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KULU VALLEY-MASS V. D. CONTROL CAMPAIGN, 1959

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Kulu Valley in Kangra District of the Punjab lies between north latitude 30.20 to 32.26, East meridian 76.59 to 77.50. The valley is situated in the large gaps made in the outer Himalayas by the rivers Beas and Sutlej and connects the immense glacier crowned ranges bordering Lahaul and Spiti with the foot-hills which extend in parallel waves towards Mandi District of Himachal Pradesh. The valley is nearly 80 miles long with a breadth varying from 20 to 24 miles spread over 1,912 square miles. The hill-sides are covered with thick pine forests. The temperature ranges between 41°F in January and 95°F. in June. Rains are not heavy as compared to the rest of the Kangra District and occur during July, August and again in January, February. During 1959, 1962 mm rain-fall was recorded. The Valley floor has an average height of 4,000 feet above sea level, with the mountain peaks over 10,000-14,000 ft.

The Kulu Sub-division comprises of the Kulu and Seraj Tehsils and sub Tehsils of Lahaul and Spiti. The 1951 census population was 1,31,000 persons (approximately 66,000 males and 65,000 females), excluding Lahaul and Spiti. Kulu town (height 4,500 feet) is the largest in the valley with a population of 3,500. Manali (height 6,000 ft.), which is 24 miles from Kulu, is a developing station, with a population of 2,300. There are revenue *Kothies* comprising 2 to 5 *phaties;* each *phatie* includes 5 to 15 villages; the village population varying from 20 to 1,000.

A metalled motor road, connects the Kulu Valley with the rail heads at Pathankot and Jogindernagar. A second Jeepable road connects the valley through Banjar, Ani, Luri to Simla. A seasonal air-service connects Delhi with Kulu via Chandigarh, the State Capital.

The local peoples are fair in colour, delicate in build and pastoral in habits and occupation. Living on steep mountain slopes and in deep cut off valleys, they depend for their livelihood on sheep and goat herds, some agriculture, and fruit growing. Education, industry and the know-how of progress are only now reaching these simple people. The sheltered and isolated existence has resulted in the backwardness and poor economic status of the population.

Main crops are maize, barley, wheat and rice. Vegetables are grown during summer months. Potatoes and tomatoes are being grown increasingly in the valley. Apple, persimmon, pear, appricot, peach and cherry fruits flourish in the valley. Horse chestnut and walnut trees grow in many places. Community Development Programmes have introduced fruit gardens in many places, improved agricultural practises, new forest plantations, cottage wool spinning and shawl making centres.

Daily diet consists of two main meals, one in the morning and a second late in the evening. In the summer a light mid-day meal of wheat or barley bread is added. The staple food consists of cakes of barley flour in summer and maize or buck wheat, flour in the winter. Rice and vegetables stew called, *'Kaupi'* are popular. Goat meat is used only at the time of festivals. A home fermented wine is used.

Festivals are celebrated with enthusiasm and zest and the most popular is the Dussehra festival in October, when the community gods are brought from all over the valley with great pomp and ceremony.

The Kulu people have, in the course of time, developed their own closed chain customs, habits, beliefs and behaviour patterns. Inter-marriages and in-breeding have affected the general hardiness of the people. Divorce

for the woman is possible and the new husband has to compensate the previous one. This custom is called *"Rheet"*. Sometimes a woman changes hands 4 to 5 times. Polygamy and polyandry have nearly died out. There is no purdah and the women and the men freely mix together. The men folk go to the plain districts to seek work and employment during winter months, and during summer large numbers of lumber labour from Mandi and Hoshiarpur districts visit the valley to seek seasonal employment with the forest or P.W.D. organisations. Attracted by the natural scenic beauty, many visitors, both Indian and foreign, come to the valley during summer and autumn months. Some of these visitors have settled in the valley and have developed flourishing apple and other fruit gardens. It is likely that venereal diseases were introduced amongst the valley population by the returning men folk and the visiting labour; and once introduced these diseases spread rapidly and extensively.

The presence of the venereal diseases among these people provides the basis of the name of *"Pahari Roag"* (hill Disease) for these diseases. The Punjab State Government placed a W.H.O. trained Venereal Diseases Treatment Team at Kulu from June, 1951. It consisted of a Physician Incharge, one Assistant Medical Officer (Serologist), one Technician with other staff. A vehicle was provided for the team to visit the field areas. A main clinic and three indoor beds at Kulu were maintained. W.H.O. and UNICEF provided help in training facilities and equipment, reagents and PAM.

The routine work of the team consisted of publicity and health education, blood and clinical examination of persons presenting themselves at the main clinic or contacted in planned and publicized field visits, and treatment with PAM in all positive cases. Later on house-to-house services were introduced. Surveys to assess the incidence of venereal diseases particularly syphilis were conducted. These estimated the overall incidence of venereal syphilis at about 30%. Upto 1956, the number of persons screened by the team is as follows:—

1951	...	...	910
1952	...	...	7,078
1953	...	...	8,133
1954	...	...	7,017
1955	...	...	5,810
1956	...	...	11,066

In 1951, 810 patients were examined, out of which 393 were diagnosed to be suffering from venereal diseases (gonorrhoea 36, chancroid 2, syphilis 355).

During 1952, out of a total of 7,078 screened by the team, in the field and at the main clinic, 2,468 were cases of venereal diseases (Gonorrhoea 222, chancroid 22, others 5, syphilis 2,219).

The over-all percentage of venereal diseases for these two years worked out to 43.1 percent for 1951 and 34.8% for 1952.

In the field surveys from March to October, 1952 out of a total of 2,962 persons examined, 1,065 were S.T.S. positive giving a percentage of sero-positivity of 33.28%. During 1953 a total of 8,133 persons were screened and the sero-positivity was 24.31%. In 1954 a total of 7,017 persons were screened and the sero-positivity worked out to 18.7%. During 1955, 5,810 persons and during 1956, 11,066 persons were examined and treated.

On an assessment of the work of the Venereal Diseases Team at the end of 1955 it was felt that although the team was doing very useful work, the response from the people was not improving and the objective of reducing the endemicity of venereal diseases from the valley population in a short-time was not being achieved. The State Health Directorate, therefore, started thinking in terms of a mass campaign reaching the entire population so as to reduce the reservoir of infection to the minimum level and to break the chain of transmission, which could be followed up by surveillance and treatment of any fresh sources of infection by the existing Venereal Diseases Team at Kulu.

On being approached through the Government of India, the W.H.O., UNICEF showed readiness to help with free supply of PAM. A plan of Operations was worked out, but on account of the non-availability of PAM supplies the programme was postponed. During 1957 and 1958 fresh requests for free PAM were made. From March, 1958 even in the absence of the free PAM, the State Government strengthened the team by addition of seven technicians and started a mass campaign to treat all villages one after another with PAM Penicillin at doses of 4 cc PAM for adults and 2 cc for children under 14 years of age. Planned field visits preceded by publicity were undertaken and by the end of March, 1959 approximately, 20,000 PAM injections were given without testing blood or a clinical examination.

In the beginning of 1959 a preliminary discussion on this project was held at Chandigarh with the Regional Advisor on Communicable Diseases in the W.H.O. Regional Office for South East Asia and Dr. Dr. R. B. Tampi of Government of India, where the W.H.O. Advisor informed the State Government that the supplies of free PAM to the tune of 78,400 vials (10 cc each) would be made available. This was based on a dosage of 8 cc PAM to adults and 4 cc to children (1 cc = 300,000 i.u.) A fresh draft plan of operations was prepared and after approval of the State Government it was sent to the Government of India for its finalisation with the W.H.O., UNICEF. The Programme of a mass campaign against venereal disease was timed to start from 1st of September, 1959, as it was felt that the monsoons would be over by this time, and that the mild weather and comparative leisure of the valley people about this time could be taken advantage of.

For a campaign of this magnitude, detailed advance planning was considered necessary. It was felt that intensive advance and concurrent health education and publicity were most important, for its successful implementation. Kulu Sub-divisional Magistrate, local M.L.A.'s, village leaders; Community Project, Public Relations, Education and Health agencies were brought together to discuss the aims and objects of the campaign and means to achieve maximum acceptance by the people. With the help of the local Public Relations Officer, Block Development Officers, Social Education Organisers, *Gram Sewaks*, Health and Education Workers, the publicity operation was planned.

(i) In this connection the Chief Minister, Punjab, addressed the first public meeting at Kulu on the 10th June, 1959.

(ii) The Public Relations and Health Teams made a complete Health education and publicity tour of the valley during July and August;

(iii) One BCG Publicity unit with van, public address equipment, film projector, films and other publicity material was sent to Kulu Valley in early August and remained at the field of operations till the end of the campaign;

(iv) A unit of the publicity organisation, Ministry of Information and Broadcasting, Government of India also helped in publicity work during the campaign;

(v) The State Government sanctioned a special grant of Rs. 5,000/- for arranging cultural shows and drama parties through the Public Relations Department.

For base-line information on the prevalence of venereal syphilis in the valley at the start of the campaign, 400 random blood samples were collected from the under-mentioned areas—

(i) Anni Dispensary (Outer Seraj)—100 blood samples; Seropositive 23; (Male 20, Female 3).

(ii) Banjar Dispensary (Inner Seraj)—100 blood samples; Seropositive 17; (Male 16, Female 1);

(iii) Naggar Dispensary (Kulu)—100 blood samples; Seropositive 22; (Male 16, Female 6);

(iv) Shoysh Village, Kothi Naggar (Kulu)—100 blood samples; Positive 12; (Male 10, Female 2).

Details of these 400 persons have been kept. Table below gives birth-rate, death-rate, infant-mortality rate for Kulu for the years 1941 to 1958 as these indices are relevant to endemicity of venereal diseases:—

Years	Death-rate per mille	Birth-rate per mille	Infantile mortality rate per 1000 live-births
1941 ...	26.51	27.52	196.16
1942 ...	26.76	28.36	107.56
1943 ...	25.16	29.74	189.72
1944 ...	25.73	32.30	171.53
1945 ...	23.45	31.49	160.50
1946 ...	25.71	30.12	187.00
1947 ...	26.68	30.66	140.77
1948 ...	29.67	30.14	151.84
1949 ...	23.88	32.33	149.50
1950 ...	25.62	29.91	164.21
1951 ...	23.49	30.06	107.50
1952 ...	19.78	35.51	126.89
1953 ...	21.45	31.65	144.81
1954 ...	20.41	32.59	139.98
1955 ...	20.74	33.23	130.10
1956 ...	20.72	34.82	178.95
1957 ...	18.34	33.40	120.34
1958 ...	19.46	29.47	168.35

The author was incharge of the campaign. The valley area was divided into three sectors —Kulu, Inner Seraj and Outer Seraj—each under the charge of a qualified and trained Public Health Officer. Lists of houses and families in individual villages were prepared, with the help of vaccination staff.

Originally 60 units were planned for undertaking the work. 62 BCG Technicians with *Swasthya Sahayaks* formed the core of injectors. For the supervision of the work of these units, 18 doctors were placed incharge of teams. 8 doctors were added at a later stage. To help and assist the technicians, 45 dispensors, 18 sanitary inspectors, 7 lady health visitors and other anciliary staff were provided.

This was in addition to the existing Kulu V. D. Team staff of two doctors, one dispenser, and 7 field technicians. Four Jeep cars and three trucks were used for movement of equipment, staff and supervisors during the campaign. Red Cross and some pharmaceutical firms sent free medical supplies. An exhaustive list of equipments required by the teams was prepared and these were collected in advance.

On 23rd August medical officers, technicians, sanitary inspectors, lady health visitors, dispensers and the senior supervisory staff reached Kulu. Tent accommodation was arranged for them. From 24th to 29th August the entire staff was given an intensive orientation training. This included:—

(i) Care in the handling and use of equipment, particularly sterilizers, syringes, needles, PAM vials and general medicines;
(ii) Scrupulous sterilization of syringes, needles, forceps and aseptic technique of intramuscular injections;
(iii) Possible penicillin sensitivity reactions and their treatment. Personnel were even trained in artificial respiration;
(iv) Symptomotology of congenital and acquired syphilis;
(v) Social behaviour in public dealings;
(vi) Filling up the various proforma and maintenance of records;
(vii) Transport and halt requirements of teams.

The detailed movement plan of each team and each unit was rehearsed. Help to be obtained from Development and Revenue department staff, and local people, were indicated.

As the UNICEF PAM had not arrived, 9000 vials of available Dumex PAM and Diamine penicillin, drugs to control penicillin reactions, general use medicines and equipment were given to the various teams. From the morning of 29th August, 1959 the teams started moving out to their places of work. By the evening of 31st August, all the 18 teams had reached their destinations and the mass campaign, as scheduled, started from 1st of September.

