and of infective hepatitis have still remained identified or unisolated.

During recent years, rapid advances have been made in Laboratory Technique and a number of viruses responsible for the diseases of central nervous system have been identified. Even so, the etiology of a considerable proportion of cases is still to be explored, and further more ecological and environmental changes in India may result in the appearance of other virological diseases. The attention of the Health authorities of India is therefore being drawn to these facts and to the immediate need of establishing virological laboratory facilities in the principal medical Centres of the Country.

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BILHARZIASIS

It appears from the available historical account that Schistosomiasis, otherwise called Bilharziasis after Dr. Bilharz who discovered the worm postmortem in the mesenteric veins of a patient who died in a Cairo Hospital in 1851, is the oldest helminthic disease known in Egypt as such, and perhaps in the world. Evidence of its prevalence during Pharao's time, (3-4000 years ago) has now been obtained from various sources. But like Leprosy, though discovered and clinically differentiated very early in the human history, detailed study about the disease started only in the earlier part of this century and the problem of its control has still remained a difficult chapter in the medical history, although it is one of the most widespread and important human diseases incapacitating many millions of people in different parts of the world. The readers may obtain a fairly good idea about this disease and the problem of its control from the article[1] published in this issue of the Journal by Dr. Abou-Gareeb of the High Institute of Public Health of Alexandria.

As far as India is concerned the disease was believed to be absent among the human beings but was found to be prevalent among the animals, particularly cattle. But sporadic cases were reported from time to time between 1903 and 1948 by different authors[2]. These cases came from widely scattered localities such as Poona, Bombay, Madras, Goa, Punjab, Saurashtra and Malsana village in the Nasik District. Sewell (1919-22)[3] thought that after the first world war many Indian soldiers who had served in the endemic areas and returned to their homes could possibly spread this disease in this country. In any case, the exis-

tence of the infection in India raised the question whether the disease had already established itself in any particular area. If not, it was considered important to keep vigilance on the possibility of the existence or establishment of such endemic foci of Schistosomiasis in the Indian soil because, once established, it might be of extreme difficulty to eradicate or even control it.

This apprehension recently proved true when Shah and Gadgil (1952)[4] recorded the existence of an endemic focus of *S.haenatobium* in the Ratnagiri district of the Bombay state. In one village, Gimvi, they found 278 out of 603 persons affected with this bilharziasis. Previously many trials to infect snails belonging to the different species were made by workers like Kemp and Gravely (1919)[5], Melo (1936)[6] in Portuguese India and by Mukherji, Bhaduri and Narain (1946)[7] with indefinite results but Gadgil and Shah[8] after a series of laboratory experiments succeeded in experimentally infecting the locally obtained snail, *Ferrisia tenius,* which they consider as the probable intermediate host in the affected village.

Among the several possibilities for establishment of this infection in the Bombay state the arrival of infected person or persons from the Arab countries through trade communications readily suggests itself. But the question may be raised that such communications have been established for centuries without the infection being brought to the state. The answer partly may be the virtual absence of suitable vector species of snail in India, as seen from the failure to infect the Indian snails by various workers in the past. The bringing of the infection by the returning Indian army is another possibility. But inspite of the fact that the west African troops were stationed in India (Bihar and Chittoor) for sometime during the last war no evidence of infection has so far been obtained in these places. However, the situation demands a thorough epidemiological investigation. On the other hand, Dr. Gareeb's paper sufficiently indicates the difficult nature of the problem and the infection in India being in the early stage no attempts should be spared to eradicate it now. It is also imperative that more scrupulous search should be made to find out if there is any other established foci in India, particularly in the Bombay state.

It may also be worthwhile to mention that the possibility of zoonosis due to schistomiasis in India also need more careful investigation.

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CURRENT PUBLIC HEALTH LITERATURE

KYASANUR FOREST DISEASE

Work, T. H.—**Virological Aspects of Kyasanur Forest Disease.**—J. Ind. Med. Assoc., 31, 111, 1958.

The Author gives an account of the isolalation of virus which resembles from Russian Spring Summer Encephalilis virus (R.S.S.E.) from monkeys, human beings and rodents who died after prolonged febrile conditions in the Malnad area of the Shimoga District in Mysore. The infection has been named Kyasanur Forest Disease, as the virus was first recovered from animals and human beings of the particular locality. The disease is an affection of the haemopioietic and visceral organs as contrasts to the cerebral nervous system disease caused by the related viruses, R.S.S., in Russia and other Eastern European countries. The virus is invariably present in the blood serum at least two days prior to the onset of symptoms and through ten days of the illness. The virus has been isolated from the heart, lung, liver, spleen, kidney and the skeletal muscles and occasionally from the cerebrospinal fluid. In the laboratory, the virus has successfully infected experimental animals such as rhesus monkeys and white mice, has been propagated through animal passage, and specific neutralizing antibodies to the virus found to be present both in the naturally and the artificially infected. The article throws considerable light on this new type of infection which is considered to be highly infectious to human beings.

INFLUENZA EPIDEMIC IN GWALIOR

Laha, P. N. and Bapet, D. R.—**The 1957 Influenza Epidemic.**—J. Ind. Med. Assoc., 31, 53, 1958.

The authors have analysed 500 cases of influenza reported in Gwalior during the last epidemic. The epidemic engulfed Gwalior during mid-June to mid-August. Amongst the cases were 477 adults and 23 children. A direct relationship has been observed between the incidence and population density, over-crowded living conditions and economic condition, the latter particularly during the early stages. The majority of affected belonged to the age group of 16-30 years (74.2 per cent) and there has been marked male preponderance perhaps due to more chances to exposure. The attack rate has been approximately 20 p.c. of the population, mortality nil in the present series.

The laboratory studies revealed no rise in leucocytes and perhaps a slight rise in the erythrocyte sedementation rate (Westergren)

The general and the atypical symptoms have been discussed together with the method of treatment followed. The relapse rate has been 5 per cent in the present series.

HAEMOGLOBIN VALUES OF SCHOOL BOYS

Govil, K. K. and Pant, K. C.—**Haemoglobin Values of School Boys in Uttar Pradesh.**—J. Ind. Med. Assoc., 31, 65, 1958.

Haemoglobin estimation of 931 boys between 6-19 years of age during the period, August 1952—March 1953, has been reported. The boys were school students and belonged to both urban and rural areas of four districts of U.P. The selection was random and represented practically all casts and all socio-economic groups. The estimations were done with a Farbstab haemometer and the following normal values were obtained in schedules:—

		Hb in g %
Male	(a) Average	16.0
	(b) Range of variation	14.0—18.0
Female	(a) Average	14.5
	(b) Range of variation	13.0—16.5

Along with the haemobin estimation, data concerning age, height and weight were also recorded. In the survey, the haemoglobin curve showed generally a gradual increase in the average Hb values with the increase of age from about 13.91 g at the age of 6 years to about 15.0 g at nineteen years, the values for younger boys were lower than those considered healthy adults. A direct co-relationship of Hb. level with both weight and height was noticed. The haemoglobin

figures were considered satisfactory, the average diet was also considered adequate in iron contents.

HAEMATOLOGICAL VALUES IN THE ASSAMESE

Banerjee, B.—**Haematological Value and their Variations amongst residents of Assam.**—J. Ind. Med. Assocn., 31, 67, 1958.

In this study, 194 males and 118 females were examined for R.B.C. Hb. and P.C.V., M.C.H., M.C.H.C., E.S.R. and W.B.C. counts. The subjects were both male and female, coming from different economic groups of the state. According to the authors, (i) the average values of different haematological factors showed wider ranges and differed to some degree from Western standards although a fair agreement existed with the findings of other Indian workers, (ii) there was a slight decline in the R.B.C. and increase in the E.S.R. and P.C.V. values in summer, (iii) a positive co-relation existed between the R.B.C. and Hb., and E.S.R. and serum globulin, (iv) female subjects showed lowest R.B.C. and and Hb. values and highest E.S.R. and W.B.C. values, (v) skilled labourers though showing these values heigher than females, occupied the lowest position amongst the male subjects, (vi) the values for R.B.C. Hb., E.S.R., and W.B.C., ranged between 4.0 to 5.3, 12.12 to 9.25 to 28.5 and 5.8 to 6.6 respectively.

BROAD SPECTRUM ANTHELMINTIC DRUG

Swartzwelder, T. C., et. al.—**Dithiazamine—An Effective Broad Spectrum Anthelmintic.**—J. Amer. Med. Assocn., 165, 2063, 1957.

This new anthelmintic was given by month to patients suffering from various helminthic infections. 164 patients infected with Trichuris were treated with doses of 200 mg. thrice daily for five days, 97 per cent of the patients were cured. Ascariasis in 42 persons, treated with 600 mg daily in divided doses, resulted in 97 per cent showing reduction in the egg count, 28 of the patients showed complete elimination of the parasite. Strongyloidiasis was eliminated in 16 out of 18 persons treated for 5-21 days. 35 boys suffering from Enterobiasis, treated with 100 mg thrice daily for five days brought cure in all cases. 39 persons belonging to the previous category, being treated for some other helminthic infection, showed remarkable reduction of the hookworm egg counts. In a separate group of 8 patients suffering from hookworm infection, better results were obtained by giving sub-curative doses of tetrecholarethylene with Dithiazamine. There were very little of side effects and its particular usefulness for the mass therapy of trichuriasis is emphasized.

POLIO VACCINE

Perkins, F. T. and Yates, R.—**Serological Response of Infants to Poliomyelitis Vaccine.**—J. Ind. Med. Assocn., II, 68, 1958.

In this studies 88 mothers and their infants have been investigated in respect of the relationship between maternal serum and umbilical cord levels of poliomeyelitis neutralizing antibodies and the rate of loss of the naturally transmitted antibodies in infants. The response of the infants immunized at different ages with poliomyelitis vaccine has also been studied.

The levels of antibody in the maternal sera and that obtained from the umbilical cord are similar. In approximately 21 days, in the infants the maternal antibody level becomes almost half for all three types.

The response of infants to the poliomyelitis vaccine depends partly on the age of the child, but principally on the level of the original maternal antibodies; this inhibits the response to the homologous type. This inhibiting effect is overcome most easily by the type 2 antigen, with type 3 not so easily and least by the type 1.

It is advised to delay immunization until 6-9 months after birth, although the response to types 1 and 3 may not be adequate.

TOXOPLASMOSIS IN MAN

Kalra, S. L.—**Toxoplasmosis: Serological Evidence of Infection in man, dogs and rodents.**—Armed Forces Med. J. (Ind.), 13, 181, 1957.

The author reports serological evidence of toxopalsmosis in man, dog and rodents. Previously one case was reported by Singh in 1953 and two cases by Rawal and Jhala in 1958 from Bombay.

Complement fixation test was employed using that ground up material from chorioallantoic membrane infected with RH strain of

toxoplasma gondii as antigen. The persistence of complement-fixing antibodies was first studied in monkeys, guineapigs and rats experimentally infected with the exudate of infectd mouse.

Of the 400 human sera of non-vegeterian group 16 were positive as against only 2 out of 135 vegeterian recruits. Similarly out of 80 dogs, 10 (8%) were positive as against only one out 25 rodents sera. The titres ranged from 1:8 to 1:256. According to author low grade incidence of toxoplosmosis appears to be present in this country. The author also points out that according to Garnham (1957) positive immunity without infection can be acquired by eating infected meat. But this also does not explain 2 serologically positive cases among 135 vegeterians.

HISTOPLASMOSIS IN MAN

Kalra, S. L., Borcar, M. D. S. and Rebello, E. R. F.—**Histoplasmosis—Isolation of Fungus from Soil an Man.**—Ind. J. Med. Sc., 11, 496, 1957.

In 1955 the author isolated a strain of *Histoplasma Duboissii* (an African specis identified by Dr. Thirumalachar, Chief Mycologist of Hindusthan Antibiotics Ltd. Pimpri) from the sputum of a patient. Previous to this, in 1954, he had also isolated one strain of histoplasma (culturally identical with the human strain mentioned above) from the soil sample taken from the entrance to a *bandicoot* burrow.

The patient was an army man aged 37 years but never worked overseas. The strain was isolated on three occasions from his sputum. X ray examination of chest showed small round pulmonary calcification, peribronchial thickenings without any lung symptoms and signs. Skin test with histoplasmin lot H-42 (obtained from the Army Medical Centre, Washington) gave only a mild reaction (6 mm induration in 24 hours). Tuberculin test was however negative, and also the complement-fixation test with antigen prepared from mycelia of spores of H. Capsulatum. Animal test carried out in mice and guineapigs showed that the strain had affinity for lungs and was lethal to mice and guineapigs by intraperitoneal route. They grow with both small and large spores but do not grow in yeast form in glucose blood sugar at 37°C. The parastic forms and serology of these Ponna strains have not yet been studied.

ORNITHOSIS IN MAN

Kalra, S. L.—**Ornithosis in Man and in Indegenous Fowls in India.**—Ind. J. of Med. Sc., 12, 162-164, 1958.

In 1955 Thomas recovered a strain of psittacosis strain from a sick pigeon at the Central Research Institute, Kasauli. In 1956 Shrivastava reported serological evidence of infections in pigeons and green parakeets around Nagpur. The same year the author detected there sporadic cases of ornithosis in human beings, one patient from Lucknow who used to keep pigeons and two cases from Poona having only casual contacts with chicken. This led the author to examine indigenous fowls in the Poona area for ornithosis infection.

Isolation of strain from fowls:

Spleens from 232 indigenous fowls were examined, 92 had enlarged spleens which were divided into 19 pools for mouse passage, yielding 4 strains. This was confirmed by infecting yolksac; the antigen prepared from this sac gave positive complement-fixation reaction with sera of cases of Orinthosis and of lyphogranuloma venereum infection, in more or less the same titres as the psittacosis antigen.

Human cases of ornithosis:

Nine cases were detected in two years by complement fixation test. Two cases occured in Jammu, one at Lucknow, one at Ambala and the rest in Poona. Eight cases were originally diagnosed as viral apneumonia and one as patchy bronchopneumonia. The cases were generally mild and non-fatal. The rise in c.f.t. was generally fourfold or higher and the highest level was reached in the 10th. week.

STAPHYLOCOCCUS IN MILK

Smith, H. W.—**The Multiplication of Staphylococcus Aureus in Cows' Milk.**—Mon. Bull. Ministy. Health Laboratory Serv., 16, 39-52, 1957.

The author states on the basis of extensive experiments, that the low incidence of milk-borne staphylococal food poisoning is due to the fact that milk is stored below tem-

peratures optimum for the growth of Staph. aureus and also to the inhibitory effect of other bacteria present. A heat-labile clumping factor in raw milk caused apparently higher counts of Staph. aureus in milks heated before inoculation. Violent agitation of raw samples, when dilutions were made, dispelled clumps and counts in raw and heated milks were similar.

INCREASE OF TUBERCULOSIS IN HIGHER AGE GROUPS

Monk, Mary A., and Terris, M.—**Increase of Tuberculosis Mortality in Elderly Men from 1940 to 1950.**—Am. J. Pub. Hlth., 48, 1020, 1958.

The authors have made a very interesting study on the incidence of tuberculosis among the males of higher age groups in U.S.A. England and Wales, Republic of Ireland, Australia and several other countries. They first became aware of the phenomenon during a study of tuberculosis mortality in Auppalo, N. Y. in which there was an opportunity to compare the data for 1939-41 and 1949-51. It was surprising to find that whereas tuberculosis mortality had declined for all the lower age groups there was an increase in death rate for white men of age 55 years and above living in the poorest economic quartile of the city. Although there was an over-all decline of 17% in the tuberculosis death rate that between men of 55 and 64 years rose by 7% and between 64 years and above by 55%. This did not hold good for women. The study was then extended to other cities of U.S.A. and for comparison to few other countries as well with the following results.

During the deceade from 1940 to 1950 there occured an increase in tuberculosis mortality rates of older men in upstate New York, many large cities of the United States, Howaii, England and Wales, many countries in Western Europe, Australia and New Zealand. The most likely explanation according to the authors, is that the increase was a temporary one caused by the Second World War. During this period older man returned to work in industry and the rseistance to tuberculosis was thereby lowered. In some countries, in addition, nutritional deficiencies served to lower the resistance. As a result of population movement, exposure to tuberculosis also increased. It is postulated that older men reacted more unfavourably to adverse environmental conditions, not only because there general resistance to infection was poor, but also because the carried within themselves a greater number of old tuberculosis infections which were reactivated. Recent data indicate that the long term decline in tuberculosis, thus interrupted between 1940 and 1950 in the heigher age group of men, is being gradually re-established with the cessation of the abnormal conditions created by World War II and the application of improved methods of thereapy.

LATE LESIONS IN LEPROSY

Junnarkar, R. V.—**Late Lesions in Leprosy**—Leprosy in India, 29, 148, 1957.

An interesting postmortem study of 20 leprous patients from Kondhwa Leprosy Hospital, Poona has been made by the author, In the autopsy material 7 cases of lepromatous leprosy showed lepra bacilli in R. E. cells of liver, spleen, bone-marrow and gonads but none were demonstrated (except from one) in the R. E. cells of lungs, although the spread was apparently haematogenous in the advanced stage of the disease. This interesting finding suggests that the lungs though rich in R. E. cells, for unknown reasons, seem to be exempted from leprous lesions.

