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The Antiseptic

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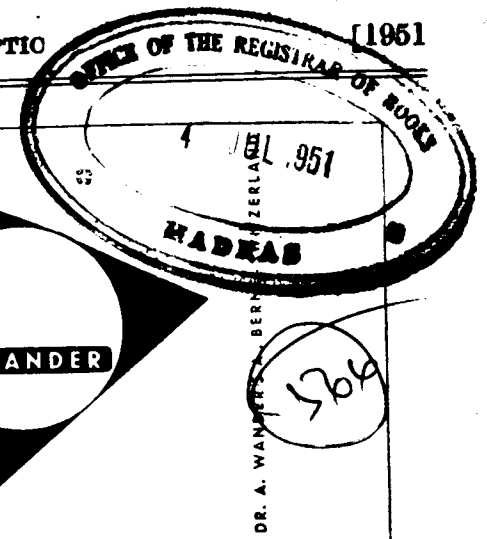
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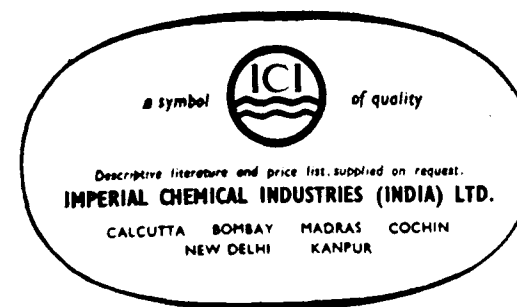
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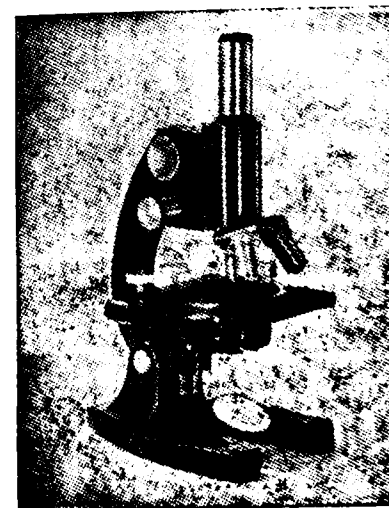
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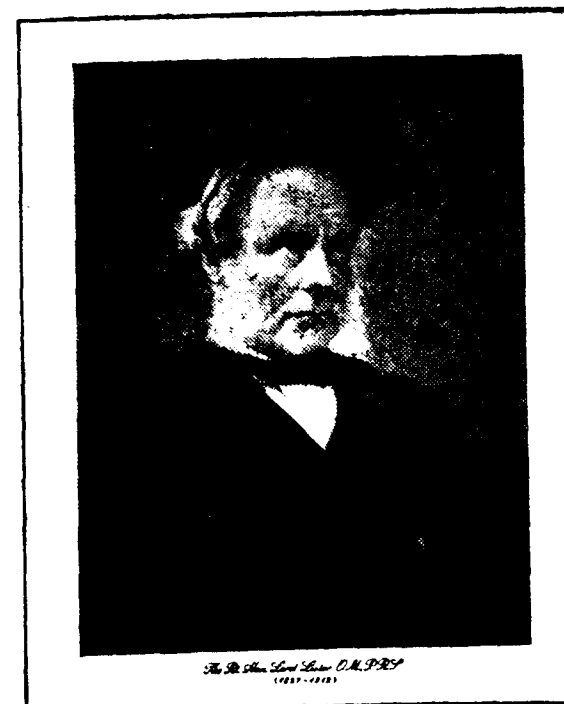