During the first five days of the campaign, more than 13,000 injections consumed the available supplies of PAM and Diamine penicillin. State Director of Health Services was in the field to guide the work of the team at the start and again during the courses of the campaign. From 6th to 9th September, the Regional Advisor on Communicable Diseases in the W.H.O. Regional Office for South East Asia and Dr. R. B. Tampi of the Government of India, visited the field operations. These experts felt satisfied about the planning and organisation of the programme and the enthusiastic response of the people. Due to unforeseen circumstances the UNICEF PAM for the campaign which had reached Calcutta on the 31st August could only reach Kulu on the 17th September. It was immediately sent to the teams in the field and the work was re-started after a break of 13 days. In this interval the teams stayed wherever they had reached on the afternoon of 6th September. This forced rest, adversely affected the success of the campaign in more than one way;

(a) The village *négies, panchayat,* revenue and block staff, who were to assist the teams at the various places on the appointed days and time, were not regularly available when the programme was re-started;
(b) The local people became busy with harvesting;
(c) The onset of *Sehri* fair from 19th September resulted in movements of large numbers of people from their villages, and with the festivities which included liberal use of the locally fermented liquor the local response decreased;
(d) The workers themselves sitting idle in difficult places lost some of their zeal and enthusiasm.

Within three days, however, the teams adjusted themselves to their new programmes. Additional workers were attached to the teams. Public relations and health personnel were rushed to places where the people were refractory to suggestions and persuasion, and the programme re-started in full swing. In Kulu town the work was started for the first time on the 23rd September and the response in the town was most heartening. More than 95% of the people accepted the injections. In the Manali town—24 miles away from Kulu the response was below normal and special effects of a fresh team were utilized.

By 10th October all the 18 teams returned to Kulu after completing the work in the various areas. *Dussehra* fair, the most popular fair of the valley, started from 11th October. The local people from far and near gathered at Kulu to take part in this festival of Gods. Check posts were set up on the approach roads to give injections to the people who had been missed in the field. In their holiday

and festive mood, the people were not so much amenable to getting the injections.

An assessment of the work completed showed that 71,453 persons were injected till then. Ten new teams were organised to undertake the mopping up operations in the valley. November and December are cold months and the local people were busy once again with the collection and stocking of the harvest. The teams visited the areas which were missed or left over, or where the response was poor in the first round. The mass campaign was closed on the 15th of December, 1959, as per plan and a total of 77,413, PAM injections were completed, attaining a coverage of 60% of population at risk.

PENICILLIN REACTIONS

Out of 77,413 PAM injections given there were only 49 allergic cases of penicillin sensitivity. Not one of these was fatal. There were 9 cases of immediate reaction and 40 cases of delayed reaction.

The details of these are mentioned below:—

Immediate reactions: 9 (more than one symptom in some).

Symptoms of giddiness;	... 4
Symptoms of respiratory distress;	2
Symptoms of vomitting;	... 3
Symptoms of fainting;	... 2
Symptoms of fall in B. P.	... 2

All these cases were treated with Adrenaline injections, anti-histamine tablets and in one case I.V. hydrocortisone injection.

Delayed reactions: 40 mainly consisting of allergic dermatitis in 2-48 hours, urticaria, angio-neurotic oedema especially in the face and allergic conjunctivity. All were treated with anti-histamines by mouth and/or injection, and severe cases by hydrocortisone i.v. injections.

One patient developed Bullous urticaria for which he was again given i.v. Cortisone.

There was no case of typical anaphylactic reaction.

Drugs carried to combat Penicillin reaction:—Adrenaline, aminophyline coramine and cardiazol, synopen ampoules, anti-histamine tablets, hydrocortisone i.v.

The detailed PAM calculations are given below:—

(a) Supplied by UNICEF ...	78,400 vials
(b) UNICEF Penicillin used:—	42,502 vials
(c) Balance UNICEF PAM ...	35,398 vials
(d) Government penicillin used	8,271 vials
(e) Total penicillin used:— ...	50,773 vials
(f) Population covered; 50,884 adults × 8 cc; 26,529 children × 4 cc	
Theoretical use	51,289 vials

The difference between 51,289 and 50,773 vials (516 vials) is accounted for by the fact that some diamine penicillin lying with the V.D. Team was utilized and the Dumex PAM supplied by Government contained as much as 12 cc in most vials.

A special proforma to record the incidence of congenital syphilis in persons under 20 years of age was provided to team doctors for personal observation. Out of 1,870 such persons injected and examined by doctors in person, 32 showed symptoms.

Persons with signs ...	32
Early signs:	
Rashes including condyloma and mucous patches	5 (only skin rash)
Angular stomatitis ...	3
Snuffles	5
Early Bony lesions ...	1
Late signs:	
Bossing	1
Saddle Nose	9
Keratitis	3
Deafness	2
Rhagades . .	nil
Hutchinson teeth ...	5
Perforated Palate ...	nil
Other late Bony Manifestations e.g. Sabre Tibia, Cluttons joints ...	nil

Interesting findings and observations of this campaign are mentioned:

(i) A new technique for the withdrawal of PAM penicillin from the vial was developed. The rubber cap of the vial is pierced with forceps; the forceps is withdrawn and the nozzle of the record-syringe is pushed through this opening. Injecting air inside the vial, enables removing of the entire contents of the vial to the last drop;

(ii) It was found that the PAM was very thick and viscous. The UNICEF PAM was more viscid than Dumex PAM-keeping the vials inside coat-pockets or dipping in warm water, made withdrawal easier;

(iii) It was shown that the full 8 cc of PAM could be injected on one thigh-lateral aspect under the facialata, at the junction of the upper 1/3 and lower 2/3. In the case of children also, 4 cc injection could be given with one prick;

(iv) Injection of 8 cc PAM took 2-3

minutes and increased pressure force did not reduce injection time, but bruised the hands Rubber ring on syringe and cotton pad on piston head were provided. Needle bore was changed from 20 to 18. A daily average of 60-65 PAM injections per injector were, only possible;

(v) The water in the sterilizer was kept constantly on the boil, and fresh sterilized needle was used for every injection; injectors washed hands frequently, with the result that there were only 4 cases of abscess formation;

(vi) Local pain and feeling of heaviness lasted for a few days in many cases;

(vii) Injecting key persons at the start, materially improved public response in the area. In this rural population, night stay and early morning work proved most effective;

(viii) Presence of a lady worker with each team helped in allaying the fear and doubts of women and children;

(ix) Medical team leaders provided medical relief, drugs, dressings and skimmed milk powder to the villagers during the campaign, and this measure further improved response;

(x) Although Panchayat help was provided at each place, adult males proved more difficult to convince and bring round as compared to children and women. School children were rather eager to get injections;

(xi) Each and every village house in the Valley was visited. Family lists proved very useful. Total coverage could not be raised above 60% in spite of the most intensive health education and publicity efforts. In many cases, villagers fled and hid in the fields or inside bolted rooms when the injection teams approached. Sometimes fear of pain and incapacitation or false notions kept them from accepting injection.

From the year 1960 the Venereal Diseases Team at Kulu, has started the planning of surveillance and follow up work, in collaboration with the eight dispensaries and other existing health services in the valley. For the consolidation phase seven sub-clinics attached to the State dispensaries in the sub-division Kulu, at Nirmand, Ani, Banjar, Sainj, Naggar, Jari and Manali have been established. One V.D. technician and one helper will look after each sub-clinic. At Kulu main clinic the consolidation phase clinic will be in the charge of one dispenser and one helper. At all these seven sub-clinics and also for the field clinic at Kulu, field visit programmes will be drawn in consultation with Medical Officers Incharge of dispensaries. From the dispensary, the field team will visit all areas round about the dispensary. In each month half the time would be spent at the dispensary and the other half on field tours. During the consolidation phase, PAM injections will be offered to those persons who did not receive the injection during the mass campaign. To make certain that a person may not get a second PAM injection, a certificate will be got signed from the patient about the fact that he did not receive the PAM injection during the mass campaign. During consolidation phase no blood testing prior to giving the injection will be undertaken.

A representative re-survey programme will be carried out in the last week of August and first fortnight of September, 1960, to constitute the first check at the end of 12 months of the mass campaign in September, 1959. In this re-check survey attention will be paid not only on the seropositivity rate and quantitative variation in seropositivity, but also on the number of fresh cases occurring in the area.

The consolidation phase will be continued further, to December, 1960. A second re-check survey on sample basis will again be carried out in August-September 1961. These two re-check surveys at the end of 12 months and 24 months of the mass campaign, and the base line information survey of August-September, 1959, along with the study of vital statistical figures of births, deaths and infant mortality for the year 1961-65, along with figures for 1941-58 will constitute the criteria for assessing the usefulness and achievements of the mass campaign.

SUMMARY

The beautiful Kulu Valley in the Punjab was known to be endemic to some extent for venereal diseases, particularly syphilis. A comparatively low birth-rate, below normal health, high mortality, particularly in children, was explainable on this account.

2. A W.H.O. trained V.D. Team was placed in the Valley from June, 1951. Till the end of 1956, when, out of a population of 1.31 lakhs some 35,000 persons were screened, examined and treated. The surveys showed an over-all incidence of some 30% infection, which decreased rather slowly with the services provided.

3. In spite of these measures, it was felt that a more intensive programme based on total treatment of the entire population at risk was necessary. Mass campaign in 1956 was

not carried out as free supplies of PAM from W.H.O. UNICEF were not available. During 1958 in the absence of the free supplies of PAM, the State Government carried out a restricted mass campaign by augmenting the existing teams and giving 4 c.c. PAM to adults and 2 c.c. to children. 20,000 injections were given in the course of one year.

4. In the beginning of 1959, W.H.O. supplies of PAM were promised. A Plan of operations was drawn up and approved by the Government of India and the W.H.O./ UNICEF Agencies. 78,400 vials of PAM (10 c.c. each) were promised on the basis of 8 c.c. PAM injections for adults, and 4 c.c. for children under 14 years. The State Government was committed to the provision of staff, equipment, transport and total coverage of 90% of the population during the campaign scheduled to be started from 1.9.1959.

5. 60 injection-units, with anciliary staff, medical personnel and supervisors, in charge of a senior Directorate Officer (Assistant Director of Health Services) were put in the field, after an intensive orientation course from the due date. The programme was preceded by an all out health education and publicity drive, utilising community projects, civil, revenue, public relations, education, health agencies and local leaders and associations.

6. UNICEF PAM reached only on the 17th September and the programme started on 1st September with State Government stocks of PAM which were exhausted by the 6th of September 1959; and for 13 days there was thus a break. This created some difficulties, but with additional staff and special efforts, the first round was completed by the 10th October when 71,491 injections were completed. An assessment was made and 10 new teams were put in the field to cover areas left over in the first round, or where response was below average. The campaign came to a close on the 15th December with a total of 77,413 injections, giving a total coverage of 60% of the total population at risk. 24,000 vials of PAM were surrendered back to the UNICEF leaving some stocks for surveillance and follow up by the existing V.D. Team.

A few of the observations, experience and difficulties of the campaign are also discussed.

NITRATES IN WATER WITH REFERENCE TO METHAEMOGLOBINAEMIA*

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Introduction

Methaemoglobin was first discussed in a paper before the Royal Society by Arthur Gamgee in 1868, but it is only since 1945 that the relationship between the incidence of methaemoglobinaemia in infants under three months and the occurrence of unusually high concentration of nitrate in water has been established.

Methaemoglobinaemia has been reported from Britain, Belgium, Germany, Japan and Ireland, but it was in the U.S.A. that a definite geographical correlation was established between water supply areas having high nitrate concentrations and localities reporting the incidence of infant methaemoglobinaemia. So far, 278 cases have been reported from the U.S.A. with 39 deaths, and from the United Kingdom 4 reported cases with 1 death. Nitrate nitrogen content of water in all these cases exceeded 20 p.p.m.

* Presented in a scientific session on "Water and Disease" at the Annual General Meeting of the Alumni Association, All-India Inst. of Hyg. & Pub. Health, in March 1961.

Role of Haemoglobin

Haemoglobin, which is a pigment in the red cells of the blood, is directly responsible for the mass movement of oxygen and carbon dioxide between the cellular centres of respiration and the breathing organs, the lungs. Through the lungs the oxygen passes from air into the blood by combining with haemoglobin. On reaching the cells where the oxygen tension is low, the haemoglobin gives up the oxygen which, through a complex enzymatic process, burns the energy rich material thereby releasing chemical energy. Carbon dioxide, a waste product of respiration, similarly links reversibly with haemoglobin and is transported by the blood from the cells and liberated at the same interface as that at which oxygen is absorbed. The haemoglobin molecule is a highly complex one containing over ten thousand atoms, and having molecular weight 66,700. It is possibly ellipsoid in shape of dimensions $55 \times 55 \times 70$ Angstrom units. X-ray diffraction techniques have recently revealed that the haemoglobin molecule is composed of two equal parts, symmetrically arranged, which dissociate on mild acidification and reconstitute on neutralisation.

The Formation of Methaemoglobin

The addition of certain chemicals to the blood will cause the formation of methaemoglobin; identified by its characteristic absorption spectrum. This molecule is incapable of transporting exchangeable oxygen though it will slowly revert to its original condition if the causal agent is removed.

The difference between haemoglobin and methaemoglobin in chemical terms cannot be explained conclusively. The most widely expressed theory is that the iron in the haemoglobin is in the ferrous state and is oxidized in methaemoglobin to the ferric state.