The other important finding is that 7 of these 20 cases *i.e.*, 35 per cent had tuberculosis lesions in the lungs, AFB being found both histologically and on culture in L. J. medium. Following this observation the author examined sputum of one hundred leprosy patients in that hospital for acid fast bacilli 27 per cent showed AFB in their sputum, only 4 of them being B. tuberculosis positive as they produced growth on L. J. medium and lesions in guineapigs. The remaining 23 sputa could not produce growth of acid fast bacilli nor any lesions in guineapigs. In the anatopsy material above one case only showed AFB in the lung when stained by Fite's technique; culture from this lung was negative for tubercle bacillus. The presence of such bacilli in the lungs in the absence of any reaction on the part of tissues suggests probably a manifestation of a generalised bacteraemia which may be occuring during the course of the disease.

HOSPITAL AND MENTAL HEALTH

Tooth, G.—**The Psychiatric Hospital and Its Place in a Mental Health Service**—Bull. Wld. Hlth Org., 19, 363, 1958.

Modern methods of treatment of mental disease enable average length of stay in hospital to be drastically reduced. The former overcrowding is therefore disappearing; in fact, it should be possible to contemplate a reduction in the size of the hospitals, particularly if now admissions are kept to a minimum by the provision of efficient outpatient clinics and of adequate geriatric and domiciliary nursing services. Taking recent trends in England and Wales as his starting point, the author outlines ways in which a modern mental health service might be built up around existing facilities under a variety of conditions. He advocates that, as far as possible, the treatment of mental disease should be integrated into general medicine, and emphasises the need for close co-operation between psychiatrists, family doctors, and the staff of general hospitals.

CONTROL OF BILHARZIASIS

Pesigan, T. P., Farooq, M., Hariston, N. G., Jauregui, J., Santos, A. T., Garcia, E. G., Santos, B. C., and Besa, A. A.—**Studies on Schistosoma Japonicum Infection in the Philippines—Preliminary Control Experiperiments.**—Bull. Wld. Hlth. Org., 19, 223, 1958.

Among the measures used in attempts to control the snail host of S. Japonicum in Leyte Province, Philippines, where the terrain is unsuited to the application of molluscides, have been removal of vegetation in and around infested streams, drainage of water-logged areas filling low lying areas with earth or flooding them, and digging fishponds in sluggish streams. Each of these measures is described in detail.

Experiments carried out in rice fields, which harbour great numbers of snails, have shown that improvements in rice growing methods will not only markedly reduce the snail population but also double the rice yield.

A campaign to promote the use of pit latrines encountered the serious difficulty that such latrines were not acceptalbe to the people. However there is evidence that the use of pit latrines does bring about a reduction in snail infestation rates.

No single control measure is recommended for all snails habitats, the choice of method depending on local circumstances. In many areas a combination of methods proved advantageous. It is felt that mass treatment of infected persons would not be fully effective until transmission is more throughly under control.

SNAIL CONTROL IN BILHARZIASIS

Schalie, Henry Van Der.—**Vector Snail Control in Qalyub, Egypt.**—Bull. Wld. Hlth. Org., 19, 263, 1958.

The author describes a pilot study in vector snail control carried out in 1953-54 by the Bilharziasis Control Project in Qalyub Egypt.

After giving a brief description of the site chosen for the project an area of some 5090 acres (2000 hectares) under perennial irrigation he presents a detailed account of the various snail surveys of the irrigation canals and drains and of the molluscicidal treatment of infested channels. Trial with dinitro-cyclo hexylphenol (DCHP) offered considerable promise for snail control.

He points out that despite the thoroughness of the surveying and treatment the snails were not completely eliminated from the area and stresses that the high cost of the molluscicide used (copper sulfate) would prohibit its widespread and continual use. He considers, however, that pending the prefection of such long-term bilharziasis control measures as improved sanitation, better treatment facilities, and health education of the public, snails control is of the first importance and determined efforts should be made to find more efficient and cheaper methods of effecting it.

CONTROL OF MOSQUITO VECTOR OF FILARIASIS

Antonipulle, P., David, H. V., and Karunaratne, M. D. R.—**Biology and Control of Taeniorhynchus (Mansonioides) Uniformis Theobald, the Chief Vector of Rural Filariasis in Ceylon.**—Bull. Wld. Hlth. Org., 19, 285, 1958.

Residual spraying of DDT for the control of taeniorhynchus (Mansonioides) uniformis, the mosquito vector of rural filariasis in Ceylon, was carried out in Induruwa, a village on

the west coast of the island. The result showed that the insecticide retained its effectiveness for a period of 4-6 months.

During the course of this investigation, various observations were made on the behaviour of T. (M) Uniformis. Its host plants, day time resting places, feeding habits, and response to light particularly moonlight were recorded. An increase in T. (M) uniformis prevalence was observed to coincide with the inset of the north east and south east monsoons, when the paddy fields are inundated and become over grown with *sachne australis* the most common aquatic plant in the area and a favourite breeding place of this mosquito species.

RESISTANT ANOPHELINES

Mosna, E., Rivosecchi, L., and Ascher, K. R. S. —**Studies on Insecticide-Resistant Anophelines —I. Chromosome Arrangements in a Dieldrin—Selected Strain of A. atroparvus.**—Bull. Wld. Hlth. Org., 19, 297, 1958.

The author presents the results of a cytological examination, carried out by the technique developed by Fizzi, of the larvae of a normally susceptible and a dieldrin selected strain of *Anopheles atroparvus* both laboratory-reared. A very high percentage (77.4) of heterozygous inversions was observed in the larvae of the 28th generation of the dieldrin—resistant strain, whereas only 20.8% occured in the normally susceptible strain, in which he standard chromosomal arrangement predominated (74.2%). These results were similar to those obtained recently by other workers in the case of Iarvae of the 12th generation of a DDT selected strain of A. atroparvus (74.8% heterozygous inversions observed).

NOTES & NEWS

U.N. Report on World Population

The population of the world is increasing so rapidly that there will hardly be enough land to live on in 600 years' time, according to a United Nations report published on June 29.

The report—The Future Growth of World Population—noted that estimates for the second half of this century were considerably higher than had been envisaged earlier, with the population of the world rising from its present 2,737 million to 4,000 million by 1980, and reaching 6,000 or 7,000 million by the turn of the century.

While it took 200,000 years for the world's human population to reach 2,500 million, the report declared it would now take a mere 30 years to add another 2,000 million. With the present rate of increase, it could be calculated that in 600 years the number of human beings on earth would be such that there would be only one square metre for each to live on. "It goes without saying that this can never take place. Something will happen to prevent it." The one square metre would include Arctic wastes, deserts and mountain tops, the report added.

Remarking that these figures could have "grave implications for the planning of the economic and social well-being of the future generations," the report said that, less than 100 years ago, there were about 1,250 million people in the world and even that figure was two or three times higher than ever before.

Now the total was twice as high with the prospect that it may double or even triple by the year 2,000.

Even if the present rate of growth should drop—and it was still increasing—world population would not stop growing until it had reached 10,000 to 25,000 million, the report stated.

"One cannot say that such growth is utterly impossible but the vast changes in human organisation required to sustain it can hardly be conceived at the present time," the report said.

A disturbing feature of population estimates, the report declared, was that a total of 6,000 million or 7,000 million would be attained so soon.

"At the time of writing, the year 2,000 is no further in the future than the year 1941 is in the past." It said: "Not only technical achievement but progress in international co-operation and organisation will have to be more effective than during the past 43 years if the expected numbers of mankind are to be organisationally and technologically accommodated to the minimum conditions required for human dignity."

One of the reasons why population estimates have increased since previous studies made in 1951 and 1954 is because of the 1953 census on the Chinese mainland, the results of which have now been made known. Previously, the official estimate of the Chinese population (including Taiwan) was 463 million, but it is now known that in 1953, there were 583 million people on the mainland.

The report said: "It is estimated that the population of most continents and of the world as a whole is likely to be quadrupled in the course of our century. The exceptions are Europe (including the Soviet Union) whose population, nevertheless, more than doubles, and Latin America whose population is likely to increase.

Because of the declining mortality population increase will probably be accelerated through the century in Africa, Latin America and Asia, even if it is admitted that, after 1975 fertility may decline."

Latin America's share in the world population, the report added, would increase throughout the century out-stripping the populations of both North America and Asia.

There would be a "continuous decline in the relative importance of Europe, including the Soviet Union." Early this century, there was one European for every two Asians. By the end of the century, this ratio may have become one to four.

The report, after stating that the rapid increase in the world's population posed a problem of the first order, added that policies aimed at showing down increases in populations recently advocated by India and the Chinese People's Republic reserved "the closest attention of the rest of the world."

"Where population threatens to outstrip resources, the only alternative to fertility would seem to be an eventual return to permanently high mortality. Emigration, at the most, can be only a temporary relief," the report said.

The report concluded by declaring: "As long as it was a question of increasing the population, we were part of the stream followed by evolution during millions of years. Faced with the problem of checking the growth, we are swimming against the tide and, in extremity, having discovered how to increase the flood waters, we now also possess the means of arresting them.

"It now depends on us whether this awakening of consciousness within the stream of life ends in failure or success."

Eleventh World Health Assembly

The Eleventh World Health Assembly has concluded its three-week session in Minneapolis (Minnesota, U. S. A.).

The 1959 public health programme, adopted by the Assembly, includes nearly 800 projects in nearly every country and territory in the world. To finance it the Asembly adopted unanimously its largest budget to date—$14,287,600. The Organisation is called upon to direct its health programme more than ever towards a primary objective of WHO—the strengthening of national public health services. Here are some of the highlights of the Assembly.

Malaria eradication is now under way in 16 countries, embracing nearly one-third of the world's population. It was stressed however, that much greater international financing is essential to bring to a successuul conclusion this first concerned effort to eradicate a major disease from the whole world in a relatively short period of time. So far, a little over $5,000,000 has been contributed to WHO's Malaria Eradication Special Account, an amount only sufficient to complete this year's programme.

The Assembly authorised the Director-General to seek funds for malaria eradication not only from governments, but from all possible sources including foundations, industry, labour organisations, institutions and individuals. The Soviet Union delegate announced that his Government was giving 10,000 tons of DDT to WHO in furtherance of this programme. He also stated that the USSR could make available technically qualified experts.

WHO was requested to promote further research particularly regarding the development of mosquito resistance to insecticides.

Research :—The Director-General was requested to "organise and arrange for a special study of the role of the Organisation in research and of ways in which WHO might assist more adequately in stimulating and coordinating research and developing research personnel". For this purpose the Government of the United States is making available some $300,000 to WHO to set up studies for ways and means by which research can best be promoted.

Atomic energy :—On the question of the health aspects of the peaceful uses of atomic energy the Assembly requested the Director-General to investigate concrete measures for dealing with this problem.

The Assembly action, based on a proposal made by the USSR, joined by the USA and 21 other sponsoring countries, opens the way for the Director-General to aid under-developed countries in the use of radioactive isotopes in medicine; and for a study to be made on the effect of radiation on human heredity and the relationship of radiation to health in general.

Smallpox :—The Director-General was requested to study the possibilities and practical implications involved in a universal smallpox eradication programme and to report his findings to the WHO Executive Board meeting in January 1959. Meanwhile, governments throughout the world are urged to continue the fight against smallpox with vaccination and revaccination campaign, and medical scientists are called upon to work towards the production of improved smallpox vaccine resistant to high temperatures.

It was announced that the USSR is giving 25,000,000 doses of smallpox vaccine to WHO, and that the Cuban Government has offered 2,000,000 doses of vaccine annually to the Organisation.

WHO's finances:—The fact was stressed that, from an initial membership of 26 countries in 1948, WHO had grown to 88 in a decade. From a 1948 budget of $5,000,000 had just been voted a regular budget of nearly $14,300,000. To this should be added a supplemental $6,000,000 from UN Technical Assistance funds, and nearly $9,000,000 contriubted so far to the special malaria eradication funds of both WHO and its regional offices in the Americas, the Pan American Sanitary Bureau. In considering the total international resources made available to WHO—assisted programmes, one should add the important UNICEF allocations of material supplies to the governments

The External Auditor's report for 1957 revealed that in the past year the collection of contributions from active member countries reached 97.08 per cent—the highest in WHO's history.

World Conference on Medical Education

The Second World Conference on Medical Education, scheduled to convene in Chicago, Illinois, U. S. A., August 30 to September 4, 1959, will consider the theme "Medicine—A Lifelong Study". This theme is the logical sequel to the 1953 London Conference at which undergraluate medical education was discussed.

The application of educational methods in efficiently and efficaciously aiding every doctor to increase his knowledge of medical science concomitantly with the modern advances in medical science is one of the basic aims of the Programme Committee. The scope of the programme will include specialist training, the development of teachers and investigators and means by which the practitioner can avail himself of the newest findings for the use in the medical care he gives his patients.

Approximately 100 invited speakers from more than 50 countries will present papers at the Conference. Simultaneous translation for English, Spanish and French will facilitate the discussions of the world's leading medical educators, investivators and practitioners as they considered the problems, programmes and standards of advanced medical education. The President is Dr. Raymond B. Allen, Chancellor, University of California, Los Angeles, U. S. A.

The Conference is being organised and sponsored by The World Medical Association. Collaborating organisations includes: The World Health Organisation, The Council for International Organisatiosn of Medical Science and The International Association of Universities. The American Medical Association is the host organisation. Information relative to the programme participation and invitations can be obtained from: The World Medical Asociation, 10 Columbus Circle, New York 19, New York (U. S. A.).

Expansion of Medical Education

During the Second Plan period, up to the end of 1957-58, the new expansion of 13 medical colleges was approved by the Government of India, of which 10 have received grants and the establishment of 7 new medical colleges had been sanctioned, for all of which grants have been paid.

The medical colleges selected for expansion are those at Madurai, Darbhanga, Mysore, Cuttack, Agra, Guntur, Dibrugarh, Gwalior, Indore, Jaipur, Trivandrum, Amritsar, and Baroda. New medical colleges, which have been started, for which financial assistance is being given by the Centre, are those at Kanpur, Ranchi, Jamnagar, Bhopal, Jabbalpur, Hubli and Kurnool. The total amount of grants made for both expansion of existing colleges and establishment of new colleges during 1957-58 was Rs. 84,64,177. A provision of Rs. 6.5 crores has been included in the second Five Year Plan for this purpose.

The scheme for setting up new colleges is based on the recommendations of a committee set up to advise the Government. On its recommendations, it has been decided to fix a ceiling of expenditure of Rs. 80,000 non-recurring and Rs. 8,000 recurring per seat for the establishment of a new college and Rs. 60,000 non-recurring and Rs. 8,000 recurring per seat for expansion of existing colleges.

Central assistance to State Governments is at the rate of 75 per cent for non-recurring

and 50 per cent for recurring expenditure, subject to the ceilings mentioned, for colleges only, during the Plan period. The entire expenditure on hospitals attached to the colleges will be borne by the State Governments.

The total number of medical colleges functioning at present throughout the country is 48.

Registration of Medical Specialists in National Register of Scientific and Technical Personnel

The officer on Special Duty, Council of Scientific and Industrial Research, National Register, Old Mill Road, New Delhi, has informed that the National Register of Scientific and Technical Personnel is being compiled and maintained by it. One can fine the standard of qualification prescribed for personnel in different categories for registration in the National Register in a general circular issued. In the first instance, only the specialists in the medical field are being registered. The general definition laid down for this purpose is as follows:

(*a*) Those medical personnel who have received postgraduate degree or diploma or holding recognised Membership or Fellowship for their specialised attainments.

(*b*) Research degree or diploma in medical subjects.

Registration cards and instruction sheets have been sent to all State/Territorial Branches of the I. M. A. Specialists should approach branches for the cards and instruction sheets and extend co-operation to the registration.

Surgical Unit for Children in Calcutta

Mr. Mehr Chand Khanna, Union Minister for Rehabilitation, opened the surgical unit the Institute of Child Health at 95, Dilkhusa Street, Calcutta on August 2.

Built at a cost of Rs. 175,000 the unit has 16 beds and has up-to-date surgery eqquipment to treat children. Of Rs. 1,100,000, spent on the construction of the Institute, Rs. 280,000 was contributed by the Union Government. It includes the Union Rehabilitation Department's grant for 20 free beds for children of displaced persons.

The Institute's founder secretary, Dr. K. C. Chaudhuri, in his report said that the Institute had five sections: curative services at the indoor and outdoor levels; laboratory services; promotive and preventive services; training facilities for doctors and nurses who must reside in the institution; and research departments for fundamental and applied medical sciences.

Dr. Chaudhuri regretted that while the Union Government had substantially helped in building the institution, the State Government had given only Rs. 20,000 for its development.

Mr. Khanna said that he had been very much impressed by the work of the Institute. The State was fortunate in having well guided charitable institutions.

The President of the Institute, Mr. P. B. Chakravarti, Chief Justice, said that the Institute aimed not only to cure children's diseases but to spread the concept of child welfare in the country.

More Beds in W. Bengal Hospitals Wanted

The West Bengal Government has asked the Union Government for more than Rs. 7 crores and Rs. 1 crore as capital and recurring expenditure to provide 6,000 additional hospital beds in the State.

Many conferences have been held between State and Central health officials in regard to the scheme. One more is expected shortly in Delhi.

The State Government contends that out of over 3.1 million displaced persons in West Bengal, there is special hospital arrangements only for about 250,000 camp refugees. It feels that there is no justification to have a separate set up for 8 per cent of displaced persons, leaving over 90 per cent to struggle and claim part of the inadequate hospital facilities available for the normal population of the State.