Effect of Methaemoglobin

Our blood normally contains about one molecule of methaemoglobin for every 200 haemoglobin molecules. Nitrates in water have produced upto 60 molecules of methaemoglobin for every hundred of haemoglobin. When the concentration of methaemoglobin increases, the blood assumes a blue-brown to chocolate-brown colour, the extremities of the body turning blue which colour gradually spreads over the whole body. It is this condition, methaemoglobinaemia, which has frequently been observed in very young infants fed with baby food prepared with water containing a high concentration of nitrates. Dry and evaporated milk formulas which require large amounts of water as diluent are most dangerous. Boiling of water makes things worse by concentrating the nitrate. Pasteurized cow's milk, undiluted and acidified, is the safest formula for infant feeding. Breast feeding is advisable in the first two months of life especially in rural areas.

'Blue water' babies die from lack of oxygen. Cyanosis of the blood leads to oxygen starvation; a fate similar to that caused by carbon monoxide where this gas combines with haemoglobin and prevents, in an analogous manner, the oxygen reaching the cellular tissues.

Biological conditions

That only the very young infant is susceptible to methaemoglobinaemia naturally induced by nitrates in water implies a vital difference between infants on the one hand and children and adults on the other.

Although the natural cause of methaemoglobinaemia in infants has been assumed to be nitrates, this radical can be tolerated by adults and children in quite high concentrations. However, if *nitrites* are injected into the blood of any vertebrate, methaemoglobin is very soon apparent. Clearly it is the *nitrite* rather than the nitrate which causes methaemoglobinaemia.

Nitrate reducing bacteria exist in the intestinal flora and are most prolific when the pH of the gastric juices is greater than 4. It is found that the gastric pH of many young infants is greater than this, thereby enabling nitrate reducing bacteria to thrive in the upper part of the intestinal tract. As the infant gets older, the acidity of the stomach juices increases and the nitrate reducing bacteria are, in effect, pushed further and further down the intestinal tract. Thus, in young infants, the ingested nitrates are reduced by bacteria in the small intestine and the nitrites so produces are absorbed into the blood; whereas in children and adults bacterial reduction only occurs in the large intestine. In children and adults, therefore, ingested nitrates are either absorbed directly into the blood or are reduced by bacteria in the lower part of the alimentary canal.

The pH of the gastric juices decreases with age, thereby reducing the possibility of nitrite

formation, but throughout the same period the proportion of foetal haemoglobin, a form which readily transports oxygen and is more susceptible to methaemoglobin conversion, declines from about 80% at birth to none, usually within 7 months. Hence the extreme susceptibility to nitrate eventually disappears.

Either or both these factors might explain the incidence of methaemoglobinaemia in infants.

Relief of methaemoglobinaemia

An infant suffering from methaemoglobinaemia will recover slowly if its food is prepared with water free from nitrates. Removal of the causal agent from the infant's blood circulation ensures a gradual regeneration of haemoglobin molecules. The most effective and immediate remedial agent is methylene blue which can be either ingested or injected.

Source of nitrates in water

Nitrates may be present in water naturally or by industrial pollution. Nitrates are generally regarded as the end products of bacterial decomposition of animal or vegetable matter. As such the level of nitrate content is a rough guide to the degree of contamination of a well from these sources. Pollution of rural wells is not uncommon due to defective construction or insufficient protection against contamination. This stresses the importance of the need for sanitary conservation, proper maintenance and prevention of pollution in ground water supplies.

Once nitrates are present in a source of potable water there is no chemical means of removing them. Filtration through a column of synthetic ion-exchange resin has been effective, but the method of treatment is costly and requires technical skill.

Position in India

Magnitude of the problem of methaemoglobinaemia in India is unknown. Shallow dugwells in rural areas show nitrate concentrations ranging from 2 to 20 p.p.m. and more. It is believed that the problem of nitrate poisoning of cattle and other domestic animals by drinking water exists in some parts of the country. Infant poisoning cases may also be there which are often mistaken for cases of congenital heart disease. If a baby from a rural area presents cyanosis unexplained by physical examination, investigation about the water supply might lead to interesting results. Thorough investigations are necessary about the incidence of nitrate poisoning in our country, in relation to the sanitary quality of well water supplies including the nitrate content. At present our knowledge of the subject relating to our country is nil.

FIELD SURVEY OF INSECTICIDE SUSCEPTIBILITY OF DISEASE VECTORS

ANOPHELES CULICIFACIES IN KOTAH (RAJASTHAN)

By

D. Narasimhan,
(*Armed Forces Medical College, Poona*)

The levels of susceptibility of *Anopheles culicifacies* in the vicinity of Poona to DDT and dieldrin were reported in Part IA[8] of the current series. The present report relates to a similar field investigation of the same species, carried out in October 1958, in a village Nanta of Rajasthan.

Materials and methods

The methodology was exactly the same as that adopted for *A. culicifacies* of Hadapsar,[8] using the W.H.O. test kit and technique, except that (a) the tests were performed at the place of collection of the test insect, (b) the

collections were made in daytime from mixed dwellings, (c) the recovered batches were kept for observation in a non-air-conditioned room, and (d) a 30-minute exposure was passed over, and a 15-minute exposure was directly employed for derivation of the LC_{50} and LC_{90} values.

RESULTS

Mortalities in batches exposed to p-p' DDT. The standard 1 hour exposure. The results are set out in Table I.

TABLE I

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

Concentration of p-p' DDT, in %	Number of *A. culicifacies* Alive	Dead	Total	Mortality in % adjusted by Abbott's formula[6]
0.25	1	19	20	92.9
0.5	0	20	20	100.0
1.0	0	20	20	100.0
2.0	0	20	20	100.0
4.0	0	20	20	100.0
8.0	0	20	20	100.0
0.0 (control)	14	6	20	30.0

This indicated a high general level of susceptibility of the test strain to p-p' DDT. In the Light of similar results[8] with *A. culicifacies* of Hadapsar, a 15-minutes exposure was tried and found adoptable for derivation of the LC_{50} and LC_{90} values.

Exposure for 15 minutes. 4 replicates were carried out.

The results were analysed for a maximum likelihood solution of each set of data on the lines indicated by Finney[5]. The results of the analysis are shown in Table II.

Tablr—II

Results of probit analysis of data for *A. culicifacies* of Nanta, exposed to p-p' DDT and pure dieldrin (HEOD).

Item	*Test insecticede*	*Value*
Exposure period in minutes ...	p-p' DDT	15
	DL	15
Regression equation ...	p-p' DDT	Y=1.395× +4.482
	DL	Y=1.954× +3.641
Denotation of 'y' ...	Both	Probit mortality
Denotation of 'x' ...	p-p' DDT	Log 10 (concentration) +1
	DL	Log 10 (concentration) +2
Standard error of regression coefficient	p-p' DDT	0.201
	DL	0.268
Chi-square value	p-p' DDT	0.3*
	DL	2.0*
Degrees of freedom ...	Both	4
LC_{50}, in%	p-p' DDT	0.235**
	DL	0.0496
5% fiducial limits	p-p' DDT	0.144— 0.384
	DL	0.0350—0.0793
LC_{90}, in%	p-p' DDT	1.945
	DL	0.219
5% fiducial limits	p-p' DDT	1.33 — 2.839
	DL	0.167 — 0.288
LC_{90}: LC_{50} ratio ...	p-p' DDT	8.27
	DL	4.42

Note: DL denotes pure dieldrin (HEOD)
* denotes insignificance of Chi-square value for 0.05 probability
** denotes extrapolated value

Dosage-mortality regression lines. The dosage-mortality regression lines for DDT and dieldrin, based on their regression equations, are presented in Annexes 1 and 2.

Meteorological data. Readings of the ambient temperature and humidity for the holding tubes, for the periods of observation, are given in Annex 3.

Discussion

In spite of all possible care control, mortalities in the investigation were appreciably high. By dispensing with the sucking tube, and by picking *A. culicifacies* individually from its habitat, one each in an open-ended tube, Bhatia[2] claims to have experienced negligible mortalities in his controls. It is possible that the conventional suction method of catching is highly injurious to *A. culicifacies* and is responsible for the high control mortalities experienced by the investigator at Hadapsar[8] and, now, at Nanta.

The LC_{50} value of p-p' DDT for *A. culicifacies* is considerably lower at Nanta than at Hadapsar[8]. The history of DDT-spraying in the two places is also substantially different; at Hadapsar DDT-spray campaign had started in 1953, and at Nanta only just prior to the present survey. But, possibly these two factors are unrelated, for, Rao and Bhatia[10] have shown that the rise in LC_{50} of DDT for *A. culicifacies* in parts of (old) Bombay State is negligibly small over the years of DDT-spray. It is, therefore, likely that *A. culicifacies* of Nanta is inherently more susceptible to DDT than its counterpart at Hadapsar. On the other hand, their relative susceptibilities to dieldrin are in the reverse order.

Upto the time of the present survey there were no published accounts of the susceptibility levels of *A. culicifacies* determined with the W.H.O. test kit and technique; data of other workers, then available and based on the Busvine-Nash method[1,2] gave the following LC_{50} values:—

DDT	...	...	0.25—0.70
Dieldrin	...	...	0.19—0.78

Judged by the $LC_{90}:LC_{50}$ ratio[4] the sensitivity of the test method for *A. culicifacies* appears to be of the same order for DDT exposures at Hadapsar[8] and Nanta; and that for dieldrin exposures higher for the 'Nanta strain'.

Summary

A field investigation on susceptibility levels of *A. culicifacies* female in a rural part of Rajasthan is reported.

The methodology of the investigation is indicated.

The test strain was found highly susceptible to DDT and dieldrin, necessitating 15-minute exposures for derivation of LC_{50} and LC_{90} values. The latter derived by probit analysis are discussed in relation to similar values reported for the test species from various parts of India.

Acknowledgement

The reporter wishes to express his thanks to the following: Lieut.-General B. Chaudhuri, then Director-General, Armed Forces Medical Services, New Delhi, for sanctioning the investigation; Mr. J. W. Wright, Division of Environmental Sanitation, World Health Organization, Geneva, for generous supply of test kits; Colonel N. D. P. Karani, then Officer-in-Charge, Department of Preventive Medicine, Armed Forces Medical College, Poona, for constant encouragement; Station Health Organization, Kotah, for their whole-hearted co-operation in the investigation; and Shri P. A. Mohideen, Insect Collector, Armed Forces Medical College, Poona, the other member of the survey team, for skilled assistance in the conduct of the tests.

The writer is grateful to Lieut-General B. M. Rao, Director-General, Armed Forces Medical Services, New Delhi, for permission to publish this paper.

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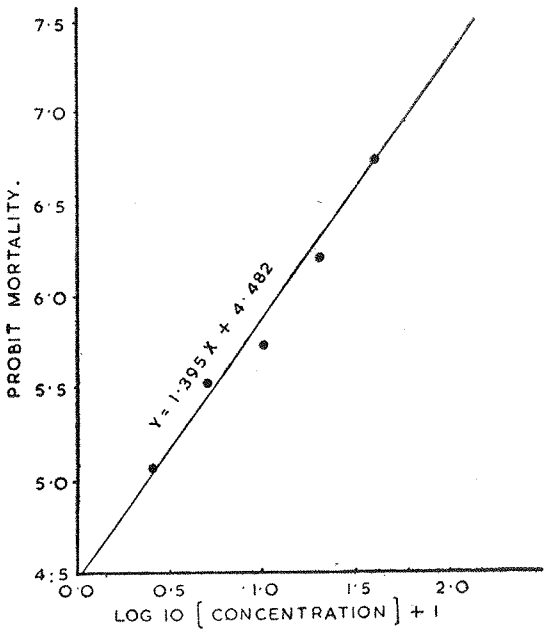
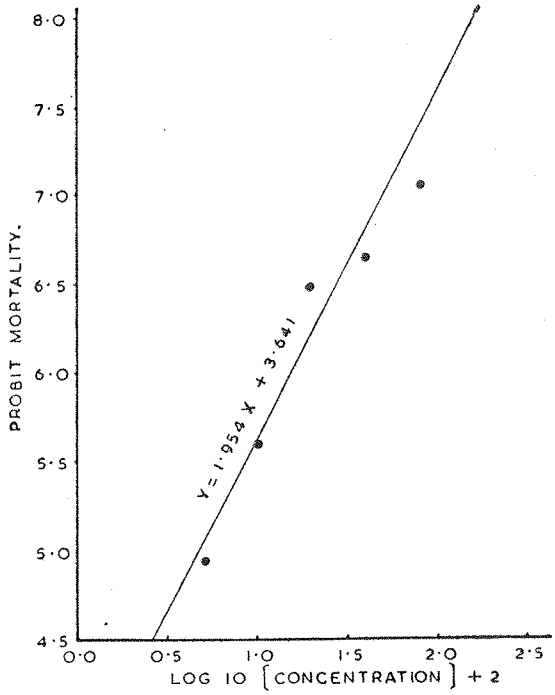
Annex 1

DOSAGE-MORTALITY REGRESSION LINE FOR A CULICIFACIES FEMALE OF NANTA, EXPOSED FOR 15 MINUTES TO P-P DDT.



Annex 2

DOSAGE-MORTALITY REGRESSION LINE FOR A CULICIFACIES FEMALE OF NANTA, EXPOSED FOR 15 MINUTES TO PURE DIELDRIN (HEOD)



Annex 3

Readings of ambient temperature and humidity for the holding tubes recorded at 08-30 A.M. during the days of the tests.

Date, October, 8561	Temperature Maximum °F	Maximum °C	Minimum °F	Minimum °C	Relative humidity in % (approximate)
16/17	80	26.7	78	25.6	83
17/18	78	25.6	72	22.2	80
18/19	80	26.7	78	25.6	80
19/20	80	26.7	78	25.6	78
20/21	78	25.6	74	23.3	83

SALMONELLA HEIDELBERG IN A RURAL AREA OF WEST BENGAL

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Public Health.

The isolation of Salmonella heidelberg was first reported by Habs from a case of food poisoning. There are reports to show that this organism has been found in the mesentric glands of normal pigs and it is quite probable that consumption of pig or pig products may cause gastro-enteritis. Salmonella infection caused by this sero-type has no doubt been recorded in other countries, but the occurrence of this type is probably the first of its kind in India and merits reporting.

HISTORY

During investigation on the incidence of gastro-enteritis in the Rural Health Unit & Training Centre, Singur, which is about 20 miles away from Calcutta, a female Mohammedan child aged about 3½ years, complaining of acute gastro-enteritis was referred to the Public Health Laboratory of the Centre. There was history of consumption of only beef but not pork or any pork products.

LABORATORY INVESTIGATIONS

The microscopical examination of her stool revealed the presence of the ova of Ancylostoma duodenale and Ascaris lumbricoides and few pus cells. No other protozoal or helminthic parasites could be found.

Cultivation: The sample of stool was inoculated in the following media:—(i) MacConkey's agar, (ii) S.S. agar, (iii) Blood agar, (iv) Selenite F broth. From Selenite F medium, after 24 hours incubation, further subculture was made on S.S. agar medium. From MacConkey's agar and S.S. agar media, non-lactose fermenting colonies were picked up and further streaked on plain nutrient agar medium and isolated in pure culture. Lactose fermenting colonies from MacConkey's agar medium and colonies from blood agar medium also were tested to determine whether they fall under the recognised common entero-pathogenic coli.

SUMMARY OF THE FINDINGS

Colonies of similar character were isolated both from direct plating on S.S. agar and also after enrichment in Selenite F. medium. The organisms were found to be gram negative motile rods, with ends rounded. Biochemical tests were performed and the following reactions were noted. The organism fermented glucose, maltose and mannitol with both acid and gas but did not attack lactose or sucrose. It did not produce indole nor could it split urea.

Serology of the organism: On preliminary slide agglutination test with poly valent Salmonella composite H and O was found to be positive, indicating its possibility of being a member of Salmonella group. By subsequent test with individual group sera, it was agglutinated with Salmonella Group B O serum and the organism was provisionally identified as Group B Salmonella (Kauffmann-White Scheme). The strain was sent to the Salmonella Reference Laboratory of the Central Research Institute, Kasauli for the purpose of determining the exact sero-type of the organism and it was identified as Salmonella heidelberg (4, 5, 12: r, 1, 2). The sample of serum collected from the patient after convalescence, showed agglutination to a titre of 1/40 against the strain isolated.

DISCUSSION

Numerous reports about the incidence of gastro-enteritis due to consumption of various types of food are often received in this country. The incidence of Salmonella in different animals is not insignificant and as such consumption of food prepared from such animals, particularly when it is not properly cooked, is likely to produce infection in man. Food poisoning due to Salmonella heidelberg due to consumption of pork or pork products has been recorded in other countries, but the one referred to above clearly indicates that the

source of the organism is not pork. The patient never took pork and it is no doubt a fact that her religion forbids her from consuming such product. She however used to take beef. The history and bacteriological investigations lend support to the possibility of infection with this sero-type through the vehicle of beef although cattles constitute a less important reservoir for Salmonella.

ACKNOWLEDGEMENT

Our thanks are due to J. B. Shrivastav, Director, Central Research Institute, Kasauli for his valuable comments, and identifying the exact serotype of the organism.

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REPORTS & REVIEWS

IN THE DEPTHS OF LIFE

The mechanism of life is "made up" of a multitude of finest parts, each of them extremely important. The physiological role of microscopic particles in the organism is sometimes inversely proportional to their size. The process of aging, for example, is connected, among other things, with the quantity of carbo-hydrate-proteid combinations—a special variety of proteins combined with carbo-hydrates—in the walls of the blood vessels. These combinations play the part of a lubricant in the organism: they give elasticity to the tissues and make the bones supple. Carbo-hydrate-proteid combinations, or, to be more precise, various carbo-hydrate groups combined with proteins, cause the incompatibility of some blood groups, a phenomenon that is universally known.

The first steps towards discovery of the laws governing these important combinations have been made by the laboratory of proteid chemistry of the Institute of Organic Chemistry under the U.S.S.R. Academy of Sciences. A group of scientists headed by Ekaterine Kaverzneva, Doctor of Chemical Sciences, has studied the composition of the carbo-hydrate-proteid groups of egg yolk, known in science as egg albumin.

They were able, but so far only by a sharp chemical reaction unsuitable for practical purposes, to split the carbo-hydrate (polysaccharide) from the protein. The position of the polysaccharide in the proteid chain was precisely established: its "seat" was found to be in the middle of the chain and not, as was supposed, at the end of it. This is important in determining the nature of the connection between the polysaccharide and the chain: just how solid is the chain and what forces constitute it. The final elucidation of this question, says Ekaterina Kaverzneva, requires a thorough study of the structure of a substance which, so far, is known in the laboratory as "substance X". It enters in the composition of the carbo-hydrate, but the scientists have not yet been able to extract it in its pure form: it disintegrates immediately.

While studying the structure of protein, which is the laboratory's main line of research, the scientists have obtained very interesting results, whose prospects in science are at present difficult to determine exactly.

This refers to collagen, the albuminoid from which tendons, cartilage and vessel walls are formed. Its alteration causes arthritis and rheumatism of the joints, which are also called collagenoses.

General theoretic problems of the structure of the peptid (proteid) chain are also connected with collagen. It contains a great quantity of proline, a special amino acid whose molecular structure differs from that of other amino acids.

No other protein in nature contains as much proline as collagen. Polymers containing proline have for the first time been obtained in the laboratory. According to the roentgenogram, these model compositions produce

the same reflexes as natural collagen. There is, therefore, every reason to suppose that the structure of the synthesised polymer is very similar to the structure of natural collagen.

The above work is directly connected with the blank spots in medicine. By deciphering the chemical nature of changes in the organism which precede diseases, collagenoses, for example, scientists are giving medicine a very powerful weapon; it will enable physicians to diagnose diseases in their rudimentary stage, to establish their precise causes and, therefore, to prevent and treat them.

THE DEAD CAN HELP THE LIVING

By
Dr. Vlidimir Demikhov

A number of human tissues have already been successfully transplanted. Transfusion of blood—"liquid tissues"—has, for example, saved millions of lives. Thousands of people have had their eye-sight restored by the transplantation of cornea by Professor Filatov's method. Transplantation of the skin in cases of large burns is currently practised.

Even when the skin takes root only temporarily, these transplants save the lives of people who would otherwise be doomed. It may incidentally be mentioned that it was a Soviet scientist, Professor Shamov, who first proved that blood could be transfused to living men from corpses.

The first attempt at transplanting a kidney from a corpse to a living man was also made by a Soviet scientist, Professor Voronov. As a result of this daring operation he was able to observe, for a period of seven days, the revival of the transplanted kidney and its functioning.

Temporary Help

It must be noted that, in many cases, when the patient's condition is dangerous, a vitally important organ can help his recovery, even if it functions only temporarily after transplantation.

But the time is not far off when the transplanted organs will function permanently, not temporarily.

Together with my colleagues of the laboratory of organ transplantation, I have, for many years, experimented on transplantations of the heart, lungs and other organs.

From a surgical and physiological point of view our experiments show the possibility of transplanting any vital organ, even the heart and the brain.

Although the animals operated on lived for a few days or weeks only, and in rare cases over a month, we believe that it is possible to apply the positive results of our experiments in the hospitals or clinics.

Of course, we do not intend to experiment on men or risk human lives. But even in the first stage we shall be able to save many lives by temporary and safe connection of a revived heart, lung or other organ from outside the patient's body.

Artificial lungs and hearts have been developed of course, and they are undoubtedly of immense value during operations. But natural organs are much more perfect. When natural revived organs are connected with another organism, they are capable of functioning for days and weeks instead of hours.

If a revived heart or lung is connected with the patient's body (externally at first—for safety)) and blood from the same organism transfused to the patient, we may expect the organ thus temporarily connected to be able to function for a long time, perhaps permanently.

In that case the organ connected externally can be transplanted internally, into its natural place.

The transplantation of a very great quantity of tissue is accompanied by a phenomenon called "immunological paralysis"— a state in which the organism stops resisting the implantation of a great quantity of tissue or a whole organ.

The Soviet scientist, Zotikov, for instance, has established that small pieces of skin, transplanted within the limits of different organisms, do not take root, while large pieces of skin transplanted under the same conditions, take root well.

Other Soviet scientists, including myself, have observed that the skin and muscles of whole organisms join well (within the limits of one biological species).

In our experiments with the transplantation of whole organs, when the animals we experimented on lived over ten days after the operation, we observed that the transplanted organs took root and functioned very well.

The complictations which prevented the experimental animals from living longer have been studied and can soon be eradicated.

Premature Death

At present most people die prematurely from diseases, without reaching natural old age. Transplantation will enable the doctor to reconstruct the patient's whole organism and even postpone the advance of old age, besides saving him from premature death.

Weaker metabolism is a characteristic symptom of approaching old age. Some of the endocrine glands stop functioning, the heart and lungs work more slowly, man gets short of breath, gets easily tired, etc.

If the endocrine glands, heart and lungs of a young organism be transplanted to an old person, a considerable degree or rejuvenation could safely be predicted.

The Soviet scientist, Andreyev, succeeded in reviving the heart 112 hours after a man's death. But nobody has so far succeeded in reviving the brain more than ten minutes after death.

It is my belief that in the near future, dying men's lives may be saved quicker and more effectively owing to new achievements in medical science.

The important thing is to keep the brain functioning and then replace the irretrievably injured organ with a healthy one.

While trying for the present to make use of healthy organs, taken from men who have died as a result of accidents, scientists are seeking for other sources of organs and tissues for transplantation. But this still requires a great deal of research.

ANTIMICROBIAL THERAPY OF TUBERCULOSIS

It is now some fifteen years since the treatment of tuberculosis with streptomycin and PAS (p-aminosalicylic acid) began, and nine yeors since the highly specific antituberculous effect of isoniazid was discovered. These developments have revolutionized the treatment of tuberculosis by making it a "manageable" disease. In a recent number of the WHO Bulletin, Dr. Walsh McDermott, Livingston Farrand Professor of Public Health, Cornell University Medical College, New York, considers the present situation of tuberculosis chemotherapy[1]. Some of his conclusions are summarized below.

Experience with the new antituberculous drugs shows that there may come a time when most tuberculous patients will be treated at home. This would solve an important public health problem in regions where the number of patients is considerably greater than the number of hospital beds available for them.

Hospital versus domiciliary treatment

While many patients can now be treated at home, it is held that it is preferable for some to be treated in hospital, particularly initially, since they are then isolated from their immediate household associates, who are liable to be infected, and the rest in bed is allegedly beneficial. However, two recent investigations—one by Hirsch et al.[2] at the Rockefeller Center, New York, and the other by the Tuberculosis Chemotherapy Centre, Madras, India, under the auspices of W.H.O. the Indian Council of Medical Research, the Government of the State of Madras and the Medical Research Council of Great Britain[3]—suggest that bed rest is not as important as is usually believed as long as the patient is receiving carefully managed chemotherapy.

As for the other argument in favour of hospitalization, the isolation of infectious cases is still to be regarded as desirable, but it is often not carried out even in the most developed countries; it is difficult, for example, to persuade asymptomatic patients that they can transmit bacilli and should therefore be isolated. When the patient is highly infectious—when the larynx is involved, for instance—it is generally held that he should be kept in hospital, if possible

1. McDermott, W. (1960), *Bull. Wld. Hlth Org., 23,* 427.
2. Hirsch, J. G. *et al* (1957), *Amer. Rev. Tuberc., 75,* 359.
3. See *WHO Chronicle,* 1959, *13,* 400; 1960, *14,* 280.

until he is no longer infectious. But the patient who is bacteriologically positive and whose state is such that he would have to be kept in hospital to the end of his life—the patient with a chronic cavitary lesion, to take an example—should be allowed to remain at home if this does not represent too great a risk for his household associates.