A census of hospital patients taken by the Government some time ago shows that about 6,000 beds in different hospitals were occupied by displaced persons. The extreme congestion prevalent in State hospitals is due to the fact that they have to cater to the needs of displaced persons in addition to those of the people of West Bengal.

About 1.4 million of the displaced persons are concentrated in and around Greater Calcutta, including 24-Parganas. The incidence of tuberculosis is the highest in this area. It has therefore been stipulated that about 50 per cent hospitals to be set up would have to be in this area.

The State Government has detailed, in its plan submitted to the Centre, the number of hospitals needed in Greater Calcutta, in district and subdivisional towns and the money needed (Rs. 7 crores) for establishing the hospitals. On the basis of the per capita expenditure of Rs. 3.2 in the State in a year, the recurring expenditure for the displaced persons amounts to over Rs. 1 crore.

Shortage of medical facilities for the people of West Bengal is no less acute, says a spokesman of the West Bengal Directorate. A well-co-ordinated plan to benefit all persons, including refugees, is what is needed to improve the hospital facilities in the State.

Occupational Therapy Centre in Nagpur

Mr. Y. B. Chavan, Chief Minister of Bombay, inaugurated on July 27, an occupational therapy centre and workshop at Nagpur, the second of its kind in Asia. The first such centre is functioning at the K.E.M. Hospital, Bombay.

The centre, which is located in the Radiology Department of the Nagpur Medical College Hospital, will conduct a two-year course. Twenty students will be trained in the schence of occupational therapy to help crippled and disabled persons learn the use of their limbs for different arts and crafts.

The Chief Minister said that it should be the endeavour of all to bring medical aid to the poorest. He hoped that students trained at the Nagpur centre would do their best to help the crippled.

Bombay's Health Minister, Mr. M. S. Kannamwar, said that a grant of Rs. 20,000 earmarked for the new department besides Rs. 10,000 donated by Mrs. Kamla Nimbkar, President of the All-India Occupational Therapist Association, for establishing a workshop.

Rupees Two Crores for Malaria Eradication

A sum of Rs. 2.1 crores ($4,400,000) has been made available to India for the Malaria Eradication Programme and an agreement signed recently by the Government of India and the U. S. Technical Co-operation Mission.

The Money will be used for the purchase of approximately 7,100 long tons of D.D.T. to help meet the requirements of the 1959 spraying season.

During the U. S. Fiscal year, which ended on June 30, 1958, the U. S. Government provided a total of $12.0 million to enable India to broaden Malaria Control Programme to one of eradication. Since the beginning of the Indo-American Programme in 1952, the U. S. Government has granted about $44.1 million for the control of eradication programmes.

It is estimated that the eradication programme will eliminate some 75 millions cases of Malaria yearly.

Steps to Restrict Use of Insecticides

The insecticidies and preparations mentioned below have been decleared on the 8th August, 1958 as 'Poisons' under the Poisons Act 1919:

Insecticides:—1. Parathion. 2. Tetraethyl Pyrophosphate.

Rodenticides:—1. Alpha-naphthyl Thiourea.

Fungicides:—1. Ethoxy ethyl Mercury Chloride, 2. Ethyl Mercury Phosphate, 3. Pehnyl Mercury Acetate, 4. Ethyl Mercury Chloride, 5. Phenyl Mercury Chloride, 6. Phenyl Mercury Urea.

Fumigants:—1. Methyl Bromide, 2. Cyanides, *viz.* the following: Liquid Hydrocyanic Acid, Sodium Cyanide, Potassium Cyanide, Calcium Cyanide.

Any preparation containing any of the aforesaid poisons.

In addition the State Governments have also been advised to declare these insecticides as 'poisons' under relevant state acts.

The declaration of insecticides as 'Poison' will regulate their possession, storage, packing, sale and labeling, transport.

Necessary instruction have been issued to the Director of Agricultural in the States and

Union Territories in the matter of precautions to be taken in the use of such insecticides and the publicity to be given about the hazards involved.

Rockefeller Foundation Grants

The Rockefellor Foundation have announcement on grants made by the Foundation. India received seven grants to varying institutions through out the World to aid research into diverse programmes total 8,461,721 dollars.

Grants to Indian Institutions included 200,000 dollars in cover the next five years for the purchase of equipments and library facilities at Balwant Rajput College's teaching and research centre on the recently acquired farm at Bichpuri.

The President of the Foundation, Dean Rusk, announcing the awards for the second quarter of 1958, reported that 2,368,580 dollars had been devoted to biological and Medical Research: 1,417,245 dollars to Agriculture: 1,392,070 dollars to social sciences: 1,115,830 dollars to the Humanities and 898,596 dollars to Medical Education and Public Health.

In addition, 1,269,400 dollars was distributed under the head of "General Appropriations", and there were several small grants totalling 20,422 dollars for projects to meet earlier commitments.

Grants to Six Asian countries totalled 1,234,850 dollars.

A grant has been made of 58.000 dollars to the Indian Council of Medical Research for post graduate training fellowship for teachers in Indian Medical Colleges for the next three years.

There is a grant of 45.000 dollars to the Institute of Child Health Trust in Calcutta to support teaching and research in paediatrics by the purchase of equipments and supplies for the basic science departments and towards the further developments of the Institute's Library.

The Foundation has granted 21.000 dollars for the development of the Hospital Record sytem at the Medical Record Library of the Christial Medical College at Vellore.

A sum of 100.000 dollars has been granted to the All India Institute of Medical Sciences, New Delhi for teaching and research equipment.

Government Grant for Various Purposes

The Government of India have sanctioned the payment of sum of Rs. 90,000 to the Government of Bihar as the first instalment of the Centre's contribution towards the training of 375 dais in the State during the Second Five-Year Plan period.

For the establishment of a regional laboratory at Bhuj under the scheme of development of public health laboratory services, the Government of India have sanctioned payment of a sum of Rs. 15,000 to the Bombay Government. This is part of the Central assistance admisible under the scheme.

Sixty tuberculosis clinics have been established during 1957-58 and proposals for the establishment of 60 more clinics during 1958-59 which are being received from the State Governments authorities, are under consideration of the Government of India. A sum of Rs. 30 lakhs has been provided for this purpose during 1958-59.

The scheme in this connection provides for the establishment of 200 new clinics and upgrading of 100 existing T.B. clinics in the country during the Second Plan period. Central assistance will be in the shape of x-ray and laboratory equipment at an estimated cost of Rs. 50,000 per clinic.

Major Dairy Schemes in Leading Cities.

Four major dairy schemes, located at Delhi, Bombay, Calcutta and Madras, are in various stages of implementation, while another is due to make a start in the near future. The total outlay on these projects is of the order of Rs. 14 crores.

The Delhi milk scheme, including a dairy with a potential capacity of processing 14,000 maunds of milk daily, is the most ambitions.

The Bombay project comes next. This will be on the line of the Delhi Dairy, but will have only half the capacity handling some 7,000 maunds of milk daily. The dairy will supplement the Aarey Milk Colony which at present produces 3,000 maunds of

milk daily. This capacity can be stepped up to 4,500 maunds. Land for the new Bombay dairy has been selected, but the scheme has been held up because of the difficulty of securing the necessary foreign exchange. Approaches have been made to one or two foreign Governments for assistance.

The Calcutta milk scheme is the costliest of the four, the total expenditure being estimated at Rs. 7 crores, of which Rs. 4.5 crores are to be incurred during the current plan period. The high cost of the scheme is due to the fact that it will be largely a colony to house the cattle and their owners scattered throughout Greater Calcutta. When ready, it will produce 5,000 maunds of milk a day.

The Rs. 1.1 crore Madras scheme is also partly a colony.

The dairy proposed to be set up at Amritsar will not only meet the milk needs of the city population but it will also be in a position of supply milk products to other areas of the State. Estimated to cost Rs. 30 lakhs, it is just emerging from the final planning stage.

Andhra Minister's Suggestion on Rural Medical Aid

Dr. V. B. Raju, Minister for Planning, Andhra Pradesh, while inaugurating the First Intra-State Seminar on Social Services at Kurnool on June 27, declared that the State Government should address itself to the question of finding adequate medical personnel for the rural medical units, since the lack of such personnel was, at present, a major handicap in extending medical aid to rural areas.

He suggested that as a remedy, the medical students should be compelled to serve in rural areas for at least six months before securing their degree. The Minister, however, added that it was also true, that conditions of service for doctors in rural areas were not attractive and agreed that their lot should be improved. He was confident that the Government would consider this important aspect and do something tangible.

The two-day Seminar on Education, Social Education, Medical and Public Health and Tribal Welfare, which was held in the Kurnool Medical College, was attended by over 75 officials of those departments at the State and district levels.

Manufactures of Drugs in India

An indication of the drugs and medicines which India would like to manufacture with the help of the Soviet financial assistance of Rs. 8.8 crores was given in Delhi on August 5 my Mr. Manubhai Shah, Union Minister of Industry.

He told the Soviet team of experts on drug manufacture when it called on him that though considerable progress had been made by the Indian pharmaceutical industry, efforts had to be made to fill the gaps in the production of synthetic drugs, alkaloids from Indian medicines. Perhaps, some additional capacity for antibiotics might also be required over the present production at Pimpri and elsewhere. India was also anxious to develop the manufacture of medical instruments and equipment.

Mr. Shah added that during the current year, the Government of India wanted to complete plans for the production of the entire range of drugs and pharmaceuticals from the primary to the finished stage.

Mr. A. G. Matradze, leader of the Soviet team which arrived in Delhi on August 3, said his team would do its best to help India experts in drawing up programmes for the manufacture of drugs still being imported.

New Process for Production of Vitamin C.

The National Chemical Laboratory, Poona, has worked out a new process to produce vitamin C (ascorbic acid) in India, according to an official Press release.

Pilot plant work was carried out on a 10 lb. scale and the results obtained in laboratory experiments were found to be reproducible. The yield of vitamin C from sorbitol was approximately 42-46 per cent of theory. The final product was found to conform to the specifications of the Indian, British and U. S. Pharmacopoeias.

Artificial Porcelain Teeth from Indigenous Raw Materials

A process for making artificial porcelain teeth from indigenous raw materials has been developed at the Central Glass and Ceramic Research Institute, Calcutta.

The process consists in preparing a fine powder of felspar and china clay mixed in proper proportions. After removal of traces of iron the stain is mixed and the powder is made into a dough with an organic binder and water. The teeth are made by pressing the dough in suitable moulds, finished and fired. They are then mounted on plastic bases or cardboard pieces for storage.

Porcelain teeth prepared by this technique compare favourably in all respects with the imported teeth. These teeth have been tested in the Calcutta Dental College and Hospital and also independently by two eminent dentists of Calcutta who have given favourable reports.

The main raw materials like felspar and china clay are easily available in the country. Colouring stains, palladium anchorages and gold coated nickel pins are the only items that, for the time being, have to be imported. Except the finishing equipment which has to be imported from abroad, most items of machinery required are available in India.

The requirements of artificial teeth in India, which are valued at Rs. 2 to 3 lakhs annually, have so far been met mostly from imports. The demand is expected to increase substantially.

Two types of artificial teeth *i.e.*, plastic teeth and porcelain teeth are commonly used. While the porcelain teeth are all imported, plastic teeth are being manufactured by a few firms on a small scale with imported moulding powder. It is generally stated that plastic teeth even when imported do not compare with porcelain teeth in quality, performance, durability and inertness to oral fluids, medicaments and food.

Result of National Malaria Control Programme

A fall of about 66 per cent in the incidence of malaria has been recorded in the course of two years from 1953-54 to 1956-57 as a result of the National Malaria Control Programme started in April 1953. The incidence of malaria in 1953-54 was 63 million. By 1956-57, it fell to 21 million.

In 1956-57, the programme covered a population of 19.53 million as against 13.72 million in 1953-54. The Central Government spent from 1953 to 1958 a sum of Rs. 297.30 lakhs towards controlling the disease.

Malaria accounted for a loss of about Rs. 1,000 crores annually to India in agricultural production and man-hours according to an assessment made in 1953.

Set up in April 1953, the National Control Programme reduced malaria cases by 50 per cent in the first year. From April 1, 1958 it has been decided to convert the programme to one of eradication of malaria. This was calculated to be ultimately cheaper than continued control measures. In about six years the programme will cover almost the entire population of the country. It aims at reducing the parasite reservoir in human beings to such a negligible degree that once that has been achieved, there will be no danger of resumption of local transmission.

There are two phases of the programme. The attack phase, and maintenance or surveillance phase. During the attack phase, the central idea is to spray twice a year every human habitation and cattle shed in the areas where malaria is endemic. Estimates show that 23 crore people live in such areas and 230 units, each designed to protect 10 lakh people, will be operating therein. Intensive insecticide spraying will be carried out for three consecutive years from 1958-59 to 1960-61.

Sixteen crores of people living in areas where malaria transmission is known to occur in such a low degree as not to constitute a health problem, would be protected under the Eradication Programme. All such areas will be brought within the ambit of spraying operations for two years from 1960-61 when 160 additional units will be established to cover them. Only one round of spray will afford adequate protection in these areas. Thus by 1960-61, the entire country will be covered by the spraying operations.

During the surveillance phase, a special staff will help watch for cases when spraying operations are decided to be interrupted. The important factor of the phase is that the surveillance staff will go into operation by 1960-61, *i.e.*, one year prior to the contemplated interruption of spraying. The data covered will help determine the advisability of stopping spraying operations during the next season. Even where this is done, vigilance will continue for a further period of

three years. After this the responsibility for surveillance will fall on the local public health administration.

The estimated cost of the eradication programme during the current and next Plan period will be about Rs. 63.24 crores whereas a control programme for the same period is expected to cost about Rs. 52.02 crores.

The eradication programme does not aim at eradication of mosquitoes, which may continue to thrive, with this difference that they will cease to be the transmitters of malaria infection.

For supply of D.D.T., which is one of the principal insecticides used in the control and also the eradication programme, a D.D.T. plant, jointly sponsored by the U.N.I.C.E.F., W.H.O. and the Government of India, has been set up at Delhi in 1955 at a cost of Rs. 40.33 lakhs, with a production capacity of 700 tons of D.D.T. annually. To meet the increased demand for D.D.T. under the eradication programme, it is proposed to step up the capacity of the plant to 1,400 tons annually.

A Second plant at Alwaye is under construction.

All-India Legislation for Controlling Leprosy

The Central Leprosy Advisory Committee has recommended that the question of enactment of an all-India legislation for controlling leprosy should be gone into further by its members and discussed again at the next meeting.

The Committee, which met in New Delhi on 26-8-58 under the Chairmanship of Shri D. P. Karmarkar, Union Minister of Health, was asked to express its opinion on whether it would be adequate to limit the scope of the legislation to compulsory segregation of leper beggars or to make it more comprehensive. The necessity of a new legislation is being urgently felt as the Lepers Act, 1898, and other existing laws have not been of much use in enforcing effective checks on the spread of leprosy.

The Committee discussed the progress of the Leprosy Control Scheme and recommended that while the programme of setting up more subsidiary centres should not be retarded, the standard of existing centres should be raised. A reappraisal of the scheme should also be undertaken in consultation with the State Governments. The Committee noted that 67 subsidiary centres had been set up covering a population of 56 lakhs. A target of 100 subsidiary centres has been fixed under the Second Five-Year Plan and so far 34 centres have been established during the Second Plan period.

Treatment of Cancer

Shri D. P. Karmarkar, Minister of Health, said in the Rajya Sabha that there were 40 hospitals in the country with the latest equipment for the treatment of cancer.

He laid the following statement on the table of the Sabha on the steps taken by Government for checking the spread of cancer:

(1) Establishment of the Indian Cancer Research Centre in Bombay in 1952 for post-graduate teaching and for research in cancer and allied subjects in collaboration with the Tata Memorial Hospital, Bombay, which has since been taken over by the Government of India. The budget provision for the Centre for 1958-59 is Rs. 5 lakhs out of which a sum of Rs. 2,83,500 has so far been paid to the Centre.

(2) There is a Plan provision of Rs. 35 lakhs to encourage research in cancer in the Second Five-Year Plan. Under this scheme the Government of India have taken over the Chittaranjan National Cancer Research Centre, Calcutta, with effect from April 1, 1957, and have so far made grants totalling Rs. 4 lakhs up to the end of the year 1957-58. The budget provision for the current year for this Centre is Rs. 2,74,000.

(3) Grants-in-aid were made to the following institutions treating cancer:

	Grants-in-aid given in			
	1945-55 Rs.	1955-56 Rs.	1956-57 Rs.	1957-58 Rs.
1. Kamala Nehru Hospital, Allahabad ...	14,000	—	2,00,000	—
2. Chittaranjan Cancer Centre, Calcutta ...	50,000	50,000	—	—
3. Radium Institute, Hyderabad	1,00,000	1,00,000	1,00,000	—
4. Cancer Institute, Madras	—	1,00,000	2,65,000	2,50,000
5. Orissa T.B. and Cancer Hospital, Chandpur	—	1,00,000	1,00,000	1,00,000

(4) The Tata Memorial Hospital, Bombay, has been taken over by the Government of India from April 1, 1957, to facilitate research work at the Indian Cancer Research Centre, Bombay. For the development and maintenance of this hospital, a provision of Rs. 44.5 lakhs has been made in the Second Five-Year Plan out of which a sum of Rs. 8.59 lakhs has already been spent.

(5) The Government of India have arranged for three Cobalt Bomb Therapy Units under the Colombo Plan for supply to the Tata Memorial Hospital, Bombay, the Chittaranjan National Cancer Research Centre, Calcutta, and the Christian Medical College, Ludhiana. It is understood that two more units will be made available from Canada under the Colombo Plan.