When patients are treated exclusively at home, three to six months must be allowed in most cases before the bacilli disappear from the sputum. In practice, therefore, there is little danger for contacts of a case treated at home from the start, for, on the one hand, treatment rapidly decreases his infectiousness, and, on the other, his household associates can be kept under observation and protected.

Choice of chemotherapy for previously untreated patients

The most suitable drugs or combinations of drugs for patients, both in hospital and at home, are, in order of effectiveness:

- isoniazid with streptomycin daily;
- isoniazid with PAS daily;
- isoniazid alone;
- isoniazid with streptomycin injections two or three times weekly.

There is also another combination of drugs, pyrazinamide and isoniazid, which is probably the most effective against the tubercle bacillus, but is much too toxic for general use, because of the pyrazinamide.

It is generally agreed that, if circumstances are favourable, it is preferable to employ more than one drug. Whatever the scheme of treatment, isoniazid is acknowledged to be the most active antituberculous drug. The use of streptomycin daily is rarely practicable on an out-patient basis.

Isoniazid resistance is encountered, not only when the drug is used alone, but also when patients are receiving PAS at the same time. PAS is most needed when the tuberculous cavities in the lung are more than 2 cm in diameter. Since the major part of the incapacitating action of antituberculous drugs against the tubercle bacillus probably takes place during the first weeks of treatment, it would seem preferable to begin with a combination of drugs—isoniazid-streptomycin or isoniazid-PAS—and to continue with isoniazid alone when the cavity has closed and the patient is no longer infectious.

Administration of isoniazid alone is still of value for prophylaxis and as treatment for tuberculosis without cavitation. It may be employed initially for cavitary pulmonary tuberculosis in special circumstances, e.g., in tuberculosis programmes where the use of PAS would involve additional expense and so restrict their scope, or when PAS is poorly tolerated and daily administration of streptomycin is not a feasible alternative.

If a patient with moderately or far advanced pulmonary tuberculosis is treated with any of the four alternative drugs or combinations of drugs listed above, the course of the disease follows one of three patterns:

(*a*) in most cases there is a considerable regression in infiltration, with closure of the cavities and disappearance of infectiousness;

(*b*) in perhaps 15-20% of cases there is an extensive regression of infiltration, but the cavities fail to close; nevertheless, infectiousness disappears, giving rise to the so-called "open negative" syndrome;

(*c*) in about 15% of cases there is a greater or lesser regression of infiltration, but no considerable reduction in cavity size, and tubercle bacilli continue to be discharged in the sputum. If this happens, the treatment has failed.

Management of cases when chemotherapy has been unsatisfactory

Failure to respond to chemotherapy usually becomes obvious by the end of six months of treatment. The development of resistance by the bacilli may be a result as well as a cause of persistent cavitation, for the walls of the cavity form an excellent medium for multiplication of the bacilli, thus favouring the appearance of resistant strains. Other drugs are available to deal with this situation but unfortunately, because of their toxicity, they can be administered only for some three or four months. Thus it might become advisable to carry out collapse therapy or excision; in any event hospitalization is highly desirable. Whatever new drugs are given, the continued administration of isoniazid has been found worth while, even though *in vitro* resistance to it has been shown to occur.

The other drugs that might be used in these resistant cases are: cycloserine, pyrazinamide, *a*-ethyl-thioamide, and viomycin.

Cycloserine, administered in a dose of 250 mg twice daily, is very effective in combination with isoniazid. It may, however, cause epileptiform seizures, and, as the margin of safety is low, it is preferable to reserve it for hospital use. Pyridoxine is said to neutralize the neutrotoxicity of cycloserine, but it is not

known whether it also decreases its efficacy against the tubercle bacillus.

Alpha-ethyl-thioamide is effective and has given good results with isoniazid, but it causes severe nausea and vomiting, and there is also some evidence of a cumulative effect with isoniazid in the production of peripheral neuritis. The combination of *a*-ethyl-thioamide with cycloserine might be quite an effective short-term treatment if the patient tolerates the drugs.

Pyrazinamide is of only limited value alone, but is very effective in association with isoniazid and provides perhaps the best combination. Its toxicity must be borne in mind, since it causes hepatitis with jaundice in about 3% of patients, with a fatal outcome in about one third of those who develop jaundice; consequently its use is restricted to cases where the danger from the disease exceeds that from the toxicity of the drug. Mention should be made of the effectiveness of pyrazinamide in combination with streptomycin. As a result of one study it was held that this combination of drugs should be given to patients with advanced cavitary disease as primary treatment, and to most patients with pulmonary tuberculosis who had failed to respond to isoniazid with PAS.

These secondary drugs should, in general, be prescribed only when treatment has clearly failed, and not merely because bacilli cultured from the patient's sputum are resistant to isoniazid *in vitro*. Needless to say, they can be given only in hospital.

A standard form of treatment for pulmonary tuberculosis might be as follows: isoniazid-PAS daily during six months, or at least until there is clear evidence of therapeutic failure. Then, if there is failure, excision or collapse therapy with administration of streptomycin plus cycloserine, *a*-ethyl-thioamide or pyrazinamide, in that order of preference, in addition to isoniazid. What of the patient severely ill with extensive acute tuberculous pneumonia? Here isoniazid plus daily streptomycin should be given until there is an improvement and infectiousness disappears; this treatment calls for four to eight months' hospitalization. Subsequently, isoniazid alone may be prescribed, provided that there are no cavities of 2 cm or more in diameter. If streptomycin has already been given for three or four months before therapeutic failure becomes clear, the best procedure is to employ two of the three secondary drugs together for as long as possible, bearing in mind their toxicity.

The toxicity of *viomycin* prevents its use except for serious forms of the disease, e.g., laryngeal tuberculosis, and then only for a limited period and in very special circumstances. It may cause deafness and nephritis. *Neomycin* is too toxic systemically and is used only locally; so too is *kanamycin*, which also causes deafness. The use of these last two drugs is not advisable.

Treatment of patients with the "open negative" syndrome

This treatment is difficult to standardize, for each case must be considered on its merits, as in the majority of cases the disease must still be regarded as active. Surgery might be advisable in some cases—say, in a young physician or dentist, even though his sputum continues to be non-infectious with continued treatment. In the case of middle-aged or older patients or those without much contact with young subjects, chemotherapy might well suffice.

Duration and dosage of chemotherapy

In pulmonary tuberculosis it has become common practice to continue treatment for 18-24 months, but it is probable that the principal therapeutic action occurs during the early week, the drugs exerting only a protective or suppressive action thereafter. In most cases, it is wise to continue chemotherapy till well past the period during which most of the healing takes place.

Streptomycin should be given at the rate of 20 mg/kg body-weight per day, i.e., an average of 1 g per average-size adult. More may be given, say, 30 or 40 mg/kg per day during short periods of two or three weeks, but there is a considerable risk of vestibular damage, especially in older age-groups. When given with streptomycin, as much as 20 g of PAS per day may be necessary. With isoniazid, the PAS dose depends on the isoniazid dose; for example, it seems suitable to give 6 to 10 g per day when the daily dose of isoniazid is 300 mg or more. The ideal dosage of isoniazid is the highest tolerated; this for most people lies between 5 and 8 mg/kg per day. While the latter dose approaches the toxic range, it can be given in certain cases over a period of several weeks. Toxicity is manifested by the appearance of peripheral neuritis and encepha-

lopathy, in the form of epileptiform seizures. For preference, therefore, the dose of isoniazid should be 300-450 mg per day, depending to some extent on the patient's size.

The appearance of drug-resistant tubercle bacilli must be taken into consideration in the treatment of a patient who persistently excretes bacilli in the sputum after three or four months of isoniazid therapy.

At present, no laboratory tests are available, apart from bacteriological examination of the sputum or gastric fluid, that will give the information required for a rational initial choice of, or a change in, chemotherapy. If the patient has not yet received treatment there is a very good chance that the bacilli will be susceptible to isoniazid, and after six to nine months' treatment there will be no more danger of resistance to this drug than to others. Resistance may finally appear, however, although its occurrence to a significant degree is less frequent than is generally thought. Hence, if the improvement in the X-rays is not sufficient and if bacteriological tests are positive after five or six months of isoniazid treatment, it is advisable to change the treatment and also to consider collapse therapy or excision. On the other hand, if, after five or six months of isoniazid treatment, the patient shows sufficient X-ray improvement, including absence of cavitation, and the bacteriological tests are negative, the clinician may rest assured that isoniazid treatment will almost certainly retain its effectiveness in the future and that significantly resistant strains will not appear.

The "open negative" syndrome poses a special problem in short-term treatment, and from the long-term viewpoint no prognosis can be made.

Epidemiology

The essential point that must be remembered in connexion with epidemiology is that isoniazid-resistant bacilli infecting new subjects will probably cause a tuberculous infection that will itself be isoniazid-resistant. However, we are without reliable information on this point and must fall back on our general knowledge of the epidemiology of tuberculosis. It must be borne in mind that only a small number of those who develop tuberculous infection subsequently develop tuberculous disease.

It may also be taken that, since the introduction of isoniazid, far more people have died because they did not receive the drug than have been seriously affected by isoniazid-resistant tubercle bacilli.

Importance of collapse therapy

It is regrettable that pneumothorax has been virtually abandoned, for, since the persistence of cavities promotes bacillary resistance, anything that will help to eliminate them should be undertaken to prevent resistance from developing. For various reasons, it is not always desirable to remove the lesions surgically, and such operations are seldom indicated during the early months of antimicrobial therapy. Hence it does not seem desirable to abandon the practice of pneumothorax, especially as it would appear that there is no reason nowadays to fear most of the serious complications that used to attend this procedure in the past. It could be carried out, in conjunction with chemotherapy, in many patients with cavities 2-4 cm in diameter and extensive pulmonary infiltration.

In this way, unsuccessful treatment might often be avoided, e.g., in cases in which cavities remain open, given rise to problems of resistance and therapeutic failure. Pneumothorax would be a highly satisfactory adjunct to chemotherapy in patients difficult to hospitalize or who, when hospitalization is possible, cannot undergo operation, for it lends itself well to ambulatory treatment, requires only periodic supervision of the patients, and permits reasonable physical activity on their part.

(*W.H.O. Chronicle*)

INDUSTRIAL SAFETY AND HEALTH

Accidents in India have Doubled in 20 Years

In September last, at a session of the Indian Labour Conference, Mr. Nanda disclosed that "the rate of industrial accidents in India have more than doubled in the last 20 years", a trend to which West Bengal, an important industrial area, must have in large part contributed.

The West Bengal Government is reported to be "seriously concerned over the rising trend of accidents in factories .... during the past ten years". Although the pace of industrialization (and possibly better reporting) is partly responsible, urgent measures to reverse the trend seem essential.

Employers will need to look upon the Factories Act and similar statutes less as a legal, and more as a moral, obligation. The sooner the idea that safety measures are part of the labour welfare programme (e.g. amenities) is

shed the better. Morale can be stimulated by the knowledge that employers take a positive and practical interest in occupational health. Nor is there sufficient awareness of how valuable a doctor's advice on working conditions could be in promoting health, safety—and output.

Except among some large and enlightened companies, safety weeks to inculcate safety-consciousness in workers are almost unknown. The principal difficulty is to determine the functional level at which responsibility for safety should be fixed. The supervisory/foreman cadre seems the most appropriate. This does not absolve top-management of the responsibility to provide the environment for safe and healthy work. Either faulty lay-out or defective designing of machinery can do much harm. Not all factories have the right work-room temperature, ventilation, lighting, etc. and few have heard of "fatigue studies".

Advisory Body

An organization comparable to the Scientific Advisory Committee of the British TUC has yet to be set up in India. This body deals with the application of atomic energy to industry, the electronic control of industrial processes, recent developments in industrial psychology and the social sciences, the efficient use of fuel and power etc. In the U.S.A. there is the President's Committee on Occupational Safety, an organization of trade union leaders, industrialists and Government officials "directly concerned with eliminating job hazards and promoting safety standards in American industry". Emphasis on safety techniques in workers' education would be rewarding; for some types of manual work are still largely inescapable and, although heavy materials are increasingly handled by machines, the operations are often in such close proximity that workers are injured either by errors of judgment or failure of plant. Psychological techniques seem necessary to rid workers of the contempt and carelessness which familiarity with machinery breeds. The notion (widely prevalent among the younger workers) that care partakes of effeminacy has also to be effectively scotched. Wide publicity to the causes and consequences of accidents should help.

Introduction of industrial safety topics into the curricula for technical institutes seems another profitable approach. Mere compilation of statistics does not help much. What is required is an analysis of the probable causes. Should it reveal (as it did in the U.K. in 1958) that "the causes of factory accidents vary only within small limits in spite of fluctuations in the number", preventive measures should be less difficult to formulate. The position should improve with the appointment of safety officers (as recommended by the State Labour Ministers' Conference), "where the strength of labour exceeded a prescribed number or where the processes were of a particularly hazardous nature". Compulsroy inquiry into serious accidents to ascertain their cause and fix responsibility is also contemplated. Not all companies can afford the expenditure involved in effective training in safety measures. Whether the situation warrants State assistance—where and what form it should take—is worth examination.