Tuberculosis Survey in India

The preliminary report of the survey made up to June, 1956, by the Indian Council of Medical Research, shows that tuberculosis is prevalent in villages, small towns and cities and that two per cent of people in areas covered by the report are affected by the disease.

Sri D. P. Karmarkar, the Minister of Health, in a statement laid on the table of the Lok Sabha said: "The T.B. survey was conducted by the Council in cities, small towns and villages in six zones namely Hyderabad, Calcutta, Delhi, Madanapalle, Trivandrum and Patna. The tentative findings of the survey in brief are: 1. The morbidity of T. B. varies from 7 to 30 per thousand persons in different areas. 2. The prevalence of T. B. in villages, small towns and cities is not so marked as originally expected. 3. The morbidity rates are lower for females than for males. 4. The prevalence of T. B. among the persons of the age group of 45 years and above was considerably higher than for the age group of 5 to 34 years. 5. Bacteriologically positive cases varied from 1 to 11 per thousand persons in different areas.

The Government of India have formulated a National T. B. Control Programme for combating T. B. The schemes included in the programme are: 1. Central subsidy for the intensification of the B.C.G. vaccination campaign. 2. Establishment/upgrading of 300 T. B. clinics to provide or expand facilities for diagnosis and domiciliary treatment. 3. Establishment of 15 T. B. demonstration and training centres. 4. Establishment of 4,000 T. B. isolation beds. 5. Establishment of eight after-care rehabilitation centres for T. B. patients."

Smoke Problem of Calcutta

A recent study by the Fuel Research Institute, Dhanbad, has revealed that, on an average, two tons of dust and soot are deposited on Calcutta every day. Alarmed by Calcutta's smoke problem following the expert assessment, the West Bengal Government has prepared a scheme to make the city smokeless. It has been sent to the Union Government for approval.

The scheme includes a proposal to build a gas grid which will ultimately bring 30 million cubic feet of gas per day to the city

from the coke oven plant at Durgapur. The Oriental Gas Company at present supplies only three million cubic feet gas—against a demand of eight million a day. The cost of the gas grid has been estimated at Rs. 3½ crores.

Divided into three phases, the scheme proposes to start with a daily supply of eight million cubic feet of gas, rising to 15 million in the second phase and ultimately to 30 million. The manufacture of smokeless coke for domestic use in the city is also planned. This information was given at a meeting of the Indian Council of Economic Affairs in Calcutta on July 16.

Rains and Rural Housing

One of the problems that has been under intensive study at the Central Building Research Institute at Roorkee in Western U.P. is how to provide adequate protection to various types of village houses from the ravages of monsoon rains.

Research has been in progress at the Institute on the properties of mud which has been and still is the principal building material in the country. In fact, in the majority of India's over 5,50,000 villages, mud is the only building material available. The way this material has been used in the past has not always been scientifically the most sound.

In the majority of cases, mud plasters, being clumsily used, have been disintegrating under excessive rains, giving rise to a major and recurring problem in rural housing.

As for a long time it will not be possible to replace mud as building material in rural areas, the only way in which this problem can be solved is by rendering the mud plaster used in rural housing non-erodable and water-proof. To achieve this aim, several methods have been evolved at the Institute.

Of the three methods developed so far, one is based on the application of a plaster made of mud and 'cut-back', prepared by diluting bitumen with kerosene oil and paraffiin-wax. In the second method, mud plaster is prepared and applied on the walls in the usual way. When it is dried, it is painted with the slurry prepared by mixing cement, hydrated lime and fine sand in soap solution. The third method consists of preparing mud plaster as done in the first method. When it is dried, it is painted with silicone solution in water.

All the three methods have been tried on houses in different villages around Roorkee. The results of these trials indicate that the methods are suitable and their cost is within the reach of an ordinary villager. Further observations are still being taken during the current monsoon season.

World Medical Association

At the opening plenary Session of the XIIth General Assembly of the World Medical Association, the doctors of the world initiated a campaign to keep the medical profession in every country fully informed on the effects of nuclear radiation. Dr. Louis M. Orr (U.S.A.), Consultant at the Institute of Nuclear Studies, Oak Ridge, Tennessee, and President—elect of the American Medical Association, addressed the delegates on "The Biological Effects of Nuclear Radiation". He reported that:—

Current nuclear experiments show air and soil contamination being reduced below the danger point to both man and animals.

The public faces greater danger of radiation from the improper, frequent or prolonged use of X-ray than from Nuclear experiment "fall-out".

Medical and industrial progress necessitates continued nuclear experimention as a means of furthering progress in making nuclear energy useful to mankind. Dr. Orr remind the Assembly that both vaccination and anaesthesia were subjected to widespread propaganda and disrepute at their inception but have now become basic elements in the practice of Medical Science.

During the past several years, The World Medical Association has considered several resolutions on nuclear experimentation. Some of the National Medical Associations that comprise the membership of the World Medical Association have urged that their doctors be provided with factual information Nuclear Radiation. The docturs note that nuclear radiation elicits great concern

among the peoples of the world because it is in the realm of the unknown and there is a belief that it is harmful to human life. The medical profession is the logical source for informing the people of the true facts on nuclear experimentation. To fulfil this obligation to the people it must be fully informed of the scientific developments in this field deviod of the political and emotional factors that have become associated with this topic.

In planning a programme to assist the national medical associations in providing scientific information to the doctors of their countries, the Council of the World Medical Association noted that in certain member countries the biological effects of radiation are openly discussed and only the process of production of these substances is kept secret. Hence, medical association in these countries will be invited to provide the head quarters secretariat with literature to the member associations for distribution to the doctors of their countries.

Dr. Louis H. Bauer, Secretary General of the World Medical Association, announced that the literature exchange programme would be effected before the beginning of 1959 from United Nations and United States Publications on this important scientific field.

Orissa to set up a Vaccine Institute

The Orissa Government has decided to start a Vaccine and Serum Institute at the New Capital, Bhubemeswar. Accordingly it has deputed the officer-in-charge of the Provincial Laboratory to Madras to make an on-the-spot study of the working of the Madras Institute and submit a report.

It is expected that the Institute start working from the next financial year.

Indian Council for Child Welfare

As a result of talk between Union Ministry of Home Affairs and the Indian Council for Child Welfare, a meeting of the representatives of the various Union Ministers, Delhi Administration, Social and Child Welfare agencies and other local organisations, was convened by the Union Ministry of Home Affairs in July 1958 in New Delhi. The meeting which was presided over by Smt. Violet Alva, Deputy Home Minister, had before it a plan of the ICCW drawn up in two phases, temporary and permanent for the proper institutional care of children in Delhi.

The gathering accepted the basic Philosophy, as enunciated by the Indian Council that it was "the direct responsibility of the state to build minimum institutions for the proper enforcement of law and maintain these institutions not only with a proper standard but with the definite objective of bringing exploited and delinquent children back into society as citizens with equal rights and opportunities.

A New Division in Harvard School of Public Health

A new division of Environmental Hygiene in the Harvard School of Public Health has been set up to bring together research and teaching activities of specialists in the field of radiation hazards, air pollution and industrial hygiene and works in close consultation with the Harvard Laboratories of Sanitary Engineering.

Dr. John C. Snyder, Dean of the School thinks that this new division will give due recognition of the new Public Health Problems of "Critical Importance" associated with peace time uses of nuclear energy, growing air pollution, with increasing industrial accident potentials, and with accident involving both ground and air transportation. These and other developments are annually creating more problems that must be attacked by the engineers, psychologists, physiologists, and medical scientist working together.

The Director of the division is Dr. James L. Whittenburger, M.D. He has already listed two immediate objectives as the study of man physiologic responses and adaptation to the particular stresses encountered in his physical environment and aiding man in adopting his environment to make the best use of his physiologic capacities.

Second Asian Pacific Congress of Cardiology

The second Asian/Pacific Congress of Cardiology will be held in Melbourne, Australia, during the last week in May 1960. Further details may be obtained from Dr. A. E. Doyle, Honarary Secretary, Alfred Hospital Melbourne, S. I. Victoria, Australia.

Post-Graduate College in Animal Sciences at Izatnagar

A Post-Graduate College in Animal Sciences has been started at the Indian Veterinary Research Institute, Izatnagar, from August 1958. The college which will impart training in animal nutrition, animal genetics, veterinary parasitology, pathology, bacteriology and physiology for the M.V.Sc. degree, will be affiliated to Agra University.

Admission will be restricted to those who have passed the B.V.Sc. examination from a University recognised by Agra University on a reciprocal basis. Particulars may be obtained from the Director, Indian Veterinary Institute, Izatnagar.

Sixth International Family Planning Conference

The Prime Minister of India will inaugurate the IPPF Sixth International Conference, at the Vigyan Bhavan in New Delhi, on February 14th, 1959. Mrs. Lakshmi Menon, the Deputy Foreign Minister will be Chairman of the Reception Committee.

"Family Planning—Motivations and Methods" will be the theme of the Conference which, under the auspices of the FPA of India, will be in session from February 14th to 21st. Subjects to be discussed include population in an atomic age, cultural patterns and motivations, biological aspects of fertility control and evaluation of oral methods, laboratory and clinical testing, sterilization infertility problems and education for family life.

Enquiries about travel and accommodation should be addressed to Messrs. Trade Wings, Ltd., 30 Rampart Row, Bombay and 60 Janpath Delhi. Application for registration forms and programme details should be made to Mrs. Avabai B. Wadia, FPA of India, 1, Metropolitan House, Dadabhai Naoroji Road, Bombay 1.

Symposium on Fungus Diseases in India

The Symposium on Fungus Diseases in India previously notified to be held in December 1958, has been deferred due to unavoidable reasons. The final dates for the symposium are February 5 and 6 1959. Last dates for sending abstracts (not exceeding 300 words) and full papers have been extended to October 30 and December 15, 1958, respectively. Dr. C. G. Pandit, Director, Indian Council of Medical Research, New Delhi, has kindly consented to preside over the symposium. Scientists from the U.S.A. and U.K. are expected to participate in the symposium.

Lady Tata Memorial Trust Scholarships and Grants

On the death anniversary of Lady Meherbai Dorabji Tata, the trustees of the Lady Tata Memorial Trust announced the awards of scholarships and grants for the year 1958-59.

International awards of varying amounts, totalling £5,080 for research in diseases of the blood, with special reference to leucaemias, are made to Doctors M. Seligmann (France), M. Simonsen (Denmark), A. J. Therkelsen (Denmark), B. G. Thorell (Sweden), M. Besis (France), G. Klein (Sweden), Mr. A. Pillai (Switzerland) and Dr. J. Ponten (Sweden).

Indian scholarships of Rs. 250 per month each for one year for scientific investigations having a bearing on the alleviation of human suffering from disease are awarded to Dr. Miss Habib Bano (Lucknow), Dr. (Miss) Satwant Kaur Sokhi (Madras), Miss M. H. Ganghi (Bombay), Mr. P. Suryanarayan Murthy (Bangalore), Dr. Inder Perkash (Lucknow), Miss S. Soroja (Bombay) and Mr. N. L. Tikotkar (Bombay).

The trustees of the Lady Meherbai D. Tata Uthamna Fund Trust announced that the Bai Jerbai Hosmasji Bhabha Scholarship has been awarded to Miss Armaity S. Desai and the Lady Meherbai Dorabji Tata scholarship to Miss Safia Mohomed-Abbas Hakim.

Recognition of the Associateship Diploma of the Institution of Chemists (India), by examination

In a recent office memorandum of the Ministry of Scientific Research and Cultural Affairs, the Government of India have decided that Associateship diploma of the Institution of Chemists (India) by examination be recognised for all chemical appointments for which M.Sc. degree in Chemistry is prescribed as a qualification.

Swasth Hind Malaria Eradication Number

The general health education bureau of the Directorate General of Health Services, Government of India deserves to be congratulated for bringing June 1958 issue as a special number on "Malaria Eradication", with message from the President of India and the Union Health Minister. We commend this issue not only to all anti-malaria and health workers in the country but to the public and various teaching institutions as well, so that they can obtain an idea of how within a short period of about five years concerted preventive action adopted on a nation wide scale through National and International agencies (like the T.CM. and WHO.) has curbed the enemey no 1. disease in a vast territory like India and how it has ultimately led to its eradication as a practical possibility and how much the country has already gained on the health and the economic front due to this action.

This publication will also give the readers an idea about the scope, magnitude and the modern operandi of the eradication programme so that they may extend more active and intensive co-operation than they had been giving so far and this is greately necessary for the attainment of the present objective. It must be remembered that the National Malaria Control Programme is the biggest project of its kind in the World and if it finally succeeds, as most people think, it is going to make world history to be quoted for generations to come.

New Health Education Journal

The Internation Journal of Health Education made its first appearence as a quarterly in January 1958. It is the official organ of the International Union for Health Education of t he Public, which has its headquarters at Paris, and is published in two languages—English and French. Professor Jacqents Parisot, the President of this Union defines health education in the opening number as follows "It is an education for living, a means of bringing to each number of a group an enrichment of his personality, of his physical and mental health, a true application of his rights.....and a sense of his responsibility towards the comuunity".

This International Union was founded in 1951 essentially as union of national bodies-national committees, societies associations or other national voluntary organisations and health agencies which have health education of the public as one of their aims. Individuals and organisations wishing to help in the work of the Union may also become its associate members.

Health education being considered as one of the most important tools in bringing about improvement of health conditions in any country a journal of an International stadard i svery much welcome. We wish it a wide circulation and the desired popularity.

The journal editor is Annette Le Meifour, chief of publication of the language of Red Cross Societies.

W. H. O. Regional Committee S.E. Asia.

The Eleventh session of the South East Asia Regional Committee of the World Health Organisation was held at New Delhi on the 30th September, 1958. The Session was opened by Dr. S. Radhakrishnan, Vice-President of India, and Mr. D. P. Karmarkar, the Minister of Health, welcomed the delegates, who came from the following countries, Afganisthan, Burma, Ceylon, India, Indonesia, Nepal, Thailand and the United Kingdom.

The following are the chief decisions of the committee:

(1) A proposal to set up a South East Asia Centre for the classification and study of diseases was approved.

(2) The committee recommended that governments of the Region should set up epidemiological units in their public health directorates.

(3) The committee discussed the subject of teachin and training of preventive and social medicine to undergraduate and post-graduate medical students and to medical and other health workers. The committee requested the regional director to assist governments in reaching these objectives.

(4) After considering the programme of Malaria eradication in the Region the committee noted with satisfaction the progress

that had been made in this direction by various governments and the increasing degree of co-operation that had been given by international and bilateral agencies. The committee recommended that governments of the Region be requested to make such contributions as possible to the Malaria eradication Special Account and be urged to stimulate generous contribution to it from all possible sources.

(5) Support for a programme for the eradication of smallpox in the South East Asia Region was expressed in a resolution which urged governments in the South East Asia Region "to undertake systematic possible measures, including legislation, to obtain total converage of the netire population".

(6) Pressing problems with regard to environmental sanitation in the South East Asia Region were discussed. The most important problems were given as: safe and wholesome water supply; safe disposal of waste materials; mainly of human excreta; control of insect borne diseases; healthful housing and food sanitation.

The committee, in a resolution, confirmed the further developing the various fields of activity in environmental sanitation as outlined in the WHO documents and requested the Regional Director to "explore all possible ways and resources" to give help to governments and to stimulate environmental sanitation schemes particularly those which aim at the provision of potable water supply and the proper disposal of human wastes.

Postgraduate Teaching in Public Health and Preventive and Social Medicine

A conference on postgraduate teaching in Public Health and in Preventive & Social Medicine was held on the 10th and 11th October 1958, at the All India Institute of Hygiene & Public Health, Calcutta. The Conference was inaugurated by Lt. Col. Jaswant Singh, Director General of Health Services, Government of India and was attended by a large number of delegates from the State Health Departments of different States, experts from the W.H.O., T.C.M. and U.N.I.C.E.F. organisations in India, Deans or principals of medical colleges, professors of the Institute, teachers of preventive and social medicine representatives from the Armed Forces, Medical College and other eminent educationists. The subject for discuss were:

(1) Manpower needs of trained postgraduate public health personnel in India.

(2) Training of doctors for general health services.

(a) Objectives of a postgraduate diploma in public health.

(b) Orientation and in service training of doctors for health work.

(3) Training of teachers in Preventive and Social Medicine and in Public Health.

(4) Training of Specialists in different branches of public health.

(i) Maternal & Child Health.
(ii) Industrial Health.
(iii) Human Nutrition.
(iv) Health Education.
(v) Epidemiology.
(vi) Medical Statistics.
(vii) Medical Social Work.

(5) Curriculum for postgraduate public health teaching. Col. Jaswant Singh in his opening speech welcomed the delegates and the international experts who had come from different parts of the Country to attend the conference and to participate in the deleberations. It was appropriate that this Conference was being held at the All India Institute of Hygiene and Public Health, Calcutta. He said that a great interest is now being increasingly taken in the subject of preventive and Social Medicine all over the world. The Conference on Medical Education held in Bangalore 1955 emphasised the importance for teaching of this aspect of medicine in the undergraduate course to meet the need of the community and of future medical services in the country, particularly in the rural areas.

The Government of India appropriately agreed in their Second Five Year Plan to assist and upgrade departments of Preventive and Social Medicine in various medical institutions with and without the help of the international agencies. WHO assisted a few medical colleges with consultants and

awarded fellowships for the training of teachers. With the assistance of TCM Orientation Training Centres had been established in three Health Centres in India. He also mentioned that the subject of teaching of Preventive and Social Medicine was also discussed in the 11th Session of the WHO Regional Committee for SEA and in the Second Annual Conference of the Indian Public Health Association in December 1957, He further said that the postgraduate training in Preventive and Social Medicine should be adapted to the national conditions, education, health, social and economic factors etc. If the postgraduate education is to fulfil its purpose in the present-day setting it was high time to review the modern trends in public health practices and teaching and the curriculum of the teaching etc., of the various public health courses in this country, and to recommend changes as considered necessary in the height of the discussion. Certain changes has taken place in the organisational pattern and the curriculum in postagraduate courses, particularly in Diploma in Public Health, its equivalent etc. The experience gained at the Institute during the last 25 years should be useful in guiding the discussions on the subject. He stated that the Government of India had been considering a proposal for conducting at the All India Institute of Hygiene & Public Health Courses for the teachers of Preventive and Social Medicine to help the medical colleges in having their full time departments of Preventive and Social Medicine.

He concluded by wishing great success in the deleberations and formulating the plans for future improvement and strengthening of the postagraduate teaching in Preventive and social Medicine and in postgraduate public health.

(Continued from page 271)

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REPORTS & REVIEWS

ENCEPHALITIS IN NAGPUR—1958

A rapid invesgtigation of the outbreak of Encephalitis in Nagpur during the months of June, July and August, 1958, showed that the total number of cases admitted in the two hospitals of the city with a population of about 5 lakhs, was 141 belonging to 38 out of its 42 wards. The actual number of cases was much larger than those admitted in the hospitals and no ward was found free from cases. The data are concerned with the period between 26th June to 11th August, 1958, but after an interval of a few days a smaller wave was also reported. The first peak was noticed on the 6th July followed by a decline up to the 18th and a second rise between the 19th to the 27th July. Thereafter there was a gradual decline up to the 11th August.

Age and sex distribution :

Apparently the main target were the infants, pre-school and earlier school age groups among whom the fatality was as follows : 7 deaths (38.9%) in infants, 20 deaths (37.9%) in pre-school (1-5 years) and 27 deaths (42.8%) in school-going age group between 5-15 years. The total deaths were 58, the overall fatality rate being 41.4 per cent. Taking the unreported cases into account the fatality rate would be much lower. The specific mortality on the basis of ½ million population was 11.6 per 100,000 population. In regard to the incidence among the different communities Hindus showed preponderance over Muslims. Density of population in city had no bearing on it.

Higher temperature with rigor or shivering, vomiting and loose motions were the main clinical features. General neurological symptoms, namely, tremor, convulsion, rigidity and drowsiness were also noticed in some cases. Acute inflammation of throat were noted in some cases. In serious cases knee jerks were lost. No local or generalised paralysis was seen. There were slight rise of leucocytes of both polymorphonuclear and lymptocytic types. Excepting the rise of pressure there was no change in C.S. fluid.

The incubation period was found to be about four days.

The quick survey in the city further revealed that quite a good percentage of the adults suffered from fever, headache, loose motions and vomiting during the month of June and July.

Water supply :

The city at the time of investigation was using three main water sources. In one source water was frankly turbid and the chlorination plant was not working properly. So far as the quantity of supply was concerned there was severe shortage due to drought.

Disposal of night-soil :

According to the Health Officer nearly three-fourths of the houses in the city had no latrine and promiscuous defecation in the open fields and spaces was the usual habit. The city drains were stinking very badly in many places.

Fly breeding were very rampant.

From the above findings and previous records available at the Vital Statistics office it was suggested that the disease was of infective nature and probably encephalitis of viral origin affecting both children and adults, the fatality being confined to younger age groups. The outbreak followed the drought period of the year (May-June). Perhaps the disease was in the dormant state there and so far as the transmission is concerned the question of insect vectors, as found in other countries having encephalitis, should be taken into account while planning to isolate the virus.

It was suggested that Sera from the convalescent patients should be tested against the known encephalitis viruses to get some idea of infection in the locality. As regards control, no definite measure was proposed except to rely on the environmental sanitation including measures against mosquitoes, flies, purification of water and safe disposal of night-soil. As no drug, either of sulpha group or antibiotics was found effective in the treatment of cases, adult serum or gumma globulin could have been tried on the basis of the fact that the adults were fairly immune.

S.C.S.

PUBLIC HEALTH INSIDE THE U.S.S.R.

(Abstracted from the Reports of Dr. Thomas Parran, Chief of the U.S. Public Health Mission to the Soviet Union).—Am. J. Pub. **Health, 48, 610, 1958.**

The above Mission visited nine cities in five of the 15 Republics of the Soviet Union as guests of the Ministry of Health. They travelled 8,500 miles and visited 61 institutions including medical colleges, medical schools for training of sub-professionals, sanitary-epidemiologic stations, homes of health education, blood transfusion services, general and special hospitals, polyclinics, the Academy of Medical Services, scientific research institutes, rest homes, industrial plants, collective farms, city markets, public schools and the headquarters of eight ministers of health.

The Land and the People:

The Soviet Union contains one-sixth of the land area of the world; it is three times as large as the United States. From west to east it encompasses 171 degrees—180 degrees is one-half of the earth's circumference—and from north to south some 2,500 miles. It is a conglomeration of 125 different races, tribes, languages, and dialects in its 15 republics and 14 autonomous republics. The "autonomous republic" contains a minority racial group located within the boundaries of one of the 15 Soviet Socialist Republics; it has some cultural autonomy and some political representation even in the higher echelons of the Communist Party.

The civil sub-divisions are the 15 Republics, including the autonomous republics. The next lower sub-division is called an oblast, a substantial number of them in each republic. The administrative region below it is the rayon, of which there are 4,500, compared with our 3,100 counties. Finally, at the lowest level—you might call it a township or a ward of a city—is the uchastok, of which there are nearly 20,000.

Meaning of Health in U.S.S.R.:

Health in its broader sense has a priority in the Soviet Union. In the Russian philosophy the worker is a "fund of gold" for the country. Hence it is important to mobilize the maximum of human power for production. In other words, they do not have the humanitarian motivation for health which we consider important in the Western world; it is purely utilitarian. Such Soviet slogans as these have real meaning: "Our greatest concern is for man"; "Everything for the health of the working class." These concerns, I repeat, are founded on the principle of sustaining human working power for the State by every means. Stalin has said, "Of all the precious materials in the world, the most precious are men and cadres." Another Communist statesman has said, "Damage to the health of workers is less harmful than damage to production."

Structure of Health Service in U.S.S.R.:

At the head is the Ministry of Health—one of the 52 reporting direct to the Praesidium, the all powerful Council of Ministers. It has a budget of 35.3 billion rubles which is equivalent to 6 per cent of the total budget of U.S.S.R.

The Ministry of Health controls and directs all medical practice and facilities, all education of physicians—both general and specialized—and of all para-medical workers; the production and distribution of medical supplies, pharmaceuticals, vaccines, instruments—in fact everything imaginable used in hospitals, or in medical care, or in health and sanitation services.

Administratively, the U.S.S.R. Ministry of Health is divided into four major operating sections:

1. The treatment and preventive service—hospitals, polyclinics, special dispensaries, etc., including all salaries—67 per cent. of the budget.

2. Child care, prophylaxis, and treatment—12.8 per cent of the budget.

3. The hygienic-epidemiologic service—including health education—which has been the keystone in the whole Soviet health structure for a long time—4.7 per cent of the budget.

4. Medical education and medical research institutes (the latter chiefly through the Academy of Medical Science)—8.7 per cent. of the budget.

Other costs, including administration, construction etc., account for 6.8 per cent of the budget. In addition, there is a planning section, or institute, and a finance section. The whole "medical industry"—including surgical instruments, X-ray, drugs, and other pharmaceuticals, hospital equipment and supplies—is not included as such in the above budget. Moreover, the physical facilities for health in industry, in physical culture, in rest homes, and on collective and State farms are provided by the industry concerned. Also, one should add to the U.S.S.R. health budget the medical service for railway workers, operated by the Ministry of Transport, but under standards prescribed by the Ministry of Health.

In each republic there is a ministry of health with a minister, a deputy minister, and the usual branches one would find in health departments most anywhere. The health officer of the republic has subordinate to him health departments in the oblasts and in the rayons. These health officers have a dual line of responsibility: one is the line vertical to the Union Ministry of Health; the other is lateral—to the government and party of the republic, for example.

The Sanitary Epidemiology Service has still another line of authority. The head of a department of sanitation in a country is responsible to the Country Health Officer, and he has also certain responsibilities in regard to standards and enforcement of regulations to both to the State and the Federal Chief Engineer. The Deputy Minister of Health for the Hygiene-Epidemiologic Service is considered as one of the important officials in the Union Ministry.

Medical Education:

There are 87 medical colleges ("institutes"). The present Five-Year Plan calls for the production of 16,000 physicians per year, more than double the U.S. output; 80,000 in the five-year period. Also being trained annually are 60,000 auxiliary personnel; 300,000 in five years. In the same period new hospital beds amount to 340,000; add to this 312,000 more beds in creches.

The basic training of a medical student is 10 years of public school education plus six years in a medical college. The programme lasts for 10 months of the year, 5½ days per week, with

only four days as holidays. Hence, after a total 16 years of schooling, a physician is eligible for licensure to practice.

The U.S.S.R. emphasizes on quantity rather than quality. There is a wide variation in the quality of Medical Training. In several Medical Colleges proper facilities were found lacking, specially in the basic or pre-clinical sciences.

After the basic six years in a medical college, the physician may become an "aspirant" by studying three more years, aspiring to be a "candidate." This is essentially comparable to a post-M.D. master's degree. Then toward the top of the group are the doctors of medical science, requiring at least five years of graduate training and research scientists. They receive much more recognition in salary of status than do the profession on leading scientists in U.S.A. A few professions selected as corresponding or as full members of the National Academy of Medical Sciences are at the summit in the medical hierarchy. In U.S.S.R., there is no financial barriers to getting a higher education hence they can draw upon their total supply of after and talented youth for their scientists, physicians and administrations.

SUMMARY OF THE IMPRESSIONS ON U.S.S.R. PUBLIC HEALTH

Public Health and Medical Care Unified Services:

High priority is given to health in order to mobilize man-power in the service of the State. Public health and medical care represent a unified service throughout the U.S.S.R., under the central direction of the Ministry of Health. More recently, some responsibility and authority in health affairs has been given by Moscow to the republics, but under central budget control —especially for new construction—and strict control of standards. One example cited to us by the acting minister of health was, "I have control over the kind of construction that goes into any building from the largest hydro-electric power station to a cinema."

Prevention of Diseases:

Special emphasis is given to the prevention of disease throughout the entire Soviet health structure in an integrated system of prevention and cure. Medical care is available without cost to the patient. Mothers are encouraged, in fact, almost required, to bring their children to pediatric clinics in accordance with a regular schedule for examination and immunizations. Prenatal care is freely available. In industrial establishments pre-employment physical examinations are given which are repeated each year, or when the occupation is hazardous at more frequent intervals. **Health education is strongly emphasized, each physician being required to give at least three hours of public lectures each month, for which they receive extra compensation.**

Distribution of Personnel:

It was a question whether in U.S.S.R. published staffing pattern, i.e., the number of type of personnel in the rural and urban areas, in hospitals, polyclinics and factories—did really apply to the remote areas. Actually by and enlarge the Health personnel as stated were found working there conscientiously at their tasks with a real interest in their patients in human beings.

There is a wide distribution of medical personnel and facilities. The sanitary-epidemiologic services, in some 2,600 stations are operating in accordance with published reports. This service long has been the back-bone of the system for combating epidemics. As the major infectious diseases have been brought under control, the sanitary-epidemiologic services are being merged at the periphery with the rural hospitals.

Physicians in the U.S.S.R. work at many tasks which here usually are performed by other personnel. That is, they do their own clerical work as indicated, since typewriters are in short supply; they specialize in sanitation; they do health education; by and large; they do the laboratory work, except tasks at the lower level; and such statistical work as is done.

In the operating room one does not see a surgical nurse; one sees assistant and aspirant surgeons. In fact, there is no exact equivalent in the Soviet Union of our trained nurse—our R.N. The training of the subsidiary personnel now requires 10 years of schooling—until recently, seven—and now two years of training in what they call a "lower medical school." Usually these are separate from the medical colleges or "institutes." They think it is unwise to mix up the training of different professions together. However, the training of nurses and feldschers—the terms now mean practically the same, since the training is identical—is minimal, with only 12 years of total schooling.

This fractional and compartmental system of training research and practice, according to the author may secure the immediate need of the States but it certainly has truncated, even desecrated, the traditional European University Concept.

Training is Free:

Professional training is free and is closely identified with political indoctrination. The young graduate must serve three years where assigned. A formal medical hierarchy exists which, through rewards in status and cash, provides strong incentives to physicians to advance their training. The minimum basic wage of young physicians is 750 rubles per month; that of a distinguished professor, 6,000 rubles, or more. An airline hostess gets 1,400 rubles, a truck driver from 1,200 to 1,600. Nurses and feldschers start at about 500 rubles per month and go up to about 750.

Quality of Medical Care :

The general quality of medical care falls well below that of this country, but it is widely available and without cost to all.

The hospitals we saw are poorly planned, badly constructed, and inadequately equipped and maintained by our standards.

Freedom of Choice of Physician and Cost of Treatment :

There is essentially no freedom of choice of physician by patient; also the good physician has very little mobility. There is no direct payment for hospital or medical science. A diabetic is given insulin without cost and ambulatory tuberculosis patient streptomycine and isoniazid. The only exception noted was that an ambulatory patient brought his own drugs, eye-glasses and prostheses from the State Stores at a reduced rate.

Great stress is put upon physical medicine of all types balneotherapy and electrotherapy, mudbirth and so forth.

Housing :

Much new housing is under construction but it is a poor quality. There is still severe overcrowding.

Sanitation :

In regard to sanitation, central water supplies are provided in all the central Asian cities we visited. About two-thirds of the people in these cities get water from a faucet in the street. Frequently, outdoor privies are used; in some cases there were cans inside the seat. In instances where there is a flush toilet in the apartment the wastes usually run into an open or closed drain or canal.

Maternal and Child Care :

There are generous provisions for child health and for prenatal and maternity care, including four months maternity leave with pay. One should recall that about a year and a half ago abortions again were legalized. In the several places where we made inquiry at maternity hospitals in different areas of the country abortions were as high as 85 per cent of the number of live births.

PROGRESS OF MATERNAL AND CHILD HEALTH IN DEVELOPING COUNTRIES

Bierman, Jessie, M.—Maternal and Child Health in the Developing Countries—Progress, Problems and Promise.—Am. J. Pub. Health, 48, 888, 1958.

A review of joint WHO/UNICEF assistance to developing countries in MCH indicates that good progress has been made in the training of personnel and in the extension of minimum services. Through 601 Fellowships, MCH workers from many countries have received professional training abroad. Governments have been assisted to establish or to extend and improve their own training facilities for personnel through 40 MCH demonstration and training projects in 29 countries, and assistance to some 64 institutions for training of physicians, nurses, midwives and auxiliary health workers in 37 countries. The greatest emphasis has been laid on the training of auxiliary personnel. There is increasing recognition of the need for increasing the training of professional personnel for supervisory and leadership post in order to better utilize the auxiliaries and bring about improvements in the quality of the services.

Among the most important aspects of Western public health practice which are transferable to developing countries are epidemiologic methods for the study of health problems and the problem—centre of approach to the development of training of service programmes. **The patterns of most present day Western MCH programmes do not fit the needs and resources of the developing countries.** A few commonly encountered problems in maternity care, in programmes for infant and young children and in school health in the assisted countries as given below to illustrate some directions for future developments.

(1) **MCH Programme :**

In areas with high prevalence of malnutrition and of endemic and epidemic diseases, maternal and child health programme must necessarily be broad in scope to be able to deal with the general health needs of mothers and children as well as with the special needs concerning the reproductive and growth process. Children under 15 and women of child bearing age constitute over 60 per cent of the population in the developing countries. They offer an incomparable avenue for the introduction of preventive services and health education for individuals and serve as a focal point around which family health services, sanitation and disease control programmes can be developed. Much attention is therefore being currently devoted to integrating the existing maternal and child health services into general health programmes particularly in Asia, and vice versa in Latin America.

(ii) **Problem-Centred Approach to Maternity Care :**

Puerperal sepsis and haemorrhage are the principal causes of maternal death in most developing countries. Anaemia is another serious problem. Most deaths occur suddenly during the third stage of labour. The nature and etiology of anaemias require more study. Lack of iron and of sufficient protein in the diets of women and intestinal parasites are some of the causes of this anaemia. Furthermore, many of the women suffer from various endemic and epidemic diseases common to the community. With

it is seen that some countries report about as many early childhood deaths as infant deaths.