THE SURGEON AND THE HEART

By

Prof. Y. Meshalkin,
Lenin Prize Winner

Surgery of the heart is one of the remarkable achievements of modern medicine. For many centuries surgeons avoided all intrusion into this vital organ and the few individual attempts at operating ended in utter failure and the patients' death. Thus many serious obstacles had to be overcome before any appreciable success could be achieved in this field, and it may be asserted with pride that Soviet scientists have made no mean contributions towards the solution of the problem.

It was only at the end of last century that surgeons first ventured to suture heart wounds and then only in cases when avoidance of the operation meant the patient's certain death. But even after that some time had to elapse before it became possible to operate on diseased hearts.

Serious Obstacles

One of the chief obstacles was shock, which often occur as a result of operations of the chest. The patient's blood pressure falls

sharply, the activity of the heart is weakened and the result may be fatal.

The usual anaesthetics did not help to avoid shock and more radical methods of anaesthesy were required. So, the anaesthetic is now given through a tube directly into the patient's trachea to achieve complete anaesthesy. Special drugs influencing the nerve centres are moreover applied.

Another serious obstacle in the way of heart surgery was the usual penetration of air into the pleural cavity as the result of which the lungs collapsed and the patient lost the capacity of breathing. But now it is possible to increase pressure in the lungs through the tube introduced in the trachea, expand the lung and ventilate it throughout the operation. This method is called "controlled breathing", which is more easily achieved by using special preparations called relaxants because they relax the muscles.

Important Features

An important feature of modern operations on the heart is the broad use of blood transfusion, which helps to make for the loss of blood, no matter how great it is, and sustain the vitalizing forces of the organism. Surgeons make blood transfusions not only into the patient's veins, but, in emergency cases, also directly into the artery, to ensure a quicker flow of blood to the heart. Thanks to that blood circulation can sometimes be restored in the organism with the aid of heart massage.

The possibility of cutting the heart off from the blood circulating system during an operation is very important. A special instrument called "artificial heart" is now used with great success to temporarily "switch off" the heart. It does the work of the heart and lungs for 45 minutes and more.

Hypothermy is another method applied in heart surgery. Observations of the condition of animals whose body temperature has been reduced have shown that the lower their temperature, the less their requirements in gas metabolism and oxygen. In a healthy animal with a normal body temperature blood circulation can be stopped for 3 or 4 minutes and, if the body temperature is reduced to 30 degrees, for 15-20 minutes.

Hypothermy, or reduction of the temperature of the patient's body, is a means now applied to prevent shortage of oxygen in the brain cells for a period which would be fatal to them. Hibernation is often used in addition to hypothermy: the patient is given drugs that lower his body temperature by several degrees. Drugs which make "control of blood circulation" possible, that is, reduce blood pressure and ensure regular blood circulation independent of the surgeon's actions in the course of the operation, have been used in recent years in the cardiovascular surgery.

I want to mention one more achievement which has simplified heart surgery: the original instrument for suturing blood vessels designed in the U.S.S.R. With its aid the surgeon can replace defective parts of vessels by other, taken from a corpse, or by tubes made of plastics. In general, the use of plastics—lavsan, nylon, kapron, polyvinylalcohol, etc.—is acquiring a growing importance in cardiovascular surgery. These materials are used for making artificial parts for heart valves and important vessels such as the aorta and its branches.

Wide Application

The wall of the aorta or the heart sometimes grows thinner and bulges out as a result of some pathologic changes in it. This phenomenon is called aneurys, which threatens rupture and mortal haemorrhage. Surgery is already applied on a rather broad scale in these cases and helps to avoid grave danger.

Surgical operations often eliminate great suffering in cases of angina pectoris, infarct and other diseases, caused by an insufficient flow of blood to the heart muscle. After numerous experiments on animals and clinical observations, scientists have come to the conclusion that in these cases the surgeon must try to provide supplementary ducts, or collaterals, to ensure the flow of blood to the heart. Soviet surgeons successfully perform the special operations which put an end to attacks of stenocardia, restores normal blood pressure and often also the patients' working ability.

The technique of heart surgery has been worked out to the extent that even new-born infants are now operated upon in emergency cases.

It is a notable fact that, like all scientific achievements in the U.S.S.R., the new methods of operations on the heart are quickly put in practice and are becoming an increasingly important means in the struggle for the Soviet people's health.

General Review of Nutrition of Government of Andhra Pradesh (1959)

The various activities of the Department included study and improvements of the Industrial diets, diet and nutritional assessments, organisation of nutrition clinics, Central Nutrition Laboratories Services and Nutrition Health Education Services.

Diet surveys during the year 1959 disclosed that the consumption of cereals was somewhat adequate but the consumption of pulses, vegetables, milk and milk products, oils and fats was found to be very low and to increase with the rise in income of the family. Dietary habits remained almost constant in all the Socio-economic groups surveyed. The diet of the poor class of the people was to be supplemented with millets like *bajra, ragi* and *sanwa*. Skimmed milk powder supplied by the UNICEF was being distributed freely to the needy expectant and lactating mothers, school and pre-school children through long range feeding programmes, of Maternal and Primary Health Centres and Schools, often supplemented by multi-vitamin tablets, Vitamin A and D capsules and other accessary food preparations. Hypo and avitaminosis and other deficiency states in persons were treated at the Nutrition Clinics set up at the regional headquarters.

The Beriberi Research Project was functioning in the Medical College, Guntur. A Central Nutrition Services Laboratory was established during the year in Hyderabad. Besides, the Nutrition Health Education Services were rendered to the people both in urban and rural areas of the State by the various known methods. During the year, a popular leaflet in simple vernacular language was published on "Correct methods of cooking" by the Nutrition Department.

Diet and Nutrition Surveys :

91 diet surveys consisting of 1092 families were undertaken both in urban and rural areas during the period under report. Besides this, four Institutional diet surveys were also carried out. Diet surveys disclose that the intake of cereals was adequate in most of the families but the intake of pulses, vegetables, milk and milk products, oils and fats was found to be very low and this dietary intake was directly proportional to the rise in income of the families.

The nutrient analysis of the food stuffs consumed showed that there was deficiency of total proteins in general and of animal proteins in particular and also deficiency of calcium, iron, VitaminA, Vitamin B Complex and Vitamin C.. The clinical manifestations of these deficiencies were as follows in certain individuals :

(a) Generalized, under and mal-nutrition. (b) Mild degree of anaemia. (c) Xeropathalmia. (d) Angular stomatitis. (e) Glossitis. (f) Dry rough skin (Xeroderma). (g) Spongy bleeding gums. (h) Dental caries.

Nutrition Survey of Middle and Primary School Children :

Nutrition surveys among 4931 school-going children were carried out in middle and primary schools both in urban and rural areas to assess their nutritional status. Most of the children came from the lower grades and the incidence of various deficiency states that was more or less similar to that found among the members of families whose diet surveys were undertaken.

Work done in Beri-beri Research Unit, Guntur, 1959 :

The broad outline of the work done in Beriberi Research Unit, Guntur, consisted in collecting cases of suspected Thiamine deficiency from the out-patient department and medical wards of Government Hospital, Guntur, and subjecting them to bio-chemical investigations after a clinical assessment of the disease. The results obtained from them were compared against those from apparently normal subjects taken as control. The conclusion of results obtained were :

(a) The study on 24-hour urinary excretion of Thiamine revealed that generally females excreted more than males.

(b)The study of 4-hour urinary excretion of Thiamine revealed that the excretion by the normal subjects was significantly higher than that by the patients.

(c) The excretion of Thiamine by the patients having oedema and B_2 complex deficiency symptoms was 37.9 mgs. and 123.8 mgs. respectively. The difference was highly significant.

These observations tend to point out that oedema can be taken as an important objective sign to look for in Chronic Thiamine deficiency and that other symptoms which are mostly subjective may be of little significance in a field survey for assessment of the prevalence of Beri-beri.

Nutrition Health Education and Publicity :

During the year the Department participated in exhibitions at eight places in the State and one at New Delhi.

Expanded Nutrition Programme :

An expanded nutrition programme for a period of three years (1960-62) in collaboration with other State Departments and UNICEF/AO has been envisaged to cover ultimately 1 lakh population in 200 villages in 20 *Panchayats Samiti* Blocks in 20 districts.

The project included the following related elements: (1) increased production of nutritionally valuable foods such as poultry and eggs, fish, fruit and vegetables in the schools and at homes.

(2) Distribution of these products by the women's committees or by other community groups, to expectant and lactating mothers and pre-school and school-children.

(3) Health Education activities through schools, mothers' clubs, health services and block personnel.

(4) Training of various categories of personnel required for the above. The staff of the Bureau of Nutrition will consist of State Nutrition Officer (Category of ADPH), two medical officer and two health inspectors. The Government will organize separate Refresher and Re-orientation Courses for four weeks duration for various categories of personnel at the Block level. The existing 3 Regional Nutrition Health Units will conduct dietary and clinical nutrition surveys in addition to the surveys made by them in their normal nutrition work.

The Health personnel of Primary Health Centres will co-operate actively in the Blocks covered by this project particularly in Nutrition Health Education and training.

The following other State Heads of Departments will also actively participate in the Expanded Nutrition Programme in Andhra Pradesh.

1. Director of Medical Services, 2. Director of Agriculture, 3. Director of Fisheries, 4. Director of Animal Husbandry, 5. Director of Information and Public Relations, 6. Director of Public Instruction, and 7. Director of Local Administration.

The Department of Agriculture will secure land for school garden under the Community Development Administration and land for gardens will be provided free of cost to schools. Villages have been selected in the *Panchayat Samiti* Blocks for the implementation of the school gardens programme. The Department of Public Instruction will select suitable teachers to undergo training in the Development of school garden.

The international assistance from the FAO/UNICEF for the implementation of this programme in the State of Andhra Pradesh is to a tune $217,000 in the form of supplies of equipment, transport, training and travel stipends for all the participating departments in the project.

After the operational period of 3 years, resurveys will be undertaken for evaluation of the project.

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ENDEMIC GOITRE IN INDIA

The Third Five Year Plan is in operation since April 1961. As in the second five year plan, the Planning Commission invited a number of health workers in the country to advise them on the planning for Health in the third plan period. The Health Panel met the Planning Commission in Delhi and discussed all aspects of Health including Medical Education, training of other health personnel and control of epidemic and endemic diseases.

In the Third Five Year Health Programme the Central Government proposes eradication of several diseases such as Malaria, Smallpox and Cholera. But there is one endemic disease in India which though mainly confined to certain remote regions affects a very virile group of population whose services in the country are of urgent importance from the point of view of the defence of the country, apart from their usefulness in developing exchange-fetching agriculture and industries. We refer to Endemic Goitre, a disease, eradication of which is much less complicated and is possible with limited financial resources. Iodine prophylaxis and rising standard of living have rendered possible the eradication of endemic goitre in many countries formerly severely affected. We believe that the situation is similar in India and can be handled in a like manner.

By actual survey as well as by other methods it has been estimated that up to 1959 there were about 9 million cases of goitre, and females suffered in slightly higher proportion than men.

This endemic disease in its distribution over the world follows the mountain and submontane ranges, classical types being found in the Alps and the Himalayan regions asociated with cretinim and deafmutism, physical and nervous degeneration. There are cases which sometime show decline with age, and others which show no change. Apart from other agencies some food factors peculiar to the population of the mountaineous ranges have been closely incriminated with the production of goitrogenic effect. In fact it has been observed that "the head quarters of goitre and cretinism on the continent of Asia has been assigned to the Himalayan mountains. It extends through Kashmir, Nepal and Burma into China".

As far back as 1917 McCarrison estimated the total number of goitrous persons in India as 5 millions or more, the prevalence rates varying from round 10% in some places to 90% or more in others. The affected population is sufficiently large and the intensity of incidence in some areas is acute enough to deserve immediate attention for its eradication.

Dietetic factors as well as insanitary and unhygienic conditions prevailing in the areas have also to be tackled even though admittedly they are time-consuming and are amenable only to long term programmes. McCarrison had however shown that though the accessory factors are partly responsible for the incidence of the disease the most predominating influence is exercised by actual or relative deficiency of iodine in soil and water.

The States affected most consist of U.P., Bihar, Assam, Punjab and Bengal. Among these U.P. (Gonda, Gorakhpur and Dehra Dun) show the largest number of cases amounting to 100,000 (Hospital and Health returns) annually. In Bihar the largest number of cases come from the Champaran district, and in Assam the Goalpara district.

In Punjab the Kangra district, and in West Bengal, the Darjeeling district give a figure of 20,000 cases annually. The Southern Slopes of the Hindukosh and the Himalayas covering a distance of 1500 miles and comprising northern parts of Kashmir, Punjab, U. P., Bihar, Bengal and Assam are probably the world's largest endemic areas for classical goitre. In some Himalayan villages McCarrison found that 60% of the infants still at breast suffered from goitre. Later work by Statt and others showed that there was close association between endemic goitre and deafmutism. Hospital returns from the various places show a definite increase in endemic goitre from year to year.