Although the mortality figures are not available according to Sinclair-Loutit of WHO in a country with a rate of 100 there will be among 1,000 infants, 27 new minor illnesses daily (case fatality of 1 per cent) or 10,000 cases of illness a year. For diseases with case fatality of 10 there would be 1,000 cases a year. The figure will be doubled or trebled in countries with infant mortality rate of 200 or 300. This device simply serves to impress on over the enormous burden of illness borne by infants of those countries. The amount of illness among young children is likewise staggering. About 85 per cent of protein and malnutrition occur in children below 1 to 3 years of age. The dangers from other nutritional disorders and from gastro-intestinal disorders and infection and intestinal parasites are also greater than during the first year of life. These are all preventable. Under these circumstances "Well child" services have little meaning and services limited to young infants make little sense. It cannot, however, be ignored that the services now rendered have brought down infant mortality rate at least to some extent. The responsibilities and opportunities of child health programme lie in the strong educational and nutritional services and in providing a combined therapeutic and preventive care focussed on the common endemic diseases and continuing throughout infancy and early childhood. The training of physicians and auxiliary health workers should therefore be directed towards knowledge of pediatrics and nutrition. Both UNICEF and WHO have therefore taken steps to call attention to training in these two subjects.

(iv) **Health Services for Children of School Age.**

Interest in the field of health services to school age children in the developing countries is just growing. Comprehensive programme cannot be thought of now. Unfortunately, the beginnings have often consisted of attempts to provide medical inspections before there have been any real possibility for providing follow up and corrective care. Under these circumstances the inspectors become perfunctory routines of little value.

A more realistic approach now receiving emphasis centres about the unequalled opportunities which the school offers for health education. If the school could provide opportunities for children to experience living in healthful environment and could practice health teaching centred around sanitation, nutrition and the transmission of disease, they could break the chain of ignorance concerning health that binds one generation to the next. The starting point are the teacher education is health and the provision of sanitary latrines and safe water supplies in schools and teachers training institutions. With little help the teacher can begin health education under the simplest circumstances. Ways for bringing about improvements in the preparation of teachers in the health field are currently being studied by WHO in collaboration with UNESCO. It is hoped that the UNICEF assistance for safe water supply and excreta disposal facilities, dry milk etc. will be available for schools.

Union Government Accepts Commission's Recommendations on Kerala Food Poisoning Cases.

The Government of India have accepted the findings and recommendations of the Commission which inquired into the recent food poisoning cases in Kerala and Madras, Mr. D. P. Karmarkar, Health Minister, told to Loksabha on August 11.

The Commission had held in the report published at last month that there was "faulty storage of Folidol" resulting in contimination of foodstuffs in S.S. Jai Hind.

Mr. Karmarkar said the Government of India had conveyed its views as regards legal liability, in the light of the Commission's findings, to the Governments of Kerala and Bombay.

Mena while, he said, the Kerala Government had registered cases against a number of persons under Section 304A and 284 of I.P.C. Three officers of S.S. Jai Hind had also been prosecuted under Section 225 of the Indian Shipping Act, 1923.

The Minister said the Kerala Government had accepted the Commission's recommendations would be in two parts : On some decisions would take a short time and on others longer time.

Out-lining action already taken, the Minister said that the insecticides which were highly toxic had been notified as 'Poisons' under the Poisons Act, 1919. The State Government had been advised to declare these insecticides as 'poisons' under the relevant State Acts. This declaration would facilitate measures for the storage, packing, sale and labelling of insecticides. In addition he said, these insecticides would also come under the category of 'Dangerous goods' for the purpose of transport by sea or mail and would be subject to the restriction applicable under the rules made under the Indian Merchant Shipping Act and the Indian Railways Act.

Mr. Karmarkar said the States had been requested to regulate the storage, packing, labelling, and sale of insecticides by making suitable rules under the Poisons Act.

Steps, he said, were also being taken to enforce safety measures in the factories dealing with insecticides to ensure that import trade control licences were issued only to sole agents of manufacturers of insecticides.

small MCH staff as provided in the rural areas the author wish to suggest the following measures :

(a) Establishment of simple training for the traditional birth attendants in which they are taught how to avoid introducing infection into the birth canal and in the cord area of the new born, to bring their patients to the health centre for prenatal care, to recognize serious complications and to arrange for treatment, and to enable the attendants to feel that they are members of the health centre team. The UNICEF has been assisting to develop this programme.

(b) The prenatal clinics should concentrate on vigorous treatment of anaemia, under and malnutrition and on imparting of necessary health education. Iron therapy, supplementary feeds and anti-helminthic treatment should be given as necessary. This might partially ensure safe delivery and successful lactation.

Under the circumstances outlines of other usual routines of parental care and routine attendance by the trained staff at confinements would be of secondary importance and should not be allowed to interfere with the services aimed at the major problems. Unfortunately it is rather common in similar situations to find the midwife devoting most of her time to routine delivery care and the remainder to routine prenatal procedures focussed primarily on pregnancy and not the patient. UNICEF iron tablets, dietary supplements and drugs are often not utilized. The author therefore suggest reorientation of the training round the problems and their solution.

(iii) Problems among Infants and Young Children :

In nearly all assisted countries services for children have received less attention than those for mothers. And the interest of staff and availability of services tend to decrease with the advancing age of the child. Young infants have had more services than the older infants and the pre-school children are largely neglected. This is particularly unfortunable because in these countries the major preventable health problems, i.e., under nutrition, malnutrition, intestinal infections and communicable diseases begin during the weaning period and continue to affect them through the next 2-3 years of life (**See** Table I).

Table 1. Comparisons of reported neonatal, post-natal mortality rates and deaths under one and one to four years ages for selected countries, 1953.

Country	Infant mortality ratio. A	Ratio of neonatal to post neonatal rates. B	Deaths under 1 year. C	Deaths 1-4 years. D
Egypt*	179	1 : 4	81,364	64,031
India	123†	...	8,08,677	7,39,938
Yugoslavia	116	1 : 2	56,268	17,601
Chile	114	1 : 1½	26,594‡	7,415‡
Guatemala	103	1 : 2	16,108	20,686
Peru	100	1 : 1½	28,226	18,834
Portugal	96	1 : 2	19,310	8,843
Mexico	95	1 : 2	1,20,117	99,889
Costa Rica	83	1 : 2½	3,956	1,692
Elsalvador	83	1 : 2	81,048	7,096
Ceylon	71	1½ : 1	22,869	17,118
Singapur	67	1 : 1	3,658	1,452
Thailand	65	1 : 3	39,397	28,273
Jamaica	64	1 : 2	3,280	1,565
Peurto Rico	63	1 : 1½	8,342‡	2,638‡
Spain	59	1 : 1½	34,552	9,044
Italy	58	1 : 1	49,076	11,550
Panama	54	1 : 1½	1,687	1,237
Japan	49	1 : 1	91,424	50,516
France	42	1 : 1	33,919	6,239
Canada	35	1½ : 1	14,764	2,444
Finland	34	1½ : 1	3,105	718
U.S.A.	28	2½ : 1	1,08,405	18,235
England & Wales	27	2 : 1	18,324	3,204
Australia	23	2½ : 1	4,713	1,205
Netherlands	22	2 : 1	5,048	1,485
Sweden	19	3 : 1	2,064	478

* Localities with Health Bureau.
† 1949.
‡ 1952.

Column B of the Table I shows that in countrie reporting infant mortality rates about 100 or higher the ratios of neonatal mortality rates to the post neonatal mortality rates run round 1 : 2 to 1 : 4 (with higher infant mortality rates). In countries where the rates have fallen below 100 the ratios are in the order of 1 : 1 and only where the total rates have reached 35 or below the neonatal mortality rates exceed those of the post-neonatal rate. Under these circumstances there appears to be little justification for concentrating the services on the neonatal at the expense of the older infants and young children in countries with infant mortality rate higher than 100. From Columns C and D in the table

CONSUMER PRICE INDICES, 1937-56.

Abstract of Consumer Price Indices (on the base 1953=100) from International Labour Review (Statistical Supplement) Vol. LXXVI No. 6 Dec. 1957.

Year	Egypt	South Africa	Canada	United States	Mexico	Burma	Ceylon	India	Iran	Iraq	Japan
1937	34	50	55	54	19	27	38	29 (Bombay only)	12	20	—
1949	94	80	87	89	74	130	90	94	102	110	82
1950	99	83	89	90	79	110	95	95	84	100	77
1951	108	89	98	97	89	107	99	98	87	107	89
1952	107	97	101	99	102	103	98	97	94	115	94
1953	100	100	100	100	100	100	100	100	100	100	100
1954	96	102	101	100	105	96	100	95	118	98	106
1955	96	105	101	100	122	98	99	90	122	101	105
1956	98	107	102	102	128	111	99	99	130	107	106

Year	Karachi	Singapore	Denmark	France	Italy	Spain	Sweden	Switzerland	United Kingdom	Australia	Germany
1937	—	29	48	—	—	27	49	59	—	38	59
1949	88	77	82	70	87	83	78	95	79	62	99
1950	85	79	87	77	86	92	79	94	81	68	93
1951	88	97	96	91	94	100	92	98	89	82	100
1952	90	100	100	101	98	98	99	101	97	96	102
1953	100	100	100	100	100	100	100	100	100	100	100
1954	98	93	101	100	103	101	101	101	102	101	100
1955	94	91	107	101	106	105	104	102	106	104	102
1956	97	92	113	103	111	111	109	103	—	110	105

NATIONAL WATER SUPPLY AND SANITATION PROGRAMME

Latest position on the water supply and sanitation schemes.

	Urban	Rural	Corporation
No. of Scheme Sanctioned ...	275	195	11
No. of Scheme under Execution ...	244	195	11
No. of Scheme Completed ...	31	—	—
Total Estimated Cost of the Scheme	Rs. 55.86 Cr.	Rs. 15.78 Cr.	Rs. 7.36 Cr.
Amount Sanctioned by Govt. of India up to the end of March, 1958	,, 21.08 Cr.	,, 5.95 Cr.	,, 58 Cr.
Tentative Allocation for '58-59 ...	,, 6.25 Cr.	,, 2 Cr.	,, 50 Cr.
Amount Spent on the Scheme up to 31st March, 1958 ...	,, 19.28 Cr.	,, 4.48 Cr.	——

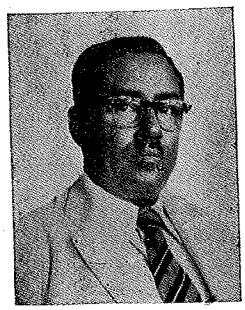
MORTALITY FIGURES FOR CHOLERA, DYSENTERY AND DIARRHOEA.

These can be easily be controlled by improved environmental sanitation.

	Cholera	Dysentery & Diarrhoea
1951 ...	41,543	1,71,802
1952 ...	58,252	1,98,248
1953 ...	1,01,731	2,19,042
1954 ...	19,340	1,79,785
1955 ...	7,662	1,41,316
Total ...	2,28,528	9,10,316

ASSOCIATION NEWS

DR. S. C. SEAL



Dr. S. C. Seal, Professor of Epidemiology, All India Institute of Hygiene & Public Health, Calcutta and General Secy. of the Association and Managing Editor of the Indian Journal of Public Health, has been appointed as a member of the Expert Committee on Plague, World Health Organisation for a period of five years. Recently he was invited to attend the Third session of the above committee held at Geneva between 15th and 20th September, 1958. He was also invited to attend the XVIth. International Congress of History of Medicine at Montpellier, France held between 22nd 29th September 1958 and to visit the Institute of Epidemiology and Microbiology at Prague, Czechoslovakia. On his way back after this programme he also paid short visits to London School of Tropical Medicine and the Medical Museum of Messrs Burroughs & Wellcome in London, the Institute Superiore Di Sanita in Rome and the High Institute of Public Health, Alexandria.

THIRD ANNUAL CONFERENCE, CALCUTTA

December 27 to 30th, 1958.

The 3rd Annual Conference of the Indian Public Health Association will be held at the All India Institute of Hygiene & Public Health. Calcutta, from 27th. to 30th. December, 1958, under the Presidentship of Dr. B. C. Dasgupta, Ex-Director of Health Services, Government of West Bengal. All members are cordially invited to attend and to participate in its various programmes and functions organised in this connection.

Members who wish to present any scientific paper are requested to send the manscript of their papers or at least the abstracts in duplicate to reach the Secretary on or before 15th December, 1958.

To meet the expenses of the Annual Conference a Reception Committee has been formed and you are earnestly requested to be one of its member, the minimum membership subscription is Rs. 5/- only.

Members are further informed that the Railway authorities has been pleased to grant concession of fare (single fare for double journey) to the Members and Delegates of the Conference. The member wishing to avail of this concession should kindly write to the Secretary at once with the name of the Railway Station from where he wishes to begin his journey so that the necessary certificate may be sent to him in time to enable him to produce the same in time to the Railway Station to obtain the ticket. The concession ticket will be issued in his favour only if his travelling expenses are not borne by his Government or Local Body.

Member's special attention is particularly drawn to the following points and the undersigned shall feel much obliged if he will kindly send his replies thereof by the 15th December, 1958, at the latest.

1. There will be a subscription dinner on the 28th December, 1958 the charges which should be paid in advance is Rs. 7/- approximately.
2. The Business meeting of the Association will be held on the 28th December, 1958, the last date of receiving resolutions is November 15th, 1958.
3. For accommodation in hotel, arrangements will be made if a prior information is received by the Secretary by the 20th December, 1958.

The tentative programme is given below: —

All members are requested to intimate their decision to attend the conference as early as possible.

PROGRAMME

Saturday the 27th December, 1958:

2-30 to 4-00 p.m.—Inauguration of Conference.

4-00 p.m. to 5-00 p.m.—Tea.

5-00 p.m. to 6-30 p.m.—Meeting of the Central Council.
7 p.m.—Entertainment.

Sunday the 28th December, 1958:

9-00 a.m. to 10-30 a m.—Scientific Session.
10-30 a.m. to 10-45 a.m.—Tea.
10-45 a.m. to 12-00 a.m.—Scientific Session.
2-00 p.m. to 4-00 p.m. —do—
5-00 p.m. to 5-00 p.m.—Tea.
5-00 p.m. to 6-30 p.m.—Business meeting.
8-00 p.m.—Subscription dinner.

Monday the 29th December, 1958:

9-00 a.m. to 10-30 a.m.—Scientific Session.
10-30 a.m. to 10-45 a.m.—Tea.
10-45 a.m. to 12-00 a.m.—Scientific Session.
2-00 p.m. to 4-00 p.m.—Reading of papers.
4-00 p.m. to 5-00 p.m.—Tea
5-00 p.m. to 6-30 p.m.—Closing Session.
7-00 p.m.—Entertainment.

Tuesday the 30th December, 1958:

8-00 a.m.—Visit to Sngur Health Centre.
2-30 p.m.—Visit to Chetla Urban Health Centre.

SUBJECTS FOR SYMPOSIUM

(1) Training of Auxilliary Health Personnel.

(*a*) Sanitary Inspector { Public Health Nurse (Men Women).
(*a*) Multipurpose worker { Other multipurpose workers.

(2) Immunisation Programme.

(*a*) Smallpox.
(*b*) Cholera.
(*c*) B.C.G.
(*d*) Diphtheria.
(*e*) Whooping Cough.

(3) Collection of Vital Statistics in Rural Areas.

(4) Miscellaneous papers.

Sd/ S. C. SEAL,
General Secretary.

CENTRAL COUNCIL MEETING

Proceedings of the Second meeting of the Central Council of the Indian Public Association held on 26th August 1958, at the All India Institute of Hygiene & Public Health, Calcutta, Under the Chairmanship of Dr. B. C. Dasgupta, the President of the Association.

The following members were present:—

Dr. B. C. Dasgupta—*President.*
Dr. N. Jungalwalla,
Dr. B. Ganguly,
Sri K. R. Bhide,
Mrs. Uma Mitra,
Dr. K. S. Viswanathan,
Dr. S. C. Seal (*General Secretary*).

Ltd. Col. Jaswant Singh—President-elect and Dr. S. K. Sinha, regretted their inability to attend the meeting.

The agenda were as follows:—

1. To confirm the proceedings of the last council meeting.
2. Discussion on the points arising out of of the proceedings.
3. Opening of Branches.
4. Approval of draft recommendations for the curriculum of the Preventive & Social Medicine, in the undergraduate Medical Colleges in India.
5. Recommendations of the Scientific Subcommittee regarding the scientific programme of the 3rd Annual Conference.
6. Tentative Programme of the ensuing Annual Conference.
7. Budget grant for the Annual meeting.
8. Miscellaneous.

Agenda 1.

The Secretary in presenting the proceedings of the last meeting informed the members that these had been circulated and also published in the April, 1958 issue of the Journal. The proceedings of the last Council meeting were then confirmed.

Agenda 2.

The Secretary gave a brief account of the activities of the Association since the Council met in March, 1958. In regard to the membership subscription he stated that the members were first intimated about the deci-

sion of the Council through a circular in the April & July issues of the Journal. This was followed by the posting of membership cards to the defaulting members by V.P.P. except the local members who could be approached directly. The results were still awaiting. The Secretary then proposed to discuss the other points arising out of the proceedings along with the agenda drawn up for the purpose.

The Council members were of the opinion that the Secretary should prepare a statement regarding the membership position for presentation before the annual meeting of the Central Council and the 3rd Annual General Meeting.

Agenda 3. Opening of Branches.