Thanks to the work of the W.H.O./F.A.O. Teams in many parts of the world and their excellent monograph and bulletins, sufficient knowledge is available to us of "the Synthesis of the Thyroid hormones from iodine containing substances in food and drinking water and iodine split off from the circulating hormones by enzymes in the blood and returned to the Plasma as iodine". We are also aware off the transferring of the iodides from blood by the thyroid gland and of the consequences of the failure of these processes leading to failure of the feed back mechanism of the pituitary whose increased output of T. S. H. produces no corresponding increase in the production of thyroid hormone. The dysfunctions of thyroid leading to morbidity in the gland has been very clearly illustrated by the W.H.O. in its chronicle Vol. 14. No. 9.

We have also ample knowledge of the goitrogens in the diet. Cabbage diet which forms a primary and principal source of vegetables in the population in the mountaineous regions is probably responsible for goitre in such areas in many parts of the world. In face Braissicagenus vegetables in the diet have been held responsible as goitrogenous in man and animal.

In a like manner we are possessing sufficient knowledge about other factors influencing goitrogenesis, be they water supplies, iodine deficiency or infection.

In the circumstances the problem of adopting control measures brooks no delay. I.C.M.R. by its continued work has drawn attention to the problem and its control. The health panel in its meeting in August 1960 made very strong recommendation advocating iodine prophylaxis and has suggested that endemic goitre can be completely eradicated by iodising salt supply in the affected region. Even though iodine deficiency may not be the primary and only cause of goitre it has been amply demonstrated in various parts of the world that the easiest and cheapest way of preventing the disease is by giving supplementary iodine and meeting deficiency.

It is therefore necessary that the appropriate authorities in the Central Government and States take proper steps without further delay in the third Five Year Plan Programme, to establish in the affected areas, where goitre is endemic, a depot of iodised salt where every individual could go and buy such salt as required for his consumption.

"Once the programme of mass prophylaxis with iodised salt has been decided upon it is necessary to fix the level of iodisation, organise manufacture of a suitable grade, and ensure its efficient distribution and consumption by as wide a section of the population as possible".

We firmly believe that the programme of eradication of diseases as promulgated by the Central Government would be further expanded to include endemic goitre, and as it involves a very small financial outlay there would be no difficulty in carrying out the task.

Endemic diseases like Filariasis and Leprosy have been taken up for control and if possible eradication. Our plea is that the mass prophylaxis of endemic goitre being so simple and cheap should not be kept waiting.

NOTES & NEWS

Public Health Aspects of Low Birth Weight

The problem of prematurity and low birth weight was examined by a W.H.O. Expert Group in 1950. It recommended the use by all countries of the international definition of prematurity (a birth weight of 2500g or less) adopted by the First World Health Assembly in 1948. This definition has been widely accepted and has contributed to greater uniformity of vital statistics. In some areas, however, its adoption resulted in the registration of unusually high percentages of low-weight babies. In many of these areas lower levels have been adopted for local use and for practical purposes, partly because of the difficulties of providing even the simplest form of special care for all babies classified as premature under the international definition, and also because some workers have been of the opinion that the majority of these low-weight babies in fact do well without such special care.

This situation was examined by a W.H.O. Expert Committee on Maternal and Child Health that met in Geneva from 21 to 26 November 1960. The committee reviewed ways and means of reducing the problem of low birth weight, different kinds of care programmes, and methods of determining for individual countries or population groups birth weight levels at which various types of care are required. Many factors that play a part in low birth weight are still not fully understood; the Committee therefore outlined some of the more important studies, field investigations, and research projects that should be undertaken.

(W.H.O. Chronicle).

Complications of Isoniazid Treatment

While the introduction of isoniazid has greatly facilitated the treatment of tuberculosis, there are still a number of problems involved in its use. For example, if the drug is administered in relatively high doses to patients suffering from malnutrition, the complication of peripheral neuritis may arise.

A recent number of the W.H.O. Bulletin contains an account of a study of the problem at the Madras Chemotherapy Centre, India, where this complication was noted in 20 out of 338 patients, drawn from a poverty-stricken malnourished section of the community, who were allocated at random to four different treatment schedules.

Nineteen of these 20 patients were in groups receiving 7.8.—9.6 mg/kg body-weight of isoniazid daily, and 18 were classified as slow inactivators of isoniazid. The remaining patient was in a group receiving 3.9-5.5 mg/kg body-weight daily plus P.A.S. (*p*-aminosalicylic acid). The neuritis appeared in 9 of the cases in the first four months of treatment. Three very mild cases improved spontaneously without any specific treatment or discontinuation of the isoniazid. Large doses of pyridoxine and the discontinuation of the isoniazid proved effective in the treatment of the complication; pyridoxine is expensive, however. There was evidence that a vitamin B complex preparation in a daily dose containing 6 mg of pyridoxine was also an effective treatment, despite the continuation of the isoniazid. The prophylactic value of this preparation is now under study.

(W.H.O. Chronicle)

Expert Committee on Health Statistics

The information obtained from mortality statistics and from the statistics routinely collected by public health services is inadequate for the expansion of health programmes or even, in many cases, for evaluating the results of these programmes. Special surveys to supplement existing data are therefore becoming more frequent. National health surveys have been organised in six countries and are being considered in others; in many countries national surveys on specific diseases (tuberculosis, trachoma, etc.) have been carried out. Numerous local health and morbidity surveys have been executed or are being planned.

The statistics obtained from these surveys are rarely comparable, since the methodology, definitions and classifications employed differ widely not only from country to country, but from survey to survey. The results of individual surveys are frequently unsatisfactory, because adequate statistical methods have not been applied.

A W.H.O. Expert Committee on Health Statistics which met in Geneva from 5 to 10

Decebber 1960, reviewed the whole question of health surveys. The Committee first considered the general charactertistics, potentialities and limitations of health and morbidity surveys, distinguishing three main types: interview surveys, health examination surveys, and surveys based on existing record systems. The scope of local health surveys, specific disease surveys, and surveys in less developed areas was considered. The Committee also reviewed the preparations for the next revision of the International Classification of Diseases.

(W.H.O. Chronicle).

The Epidemiology of Mental Disorders

A W.H.O. inter-regional conference was held from 6 to 15th December 1960 at Naples to discuss techniques of conducting surveys on the epidemiology of mental disorders. The participants were drawn from Southern European and North African countries in the European and Eastern Mediterranean Regions.

The conference discussed three main topics. One was sample surveys of prevalence, with special reference to the census method and the relationship of general demographic factors to mental health conditions. Another was surveys based on hospital populations, special attention being paid to the problems of retrospective and prospective cohort studies and the possibility of using hospital populations for assessment of the results of treatment. The third was studies of social influences on psychiatric pathology, especially in relation to epidemiological problems of migrating populations and the validation of results by the investigation of appropriate control groups.

(W.H.O. Chronicle).

Diarrhoea and Sanitation

The improvement of potable water supplies during the last years of the nineteenth century and the first years of the twentieth was followed by a marked decrease in the incidence of typhoid fever. Although no such definite correlation was noted in respect of diarrhoea morbidity and mortality, S. W. Simmons, writing in a recent number of the *Boletin* of the Pan American Sanitary Bureau, observes that this type of disease becomes less frequent when the following improvements are introduced into a community: (1) an adequate water supply in each home; (2) a hygienic system of evacuating excerta; (3) elimination of flies, and in some places of snails that are the hosts of *Schistosoma;* (5) provision of sufficient domestic living space; (6) exercise of adequate control over food hygiene. It is usually admitted that diarrhoea and dysentry, and in particular the bacillary forms of the diseases, tend to disappear when all these sanitary measures are adopted.

The supply of potable water is considered as a rule to be the first prerequisite for the prevention of diarrhoeal diseases. However, recent studies on shigellosis seem to indicate that the quantity of water available for personal hygiene is atleast as important as, if not more important than, the quality of the water. Although outbreaks of water-borne shigellosis have been notified, investigations have shown that *Shigella* dies quickly in water, and very few epidemics can be specially attributed to it. On the other hand, *Shigella* can be easily passed from one person to another—which means that personal hygiene is an important factor. It has been proved that there is considerably more shigellosis among families without laid-on water in their homes than among those who have this amenity, whereas no difference of incidence is noted as between communities with a municipal water supply and communities using well water liable to be contaminated. The rates observed in Kentucky among pre-school-age children are enlightening; 1.1% in localities with domestic water supplies and adequate facilities for the evacuation of excreta; 2.4% in localities with water laid on to the homes but with latrines outside; 5.9% in localities where both latrines and water points are outside; and 6% in localities where the water supply is at a distance. In the camps for immigrant workers in California, the rates for *Shigella* infection among children of families using outside latrines were approximately double those for families with inside latrines.

In tropical and sub-tropical countries, flies are among the main vectors of diarrhoeal diseases. In the low-lying region of the Rio Grande Valley, it was found that total elimination of flies reduced *Shigella* infection by approximately 40%. The best way of combating flies is, by environmental sanitation, to prevent their propagation. Any Municipal sanitation programme must first and foremost include appropriate measures for the collection and disposal of refuse.

(W.H.O. Chronicle).

A Vaccination Against Measles

Enders and co-workers have elaborated a method of vaccination against measles with a living virus modified by successive passage in kidney tissues and then in amniotic membrance cultures. The first results obtained in man are very promising and very likely this method will be routinly applied in the future.

(*Medical Digest*, Vol. 92, No. 1).

Activities of the Union Ministry of Health

It is expected to have one primary health centre in each community development block in the country by the end of the Third Plan period, according to the summary of activities of the Union Ministry of Health for 1960-61.

Upto March 31, 1960, 2,282 primary health centres were established and during 1960-61 and 1961-62, 635 and 467, respectively, were expected to be opened, the report said.

During the year under review 390 malaria eradication units had been established. Forty-seven filaria control units were allotted under the National Filaria Control programme during the year.

The report said that pilot projects, as part of the preparatory steps for the implementation of the national small-pox eradication programme in the Third Plan period had already been started in one district in each state and in the Union territory of Delhi. These pilot projects were expected to be completed by the end of March. The actual small-pox eradication programme would be launched later this year.

At present 170 BCG teams were working in the country and upto the end of October, 1960, 54,490,871 persons had been vaccinated.

Uuder the scheme for the control of leprosy there were at present four treatment and study centres and 109 subsidiary centres, the report added. The Second Plan provision of Rupees 6. 5 crores for the establishment of new medical colleges and the expansion of existing ones was likely to be exceeded by Rs. 4 crores. During 1960-61 the Government approved establishment of 150 T. B. isolation beds. The total number of T. B. isolation beds approved for establishment during the Second Plan, was 4,720. The number of beds actually establish during 1956-57 to 1959-60 was 784, and 2,228 were proposed to be established during 1960-61. These figures do not include those for Andhra.

The report further said that by December, 1960, the number of family planning clinics was 1,492 (963 rural), other medical and health centres giving family planning advice 1,589 and districts having family planning service 292. The reported number of sterilization cases (under estimates) increased from 7823 (1956) to 35,722 (1959). The total reported number from 1956-60 (November) was 108,047.

Rupees 6.78 lakhs have so far been granted to various private institutions for the development of indigenous systems of medicine in the year under review.

A total of 363 projects had been included so far in the National Water Supply and Sanitation Programme, the report said. The estimated cost of all the approved schemes was about Rs. 80 crores. A provision of Rs. 63 crores was made in the Second Plan but was later reduced to Rs. 57 crores.

Get Rid of Those Plastic Bags

The Union Health Ministry in a press note warned the public against the wrong use of, or allowing children to play with thin plastic bags and coverings used as packing material.

The note said that these bags and coverings should be destroyed soon after being unwrapped and should never be given to children to handle.

Windmills for Rural Water Supply

A new project to introduce windmills to the Indian countryside is likely to be taken in hand this year.

It is learnt that about 200 indigenous windmills are to be manufactured over the next two years to provide cheap drinking water and minor irrigation facilities to selected villages. This is still an experimental project which, if successful, will be taken up on a mass scale.

Wind velocity surveys, conducted in various parts of the country over the past three years, have indicated that the most suitable areas for windmills are Saurashtra, Bombay, Mysore and parts of Madras, Andhra and Orissa States. The 200 windmills are, therefore, likely to be installed in these areas. It has been estimated that the windmills, once erected, will require constant supervision by official technicians who will also have to record periodically the readings of wind recording instruments attached to the windmills. Official estimates say that it will take

a week to install a windmill in a village after a suitable site has been selected.

This Project, which is under the charge of the National Aeronautical Laboratory, Bangalore, is expected to cost about Rs. 14.5 lakhs over the next two years. The scheme to utilise wind power was started in 1957 to develope indigenous windmills and to study wind velocities in different areas. One of the windmills developed in India the W-P-2, costs about Rs. 2,500.

All-out Offensive Against Tuberculosis

Nearly 50 million people will be checked for tuberculosis in the Soviet Union this year, and 10 million children will be given prophylactic anti-tuberculosis injections. Every Soviet citizen will have a special check-up at least once every two years.