The Secretary stated that inspite of the formation of the sub-committee for the opening of the state branches the progress was not at all satisfactory. The two states in which the members had taken initiative in the matter were Bihar and West Bengal. The Secretary then gave an account of his personal efforts in the matter. During his visits to Talcher (Orissa), Madras, Lucknow, and Nagpur he had opportunities to discuss the question of opening of states branches with the respective local members and other doctors. In Orissa the meeting was organised by Dr. S. C. Das, Civil Surgeon, Sambalpore, and at Lucknow by R. B. Dr. A. C. Banerjee, the President of the U. P. Public Health Association. In Madras he saw the Chief Health Officer of the city and the Director of Public Health. At Nagpur he met the Regional Director of Public Health, the Chief Health Officer and the Professor of Preventive and Social Medicine of the Medical College. In fact he returned with the hope that besides West Bengal and Bihar, Madras, Bombay, and Uttar Pradesh would soon organise their branches but these had not materialised so far. Dr. Patnaik, at the All India Institute of Medical Sciences, New Delhi, Dr. Sundarababu of Madras, Dr. G. C. S. Naidu of Hyderabad, and Dr. T. B. Patel of Bombay have been personally contacted to take steps to form the branches as soon as possible. Dr. U. C. Bardoloi, the Director of Health Services, Assam was also approached but he could not give any assurance of opening a state branch in Assam at the present stage.

The Secretary then presented the application of the West Bengal members with the proposed Rules and Regulations and the list of members of the Executive Committee of the West Bengal State Branch for due recognition of the Central Council. As the Chairman himself presided over the inaugural meeting and the memorandum was drawn up properly the West Bengal Branch was the first Branch which was accorded the due recognition. The Bihar State Branch which applied earlier did not draw up the Rules and Regulations properly as reported by the sub-commitee. Their report was read at the meeting and the Bihar State Branch was provisionally recognised subject to the modification of the Rules and Regulations. The Secretary was however directed to send a copy of the memorandum of the West Bengal Branch to the Secretary Bihar State Branch for information and guidance, and for resubmission of the memorandum after necessary modification. The Chairman requested other members to take more interest in inducing every state to open its branch.

Agenda 4.

The Secretary presented the final recommendations of the curriculum sub-committee in regard to the curriculum of the P. & S. Medicine for under-graduate colleges in India. Before the final meeting of the Sub-committee was held on the 21st and 25th August he had circulated a draft curriculum prepared according to the suggestions received from the different members as well as from the available reports of various meetings and committees on the subject. The Council members discussed the report drawn and emphasised on the following points before giving their final approval, *viz.*, (1) Some discourse on health education should be given before family visits and village work, (2) The P. S. M. Department may deal with the lectures and demonstration in entomology which is not given by the Pathology and Bacteriology Dept. (3) Rural Training may spread over the entire clinical period so that the students may be taken in batches without determent to the routine lectures of other departments. (4) Family studies to be better organised during the clinical period and a minimum of 10 visits should be made compulsory and 10 seminars of one hour each should be held (5) Integration of teaching

should be kept flexible and collaborative teaching to be organised as the facilities are available (6) Teaching on Classical Hygiene should be continued at the present state of the country's development (7) There should be a separate examination at the end of the course (5th year) on Preventive and Social medicine with one theoratical paper of 100 marks and oral and practical test of 50 marks. The Council, however, made it clear that as in the training of personnel in this country the Preventive and Social Medicine would have to play an increasing role, the aim of the I. P. H. A. was to prepare a standard curriculum for all medical institutions in India to follow but its implementation might be flexible for the time being depending upon the staff and facilities available. The total hours during the entire period of medical course was brought down to 300 hours from 400 hours as originally proposed. Taking 5,000 hours as the total hours available for the entire Medical Course the alloted number of hours is only 6 per cent for Preventive and Social Medicine.

The recommendations of the scientific subcommittee in regard to the scientific session of the next annual conference were then presented before the Council. The Subjects chosen were (1) Training of Auxiliary Health Personnel; (*a*) Sanitary Inspector, (*b*) Multipurpose Workers;—(*i*) Public Health Nurse, (*ii*) Other Multipurpose Workers (2) Immunisation Programme:—(*a*) Smallpox, (*b*) Cholera and T.A.B. (*c*) B.C.G. (*d*) Diphtheria, (*e*) Whooping Cough. (3) Collection of vital statistics in rural areas. (4) Miscellaneous papers. The last item was to give opportunities to the members of the Association to present any subject of their own choice. The following chairmen were proposed for the above panels: (1) Lt. Col. C. K. Lakshmanan or Lt. Col. Chadda. (2) Dr. Seshagiri Rau or Dr. T. B. Patel, (3) Dr. E. Charles, (4) Rai Bahadur Dr. A. C. Banerjee or Dr. B. C. Dasgupta. The speakers proposed for different panels were as follows:—

Panel 1:

(*a*) Lt. Col. Chadda and Sri P. C. Bose.
(*b*) Miss T. K. Adranvala.
(*c*) Col. Barkat Narain.

Panel 2:

(*a*) Dr. K. M. Lal.
(*b*) Dr. M. N. Lahiri.
(*c*) Dr. Benjamin and Dr. P. K. Sen.
(*d*) Dr. L. M. Bhattacharji.
(*e*) Dr. Kulende.

Agenda 3.

Adviser, Model Vital and Health Statistical Unit, Nagpur.

Other participants:—

(*a*) Dr. C. Chandrasekharan,
(*b*) Dr. D. G. Choudhury, Deputy Director of Health Services (Vital Statistics), West Bengal.
(*c*) Dr. A. Mukherjee H. O. Calcutta Corporation.
(*d*) Dr. Jagjit Singh.
(*e*) Dr. Gideon & others.

The above recommendations were approved by the Council and it was also suggested that a group of speakers of each panel may be selected and approached for taking part in the discussion.

Agenda 6.

The following tentative programme of the Third Annual Conference was approved.

Venue of the Conference:—

All India Institute of Hygine & Public Health, Calcutta.

Dates:—

27th to 30th December, 1958.

27 December—
2-30 P.M.—Inauguration.
4-30 P.M.—Central Council Meeting.

28th December—
9-00 A.M.—Scientific Session. (Panel 1).
2-30 P.M.—Scientific Session. (Panel 2).
5-00 P.M.—Annual General Meeting.

29th December—
9-00 A.M.—Scientific Session. (Panel 3).
2-30 P.M.—Miscellaneous. (Panel 4).
5-30 P.M.—Closing of Annual Session.

30th December—
Visit to Singur and Chetla Health Centres.

The following names were proposed:—

(2) Inauguration by:—Dr. B. C. Roy, Chief Minister of West Bengal or the Governor.

(3) Chairman of the Reception Committee:—The Mayor of Calcutta, or Dr. N. R. Sen Gupta.

The cultural Programme might be arranged by the Reception Committee. Dr. Jungalwalla, however, proposed that a study fund may be created for offering I. P. H. A. Scholarship to deserving students.

Agenda 7.

Rs. 500/- was sanctioned from the IPHA fund to meet the expenditure of the Annual General Meeting and Election etc. In this connection the present financial position as presented by the Secretary was also examined by the Council (the Statement of Accounts enclosed).

Agenda 8.

Among the miscellaneous items the applications of the Accounts Clerk and the peon to enhance their salaries were considered. It was decided to bring up this point in the next meeting of the Central Council for final decision and in the mean time interim grant of Rs. 10/- per month might be given to them.

The Secretary wanted to know whether in view of the journal account being maintained in separate banks the same procedure of fixing a donation from membership subscription to the Journal Fund as adopted by the Indian Medical Association should be followed. The members were of opinion that no separate account need be shown in the audited accounts for the Journal, although the two accounts may be maintained in different banks to facilitate collection of advertisement bills.

The meeting was then declared closed with a vote of thanks to the Chair.

Sd/- S. C. SEAL, *General Secretary,*
Sd/- B. C. DASGUPTA, *President.*

ANNOUNCEMENT

Post-graduate Training in Health Education at the All-India Institute of Hygiene and Public Health, Calcutta.

In view of the great importance of Health Education in the Public Health programme and the high priority given to it by the Planning Commission in the development of health services in the country, the All India Institute of Hygiene and Public Health, Calcutta introduced a three-months certificate course with effect from June, 1956, which is held twice in the academic year commencing from January and June respectively.

This course is open to candidates holding the following qualifications:—

1. A University degree in Medicine, Science or Arts.
2. Intermediate in science or arts provided the candidate is employed in Govt. agencies such as health departments, hospitals, schools, colleges and community development projects.

With effect from October 1958 a post-graduate certificate Part II course of Health Education of five and half month's duration has been opened at the same Institute. Only Medical graduates who are exempted from part I course of 3 months are eligible to join this part II course. Preference will be given to those candidates nominated by official and non-official agencies and to those possessing D.P.H. qualification.

These courses will be particularly useful for Health Officers, nurses, health visitors, sanitary inspectors, teachers and social workers etc.

Further particulars regarding the course and application forms etc. may be obtained from the Director, All India Institute of Hygiene and Public Health.

Curriculum of Preventive and Social Medicine for the Undergraduate Medical Course as recommended by the Curriculum Committee and approved by the Central Council of the Indian Public Health Association.

Subject	To be taught by	Method of teaching	Year	Hours
1. The purpose of Medical Education in the background of the changing phases of medicine and the country's need.	P.S.M.	Lecture.	1	10 + 2 (practical).
2. Human Ecology— (a) History of evolution with reference to man and disease pattern and and ecological adaptation of man. (b) Man and Environment— (i) Physical environment. (ii) Biological environment. (iii) Social environment. —Individual and community. (c) Population and their growth.		Lecture and films.	1	
3. Elementary Statistics— Statistical methods.	P.S.M.	Lecture and practical.	1	12+12 (practical).
4. Elementary Psychology. 5. Elementary Social Sciences and citizenship	P.S.M. by arrangement with specialist.	Lecture.	1	12
6. Normal growth and development— (a) Anthropological studies of men.	P.S.M.+Anatomy Department + Anthropologist.	Lecture Demonstration.	2	4
(b) The meaning of normal and its variability.	P.S.M. + Anatomy + Physiology Dept.	—do.—	2	4
(c) Health of the individual and community.	P.S.M.	Lecture and Charts	2	2
(d) Heredity and Health, physical and mental characteristics (normal and deviation from normal).	P.S.M. + Anatomy + Physiology Dept.	—do.—	2	4
(e) Other Genetic studies.		Lecture and Charts	2	2
7. Nutrition and Dietitics. (a) Nutrition, growth and maturation of infants and children with particular reference to preventive and social aspects.	P.S.M. & Physiology Dept.	Lecture and Demonstration.	2	2

PRE-CLINICAL COURSE

Subject	To be taught by	Method of teaching	Year	Hours
(b) Balancing of diets—composition of diet, local food habits, etc.	P.S.M. & Physiology Dept.	Lecture and Demonstration.	2	2
(c) Results of deficiencies and unbalancing of diets.	P.S.M.	—do.—	2	2
8. Personal Hygiene.	P.S.M.	—do.—	2	4
9. Climatology and its effect on health and disease.	P.S.M.	—do.—	2	4
				78 hours. (64 didactive 14 practical)

N.B.—Practical note books are to be maintained. Class work to be signed and approved by the teacher.

CLINICAL YEARS

Subjects	To be taught by	Method of teaching	Year	Hours
1. History of Evolution of Medicine (Primitive, ancient, modern scientific, preventive and social).	P.S.M.	Lecture and charts of film.	3	4
2. Medical Statistics.	P.S.M.	Lectures, demonstration and practicals.		6+6 (Practical).
(a) Recapitulation of fundamentals.				
(b) Measures of dispersion—standard deviation, standard error.				
(c) Collection, tabulation and presentation of medical data.				
(d) Interpretation of data.				
(e) Use of statistical methods in medical science.				

Subjects	To be taught by	Method of teaching	Year	Hours
3. Environmental Hygiene— (a) Changes in man and changes in environment; (b) Water, air, sewage and refuse disposal, housing and health; (c) Diseases carried by food and food control; (d) Offensive trades; (e) Occupational health and industrial hygiene programme; (f) Village and town sanitation; (g) Mela sanitation.	P.S.M.	Lecture, demonstrations and practicals and field visits.	3	16+ 6 field visits 6 seminars.
4. Bacteriology— General, water, air, milk, and other foods, utensil and food equipment.	P.S.M. in collaboration with Pathology and Bacteriology Dept.	Lecture, demonstrations and practicals.	3	(incorporated in the regular course of the Dept. of Path. and Bact.)
5. Parasitology, Helminthology and Entomology in relation to communicable diseases and prevention and control.	—do.—	Lecture, demonstration and practical. (P.S.M. to deal with entomology section and demonstration).	3	to be incorporated in the regular course of Path. and Bact. 6+16 practical.
6. **Principles of Epidemiology**— General, principles, mass phenomena and mass study of diseases—Natural history of diseases. Social etiology and social pathology. Investigation of epidemic.	P.S.M.	Lecture and charts.	(3rd, 2nd half)	
7. Communicable Diseases— Infection, reservoirs, transmission, host resistance and susceptibility etc. and preventive and control.	P.S.M.	Lecture and charts.	4th year (1st half)	2
8. General principles of prevention and control— Notification, ascertainment, isolation, disinfection and disinfestation, treatment, immunization, vector control, environmental sanitation,etc.; Control of fairs and festivals, traffic control.	P.S.M.	Lecture and field demonstration.	4th year (1st half)	4+2 field visits.
9. Communicable aspects and prevention and control of individual disease. Diseases to be tackled :— Meningitis, diphtheria, smallpox, chickenpox, measles, whooping cough, pneumonias, tuberculosis, leprosy, typhus, enteric fevers, cholera, diarrhoea and dysentery, intestinal parasites, malaria, kalaazar, fllaria, plague, rabies, infective hepatitis, poliomyelitis, venereal diseases and yaws.	Combined lecture of Professor of Medicine P.S.M.	Lecture, charts or films.	4th year the whole year.	25+15 clinical attendance of 2 hours each.

	Subjects	To be taught by	Method of teaching	Year	Hours
10.	Clinico Socio-Pathological Joint Seminars. On chosen diseases.	P.S.M., Depts. of Medicine, Pathology and Bacteriology.	Seminar.	4th and 5th year.	16 hours (8 seminars—once a fortnight of 2 hrs. each).
11.	Nutritional deficiencies — Pathology, clinical manifestation—Lab. diagnosis, prevention and treatment.	P.S.M. and Dept. Medicine.	Lecture and films.	4th year (2nd half)	
12.	Adulteration and Purification (Pasteurization) of food and food poisoning, etc.	P.S.M.	Lecture and demonstration.	(2nd half).	4
13.	Public Health Administration—Health problems of the country, composition of population, census, vital statistics, collection, morbidity and mortality statistics, death certificates. Nature of Health Services— State, Urban, Rural (Health Centre); community projects, etc.; Social and Voluntary organisation: Community health resources; Utilisation of hospitals and dispensaries for prevention and cure.	P.S.M.	Lecture and charts.	5th year (1st half).	8
14.	Preventive and Social Medicine— (a) Patient's history taking and clinical examination—Six clinical sessions. One each with medical, surgical, obstetrical, gynaecological, pediatrics and psychiary.	Integrated teaching medical, surgical, obstetrics and gynecological, pediatrics, psychiatry and dental clinics combined with P.S.M.	Lecture, clinical conference, seminars, demonstrations.	4th+5th year.	No special time is allotted as the clinics fall within the normal routine of different departments.
	(b) Health Examination and Insurance. (c) Socio-Clinico-Pathological conferences with each dept. (d) Dietary deficiencies, child diseases, metabolic diseases and their prevention, cardiac diseases and their prevention, gastric ulcer, cancer, mental diseases, etc.	P.S.M. and Dept. of Medicine collaboration with different Depts.	Demonstration Seminar.	4th or 5th year.	Included in the normal routine of other Depts.
	(e) Taking care of mothers and infants (Maternity and child welfare—antenatal, natal and post-natal care, etc.).	P.S.M. and Dept. of Obst. and Gynec.	Lecture and demonstration.	4th and 5th year.	4+2 clinic visits (4 hours).
	(f) Family planning.	P.S.M. and Dept. of Obst. & Gynec.	Lecture and field visit.	5th year.	2+1 field visit.
	(g) School health and adolescent health.	P.S.M.		—do.—	2+1 field visit.
	(h) Old age and geriatics problems.	P.S.M.	Lecture and field visit. Lecture.	—do.—	1
	(i) Social security and comprehensive medical care plan—Health centres, hospitals, outpatients dept., clinics, follow up services, rehabilitation.	P.S.M.	Lecture and charts and field visit.	4th+5th year.	8 and field visit (see under supervised field training).

Subject	To be taught by	Method of teaching	Year	Hours
Role of general practitioners in the health programme, medical ethics and laws.	P.S.M.	Lecture.	5 years.	1
(j) Health education.	P.S.M.	Lecture and demonstration.	5th year.	4+4 (8 hrs.) practical.
(k) Importance of team work (physician, nurse, social work, sanitation, lady health visitor, midwife, health assistants—village level workers, etc.)	P.S.M.	Lecture and chart.	5th year. (2nd half)	1
(l) National health service.	P.S.M.	—do.—	—do.—	1
(m) Global health.	P.S.M.	—do.—	—do.—	1
15. Supervised field training—to be organised by the Department of Preventive and Social Medicine.				
(a) Family study plan and co-ordinated P. D. services—Student should collect comprehensive data of all phases of the family life particularly as they related to health—completed records of each visit are to be kept in a diary. In this connection the student must know how to instal smokeless chulah, dug-well latrine, soakage pits, DDT ing better ways of cooking, maintenance of kitchen gardens etc.	P.S.M. in collaboration with the Medical Officer (for T.B., V.D., typhoid).	Field visits and seminars. Helping by the students of the social and health problems arising in the family and finding reminding for them health education method should also be tried.	3rd, 4th and 5th year.	Visit once weekly—one seminar a month (only 4 students will present their records for discussion).
(b) Study of the family surroundings and of the socio-economic and sanitary conditions of the patients' home. Ascertain source of infection and planning and actual participation in the central measures.	—do.—			6 families to be visited and detailed records and account taken to be present in seminars. (6 visits).
(d) Diet survey in the families.	P.S.M. and Physiology.	Any time during 3rd, 4th and 5th year.		6 hours including analysis and presentation.
(d) Family health survey.	P.S.M.	Between 3rd and 4th year.		3 days (use vacation period).
(e) Participation in rural health and medical care programme : —Child welfare and maternity work. —Rural sanitation. —Control of communicable diseases. —Sp. Immunisation programme. —School health. —Collection of vital statistics. Dispensary or hospital medical care programme : Family visits. Efforts to meet the social needs of a given community.	P.S.M. and Med. Off. Health Centre area.	Field training.	4th year.	1 seek at the health centre to be sent by turn in groups by turn (shared over the whole clinical period).

Subject	To be taught by	Method of teaching	Year	Hours
(f) Student health services for medical and university students.	P.S.M.		3rd, 4th and 5th year.	As a special service. 2 hours.

DEMONSTRATIONS & PRACTICALS

	Subjects	To be taught by	Given by	Year	Hours
1.	Anthropological.	Demonstration.	Anthropologist or Dept. of Anatomy.	1st year.	2 hours.
2.	Nutrition and Dietetics—Preparation of balanced diet for different classes of people.	—do.—	P.S.M. and Dept. of Physiology.	1st year.	6 hours.
3.	Elementary Statistics.	Practicals.	P.S.M.	1st year.	12 hours.
4.	Personal Hygiene.	Demonstration.	P.S.M.	2nd year.	4 hours.
5.	Climatology.	Demonstration.	P.S.M.	2nd year.	4 hours.
6.	Environmental Sanitation.	Demonstration and practice :	P.S.M.	3rd year.	14 hours.
	Atmospheric pollution and purification : Water pollution and purification.	Visit to water purification plant, trenching ground, sewage disposal works.			
	Garbage, refuse and excreta disposal; food, sanitation and housing.	Incineration bored-hole and dug-well latrine, etc. Construction of tube-well, housing projects, etc.			
7.	Disinfection and Disinfestation.	Visit to steam disinfection station, current and terminal disinfection of houses, transport ambulance, disinfection of well, various articles and discharges, Hospital disinfection.	P.S.M.	3rd year.	6 hrs.+2 seminars—1 hr. each.
8.	Mela Sanitation.	Demonstration.	P.S.M.	3rd year or 4th year.	one day.
9.	Hospital clinics on communicable diseases.	Clinic demonstration.	Clinicians.	3rd year and 4th year.	24 hrs. (included in the study of medicine.)
10.	Bacteriology including diagnostic procedures.	Practicals.	Pathology and Bacteriology Dept.	3rd year.	Included in the study programme of Bacteriology.

	Subject	Demonstration or practical	Given by	Year.	Hour
11.	Parasitology, Helminthology and Entomology.	Practicals and demonstration.	In collaboration with Pathology and Bacteriology.	3rd year.	16 hours (8 classes).
12.	Clinico-Social and Clinico-Pathological conferences.	Conference.	In collaboration with Dept. of Medicine, Surgery, Midwifery, Pathology and Bacteriology.	4th and 5th year.	16 hours (8 hrs. conferences of 2 hours each).
13.	Vital Statistics II.	Practicals.	P.S.M.	4th year.	12 hours.
14.	Visit to Industrial Establishment (occupational diseases).	Demonstration.	P.S.M.	4th year.	One full day.
15.	Visit to slaughter house, tannery, rice mills, etc.	—do.—	P.S.M.	4th year.	Half-day.
16.	Immunisation procedures : Preparation of vaccine lymph procedures of vaccination (visit to vaccination centre), other inoculation measures.	Demonstration.	P.S.M.	4th year.	Half-day.
17.	Adulterated and unwholesome food.	Demonstration.	P.S.M.		2 hours.
18.	Visit to T.B., V.D., Deprosy and Cardiac clinics.	Demonstration.	P.S.M.	4th and 5th year.	8 hours.
19.	Visit to maternity and child welfare clinics, pediatrics clinic.	Demonstration.	P.S.M. and Dept. of Obst. and Gynec.	4th year and 5th year.	6 hours.
20.	Visit to family planning clinics.	—do.—	—do.—	5th year.	2 hours.
21.	School health.	—do.—	P.S.M.	5th year.	2 hours.
22.	Family study—follow up plans for hospital and O.P.D. cases.	Field practicals.	—do.—	4th and 5th year.	Outside lecture hours once a week, seminar once a month.
23.	Diet survey in families or in students' hostel.	—do.—	P.S.M. and Physiology.	3rd and 4th year.	4 hours (including interpretation).
24.	Family health survey.	Field practicals.	P.S.M.	Between 3rd. and 4th year.	3 days (use vaccination period).
25.	Visit to mental hospital and mental hygiene clinics.	Clinics demonstration.	P.S.M. and Dept. of Medicine.	5th year.	2 hours + 10 hours (included in Medicine).
26.	Visit to Rural Health Centre.	Field of practice.	P.S.M.	4th and 5th year.	1 week (in batches).
27.	Visit to Health Museum and health education procedure.	Demonstration.		4th and 5th year.	4 hours.

SUMMARY OF THE TIME SCHEDULE.

Year	Lecture hours.	Lecture-cum-Demonstration hours.	Practicals hours.	Clinics.	Joint Conferences and Seminars.	Field Practice and visits.	Total hours. Pre-Clinical
1	26	8	14	—	—	—	48
2	—	30	—	—	—	—	30
Pre-Clinical	26	38	14				78
3 4 5	62	44	36	54*	34 (50 hours)	30 hrs. Mela sanitation —1 day. Industrial— 1 day. Off trade—½ day Immunisat—. ½ day	
Clinical	62	44	36	Outside teaching hours.	50	30 hrs.	222
Total period	88	82	50	—	50	30 hours + (10 days field work)	300 hrs.

* Included in the usual programme. No extra time is allotted.

Practicals :

(1) Elementary statistics—1st year—12 hours.
(2) Balanced diet and diet survey—1st year + clincing years—2 + 4 = 6 hours.
(3) Bacteriology, Helminthology, Pathology, Entomology—16 hours, extra over and above what is now being given in the M.B.B.S. Course.
(4) Medical statistics including vital statistics—4th—12 hours.
(5) Demonstration of testing of adulterated and unwholesome food—milk, mustard oil, fish, meat, eggs.—4th year—2 hours.

Examination :

At the end of the whole course in 5th year—

(a) A Theoretical paper of 100 marks
(b) Oral and Practical 50 marks

} Pass Mark—50%

Pre-Registration Course :

At least one month's (some advocated 2 months) training in Rural Health Centre has been suggested where facilities are available.

BOOK-REVIEWS

PREVENTIVE MEDICINE FOR THE DOCTOR IN HIS COMMUNITY—An Epidemiological Approach—by Hugh R. Leavell and E. Gurney Clark; Second Edition. Published by McGraw Hill Book Company Inc. Blakiston Division, New York, 1958, 689 pp.; Price $10.00.

Formerly titled as the Text Book of Preventive Medicine in its first edition, the book has been renamed by the authors, perhaps more appropriately, as 'Preventive Medicine for the doctor in his community' in its second edition. The same method of approach has been maintained, the main underlying theme being application and utilization of the epidemiological principles in the understanding of preventive medicine which, according to the present day concept, also includes what is known as social medicine. This approach has indeed given a newer outlook and greater consistency of this text than what could be obtained by the classical approach. It seems that the idea of approaching preventive medicine from the standpoint of natural history of disease, as adopted by the authors, appealed to the health workers and teachers in many parts of the world and their appreciation of its value is evident from the need for a second edition within a short time. The authors therefore deserve to be congratulated for the desired success of their purposeful efforts.

The book derives its distinction from other books on the subjects in having as many as 19 distinguished contributors besides the two principal authors and in focussing the attention of the readers on the epidemiology in a broad sense and in the organisation of the subject content within each chapter on the basis of five levels of prevention. Thus the readers obtains a suggestion that preventive medicine is a part and parcel of general medicine and public health, a desirable concept in the present day practice of medicine. The task is indeed a difficult one and the authors have tried to push this concept through an emphasis on principles even at some sacrifice of factual contents. At the same time it emphasizes on the multiple causes of disease and multiple potential opportunities of service for its prevention. The approach is useful and should be appealing particularly to those who are dealing normally with preventive medicine and public health; besides it provides a frame work of understanding into which new factual knowledge of importance to practitioners can be added.

The book is divided into three parts and 21 chapters viz., 1. Basic principles—4 chapters. 2. Application of principles—12 chapters and 3. Public Health—Preventive medicine as organised community action—5 chapters. Besides the addition of a new title the main changes in this addition are the addition of a new chapter on the natural history and prevention of oral diseases, a more orderly arrangement of chapters, more illustrations, some expansion in length of the chapters and addition of bibliographies. Nearly half of the text was dealt with by the two senior authors. Since the principles underlying the social medicine formed the basis of a large number of chapters in this book it might be worthwhile to consider whether in tune with the time the term social medicine could be incorporated in the title of the book, or else its might be conjectured that this term has been purposedly omitted.

The printing and make up of the book are good and is highly commended to all workers, students and practitioner of medicine and public health including dental practice.

THE PROBLEM OF DENTAL CARIES AND FLUORIDATION OF PUBLIC WATER SUPPLIES—By Dr. D. G. Steyn. Published by Die Voortrikkerpers, Beperk, Johannesburgh, South Africa, pp. 208. Price 45/- (postage paid).

Dental caries is a common malady all over the civilized world, particularly affecting the earlier age groups. Progressive changes in the food habits, neglect of oral hygiene and increasing use of beverages and sugar products are some of the most important factors causing ever-increasing dental caries even in India. This high incidence must have deleterious effects upon the health and economy of the masses and any effort to combat this disease should be welcome.

Fluoridation of domestic water supplies as a prophylactic measure against tooth decay is now being pursued most enthusiastically in many countries. The arguments for its mass application must in the first instance be logically supported and then its efficiency to be judged from the results in the field.

In his connection, Dr. D. G. Steyn, Professor of Pharmacology in the University of Pretoria has studied this problem intensively and has done a good and timely service to the humanity at large by bringing out this publication. He has not only reviewed the available literature on the subject creating a picture of the problem understandable to all who may read it but has also put up unbiased arguments how mass fluoridation irrespective of age, sex, occupation, susceptibility, climatic conditions, disease and eating and drinking habits can be dangerous to the community.

This book contains five essential chapters ending with summary and conclusions. The first four chapters are I. General; II. Dental decay—Nature causes and prophylaxis including fluoridation; III. Chronic fluorine poisoning—factors and symptoms; IV. Discussion. It is a handbook well-printed and nicely bound, and is a valuable contribution to the knowledge on caries.

It is commended to all readers who are interested in the problem and particularly to the health administrators, practising dentists and physicians, teachers of all medical, public health and allied institutions as well as to those who are engaged in investigating the problem.

INDUSTRY AND TROPICAL HEALTH III—Proceedings of the Third Conference of Industrial Council for Tropical Health. Published by Harvard School of Public Health, Boston, 1957: pp. 261.

This is a report of the proceedings of the Third Conference of the Industrial Council for Tropical Health held in April, 1957, under the sponsorship of the Harvard School of Public Health, Boston, U.S.A. The first two conferences were also held at the same school in December, 1950, and April, 1954, respectively. The importance of such a conference and the interest created among those involved and associated with industrial health with particular reference to the tropical climate is easily appreciable from the very fact of holding three such International Conferences in succession within a period of seven years. In this conference representatives from as many as 61 Industrial Organisations participated.

The Conference had eight sessions to discuss a large number of subjects of both general and special interest discussed by leaders in their respective fields. To mention a few, community integration of medical services, problems of organisation of health serivces in the tropics, educational programmes in preventive medicines, social adjustment of service abroad, the role of government in research on tropical disease and some important diseases like Malaria, Hepatitis, Poliomyelitis, Tuberculosis, Dysentery, Nutrition and Immunisation. In fact, there are discussions of problems that the Business Concerns have had in countries that are not adequately industrialized. The practical approaches for their solution are described in detail. Many members of Industrial managements will find the discussions as of great value to them and so also the industrial physicians and students and teachers of industrial hygiene occupational health, particularly in respect of prevention and control. The general practitioners, too, in both temperate and tropical climates will discover a wealth of information available here.

The report is nicely printed and bound. The interesting feature of the report is the register of all participants and delegates with their photos and descriptions appended at the end.

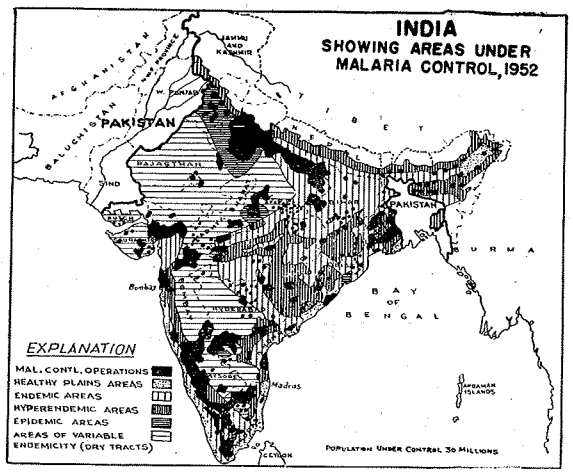
THE NEW MYSORE MEDICAL & PHARMACEUTICAL DIRECTORY—Published by New **Mysore Publishers, Dharwar, Mysore State, 1958. pp. 442. Price Rs. 10.50 n.p.**

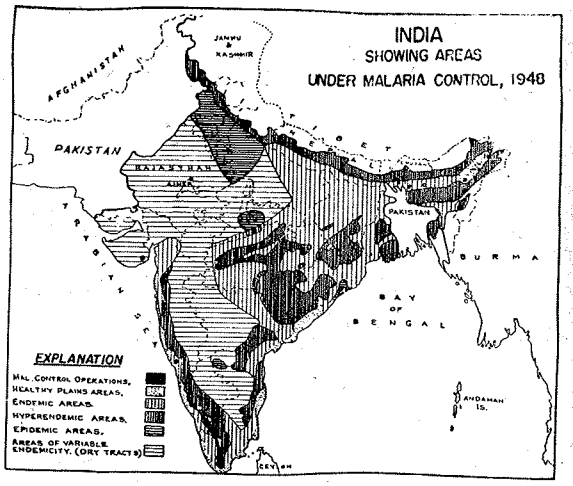
The publication of the New Mysore Medical and Pharmaceutical Directory, 1958, is a new adventure in Directory Publication relating to a State in India. It is a fairly comprehensive publication containing information regarding the State (recently recognised), ancient Indian medicine, modern medical science, medical educations, medical journals, Health Services, Hospitals, dispensaries and research institutions, scientific societies and associations, dental institutions, medical and dental practitioners, pharmacy and pharmaceuticals, laws regulating health and drugs, Red Cross and Ambulance Services, etc. In fact, it is a useful book both for the public as well as the medical and dental professions. It can also serve as a reference book not only for the various informations relating to the Mysore State but also for the general information about modern medical sciences as applied to India.

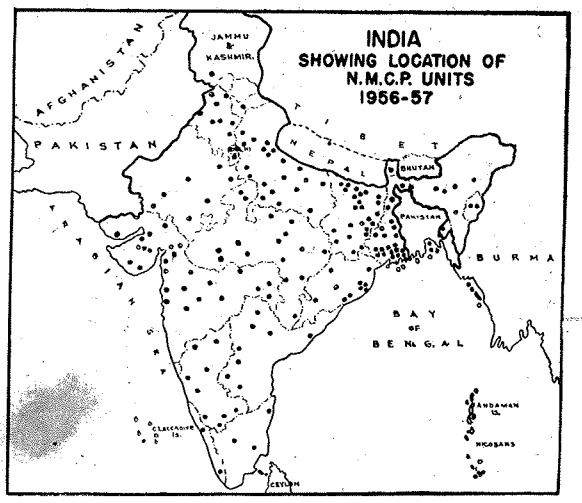
Among the various journals, societies and associations the Indian Public Health Association and the Indian Journal of Public Health should also have been given a place.

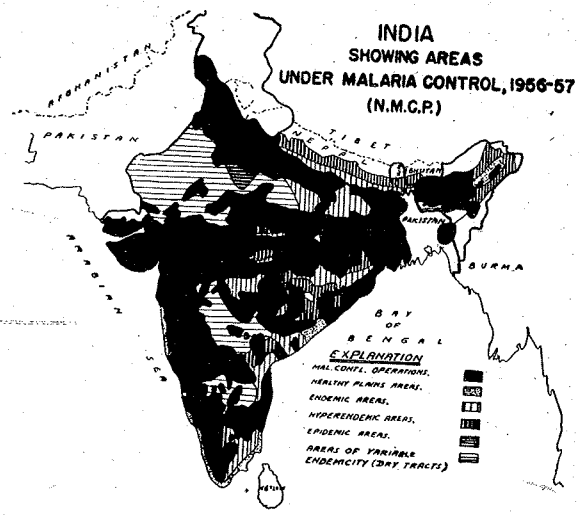
We commend the book to all concerned and wish the publishers every success.

CHRONOLOGICAL MAP OF MALARIA CONTROL IN INDIA









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