Substitute for Curarine

Uzbek scientists have found a substitute for curarine, a muscle-relaxing preparation used to facilitate complex and protracted surgical operations.

Curarine is made from the wild plant curare, which is found only in American prairies. Both the composition of the preparation and the method of its manufacture are held a close secret.

Uzbek scientists have found an alkaloid which not only substitutes curarine, but surpasses it in medicinal properties. The new preparation, called "Demsemien", was isolated from larkspur, a herbaceous plant widely growing in Central Asia.

It has been tested with success, and has been found to be superior to the American preparation in that it has no harmful effects on the organism when administered in the same doses.

FOURTEENTH WORLD HEALTH ASSEMBLY

The 14th World Health Assembly met in New Delhi from 7 February to 24 February 1961. The President was Sir Arcot Lakshmanaswami Mudaliar, Vice-Chanceller of Madras University and Chief Delegate for India. In his speech to the closing Session the President said that delegates had shown that they had one goal, one ideal and one language. The goal was that of the World Health Organization; the attainment by all peoples of the highest level of health. The ideal was that of promoting the well-being of mankind and the single voice that of the medical profession, whose first duty had always been service to those in need irrespective of all other considerations.

The Assembly had voted the largest budget the Organization had ever had and had adopted a firm policy of eradication of disease. However, Sir Arcot appealed to the more favoured nations to continue their voluntary contributions for malaria eradication work. The need and the opportunity were now, he said, when so many newly-independent nations were emerging and needed help.

Referring to the Assemly's dicussions on the health hazards of atomic radiation, the President appealed to all the countries concerned to listen in a proper spirit to the expressions of anxiety that had been heard from many delegates. He hoped that when they met again there would be a "clean slate" and the situation would be such that there would be no further need for illusions on this matter.

Earlier the Assembly adopted a resolution of thanks to the Government and people of India for their warm welcome and hospitality.

The Assembly was attended by delegates from WHO's 109 Member and Associate Member States, including those from one new Member, the Islamic Republic of Mauritania, and from two new Associate Members, Tanganyika and Ruanda Urundi.

The World Health Assembly adopted a programme of work for 1962, with a working budget of 23,607,180 dollars. This figure comprises the Director-General's original proposal of 20,852,000 dollars, plus several additions approved by the Assembly, including an amount of 2,000,000 dollars towards financing the field activities of the world-wide malaria eradication programme, 797,347 dollars for the administrative and operational services costs of the malaria eradication programme, 110,033 dollars for assistance to the Republic of the Congo (Leopoldville), and 21,400 dollars for the use of Russian as a working language in the European Region. A deduction of 203,000 dollars was made by the Director-General from his original proposal, following the decision of the General Asssembly of the United Nations to reimburse WHO

for the book value of its iuvestment in the Palais des Nations in Geneva, WHO's present headquarters. A new headquarters for WHO is at present being built in Geneva.

The budget adopted for 1962 reflects attempts to preserve the continuity of WHO's evolution in recent years, with particular reference to the increasing importance of the stimulation and co-ordination of medical research; the continued need to concentrate efforts on the world-wide eradication of malaria; the efforts to strengthen basic public health services and the wish to accept fully the responsibility which a very substantial increase in membership places upon the Organization.

Twelve countries were elected to designate a person to serve, on the WHO Executive Board. They are: Chile, Iceland, Iraq, Israel, Italy, Japan, Nigeria, Pakistan, Poland, Senegal, Spain and the United States of America. The twelve other members of the Board are from the following countries: Argentina, Ghana, Ireland, Jordan, Korea, Luxembourg, Nepal, Peru, Sudan, Thailand, United Kingdom and Venezuela.

Assistance to newly independent States: In its penultimate session the Assembly unanimously adopted a resolution concerning the granting of independence to colonial countries and peoples. Welcoming the attainment of independence by new States and their entry into WHO and stressing that WHO has an important part to play in promoting the right of colonial peoples to freedom and independence through assistance in raising levels of physical and mental health, the resolution appeals to the Member States of WHO to introduce or develop in their health education programmes the teaching of the principles of racial equality and non-discrimination with a view to promoting good mental health and in recognition of the fundamental right of every human being to health.

The Assembly also adopted a resolution voicing satisfaction with the speedy assistance given by WHO to the Congo and requesting the Director-General to give similar assistance to all newly independent States who become members of WHO.

Malaria eradication: The Assembly approved a scheme to transfer gradually, over a period of three years, the cost of field operations in the world-wide malaria eradication campaign from the special voluntary fund to WHO's regular budget. Efforts to obtain voluntary contributions to the Malaria Eradication Special Account, from governments and private sources, would continue. It was also decided that, beginning in 1961, the administrative and operational services' cost of the malaria eradication programme should be financed from WHO's Regular Budget.

These measures were designed to ensure that the technical achievements in malaria eradication, with which the Assembly expressed satisfaction, would not be hampered by lack of funds.

Radiation health: A resolution defining the role of WHO in radiation health, including the protection of mankind from ionizing radiation hazards, whatever their source, was adopted by the Assembly. The resolution notes that present scientific knowledge provides data on the harmful biologic and genetic effects on human beings of massive doses of ionizing radiation, voices recognition of the anxiety of WHO Member States concerning increased exposure to ionizing radiation and approval of the action of the United Nations General Assembly relating to the immediate cessation of nuclear test explosions.

Smallpox eraication: It was reported that the world-wide efforts to wipe out smallpox are making good progress and that most countries in which the disease is still present have now undertaken programmes to eradicate it. However, the Assembly adopted a resolution which noted that smallpox is still an important problem in international travel and that it was urgent to speed up eradication programmes.

The Assembly also gave approval to a resolution that WHO should have a flag, of the same blue colour as that of the United Nations but featuring the WHO emblem in white and gold. This emblem consists of the Aesculpian staff super-imposed on the UN symbol.

The informal technical discussions this year dealt with "Recent Advances in Tuberculosis Control".

The Assembly decided that the Fifteenth Assembly should be held in Switzerland.

ABSTRACTS

Premature African Babies

Oomen, A. P. & Smulders, Frances. *Six Hundred African Prematures. A Review of the Conditions and the Results of Simple Treatment.*

Trop. & Geograph. Med. Amsterdam, 1960, Mar. v. 12, No. 1, 15—20, 2 graphs.

This paper was written to demonstrate that much can be done to save premature babies even where accommodation and equipment are very simple. The hospital was in the Sumve area of Tanganyika and babies under 5 lb. weight were regarded as premature. Conditions favouring the premature infant were the temperature and the generous supply of mothers' milk. The regime of feeding is described, breast milk being given by the tube to weakly infants until they reached 5 lb. weight.

There were 601 premature infants in the series; 101 born in the hospital had a mortality of 36% and of 500 admitted after birth 61% died. Birth weight was the main factor affecting survival. No definite cause could be given for prematurity which was common. Many mothers showed anaemia which responded rapidly to an improved diet. The data suggested that progressive deterioration of the mother's health might cause prematurity which also showed seasonal prevalence during the rains when the mothers were working intensively on the farms. A second peak of prematurity followed sale of the cash crop, the time when medical help is most often sought. Toxaemias of pregnancy and syphilis were not causative factors. Primiparae formed 35% of the mothers of premature infants, and 13% of the mothers of prematures bore twins of whom 39% survived.

(*Bull. of Hyg.*)

Epidemiological Studies on Prematurity in Japan

Funakawa, H., *Epidemiological Studies on Prematurity in Japan.* Bull. Inst. Pub. Health, 9(1):1-8, 1960.

Epidemiological studies on prematurity were carried out and the following results were obtained: The incidence of prematurity in Japan in 1952 was 9.0% (8.3% for males and 9.8% for females), and the neo-natal death-rate of premature infants was 8.4%, remarkably higher than that of mature infants. The correlation of incidence of birth and death of premature infants with some factors occurring during pregnancy and at delivery was analysed by comparing the data from 202 premature infants with those from 181 mature ones. Abnormal episodes in mothers during pregnancy might have some relationships to the premature birth. The rate of growth of premature infants was higher than that of mature infants, but the variance of body-weight was larger in premature infants. Neo-natal care for premature infants born in their homes was surveyed and the high neo-natal death-rate of premature infants was observed.

Bio-ecological Studies of Sewage Purification and Drinking Water

Nakajima, F., *Bio-ecological studies of sewag purification and drinking water. (III) Succession of biological community in the trickling filter and characteristics of biota in the oxidatin tank.* Bull. Inst. Publ. Health, 9(3):115-137, 1960.

(1) The characteristic biological community developing on the surface of materials contained in the trickling filter and oxidation tank (domestic small trickling filter) may be called the damp-rock community which develops in a flow of polluted water film. (2) The biological community of the trickling filter completes itself from the biota of settled sewage with following processes: from the swimming type *Ciliata* to the creeping type *Ciliata* and further to fixing type *Ciliata.* The amount of organisms in the community fluctuates with the degree of loading on the filter. From the standpoint of quality and quantity of organisms affecting the efficiency of the trickling filter, 900 ± 100 g/m^3/d BOD may be called the optimum loading on the filter. (3) Such difficulties of the trickling filter as clogging, decomposition of sludge or seasonal slough are caused by the phenomena of over or undergrowth or the decrease of organisms in a comparatively short period of time. When the difficulties actually occur, several organisms indicative of those difficulties come to sight. (4) The amount of organisms in the biological community of the oxidation tank is extremely poor in comparison with that of the standard trickling filter. The poor efficiency of sewage

purification of the oxidation tank is believed to be due to the above mentioned result.

Experimental Studies on the Examination of Coli-form Organisms in Water

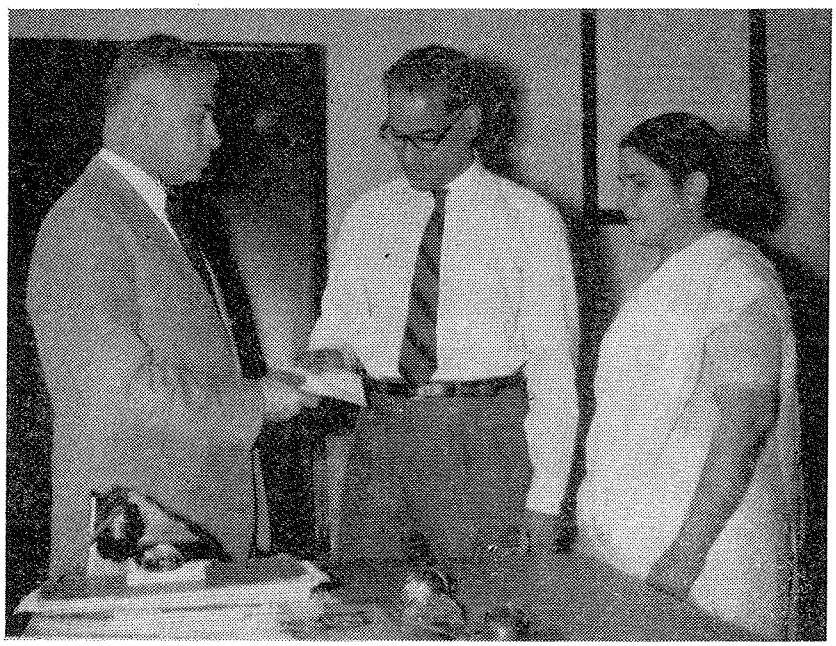
Taguchi, K., *Experimental studies on the examination of coli-form organisms in water. I. Fundamental studies on incubation temperature.* Bull. Inst. Publ. Health, 9(3): 165-174, 1960.

An experimental study was made to determine the most favourable temperature for the growth of coli-form organisms. Five incubation temperatures, 20, 30, 35, 37 and 44°C, were studied. E. coli separated from well water, sewage, night-soil, and polluted fish, were incubated on agar plate at each of the above temperatures. B. subtilis and Staphylococci were also cultivated in the same way for comparison. It was found by a statistical analysis of the data obtained that 45°C was the best temperature for the growth of E. coli and that 37°C was next to it. For B. subtilis it was proved that 30°C was the most favourable temperature, and for Staphylococci the almost same results were obtained as for E. coli.

Effect of Clothings on the Pulmonary Function

Ishige, H., *Effect of clothings on the pulmonary function. II. The change of respiratory patterns as between with and without a waist-nipper.* Bull. Inst. Publ. Health, 9(3): 158-164, 1960.

Ten healthy girl students aged from 21 to 23 years were chosen as the subjects. Spirograms with the use of new three-speed respirometer were taken in standing positions both with and without a waist-nipper. The results were analysed statistically. Vital capacity, maximum breathing capacity, inspiratory reserve volume, and minute ventilatory volume showed no difference between the two conditions. When the subjects wore waist-nippers, one second vital capacity and tidal volume increased, while the time for vital capacity and expiratory reserve volume decreased. Thus, it was suggested that some elastic clothings like waist-nipper might be helpful for easy respiration of emphysematic patients.



President handing over to the General Secretary cheque for Rs. 10,000 received as ad-hoc grant to the Association from the Ministry of Health, Government of India. The Director of the All-India Institute of Hygiene and Public Health is standing by.

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