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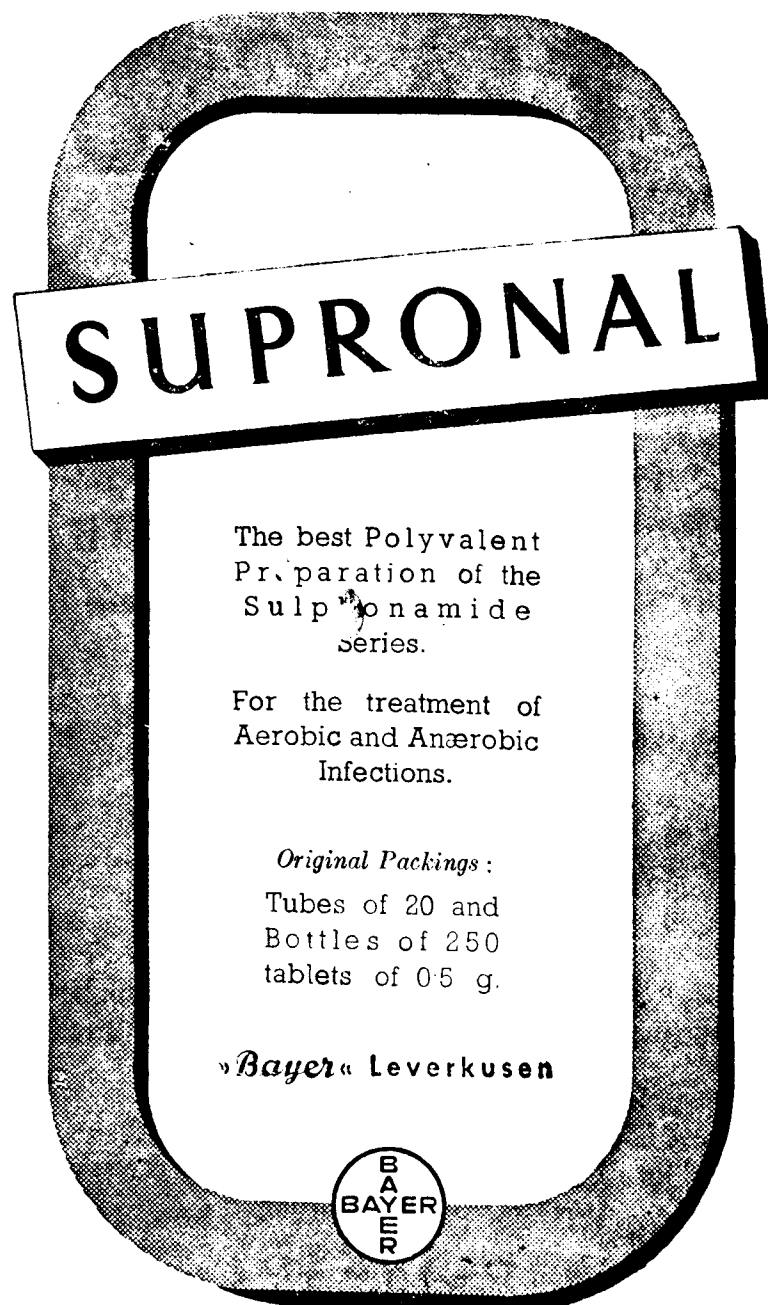
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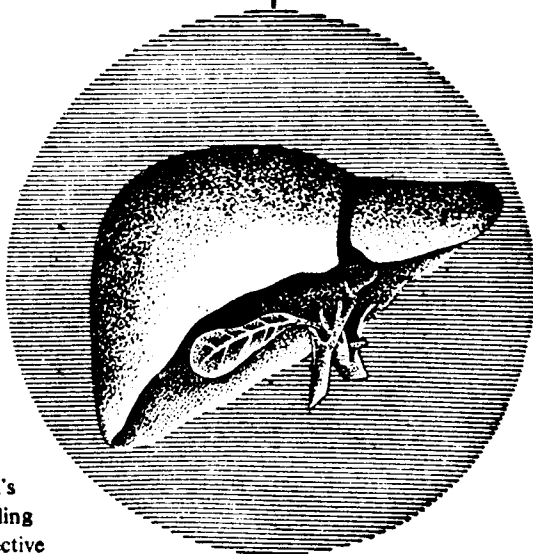
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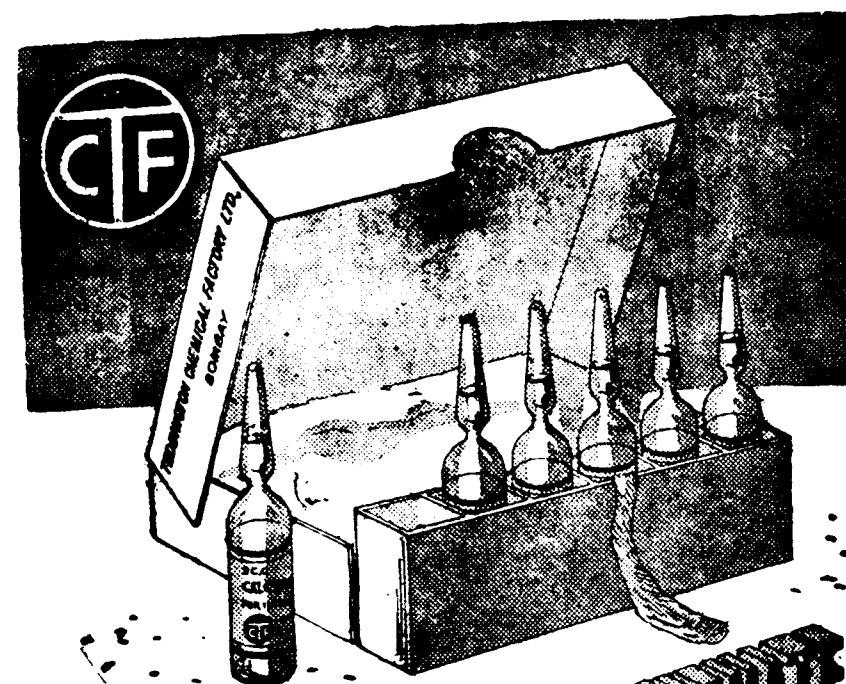
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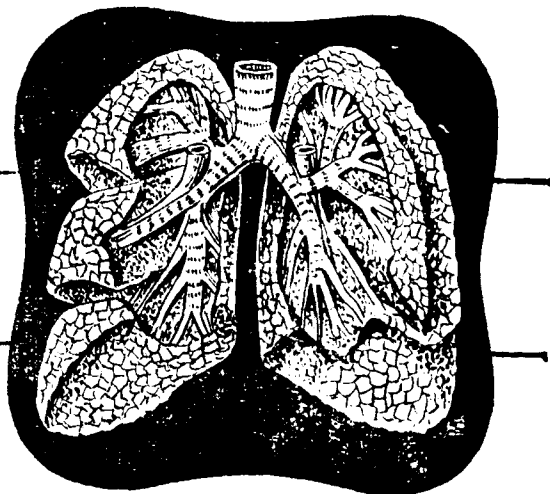
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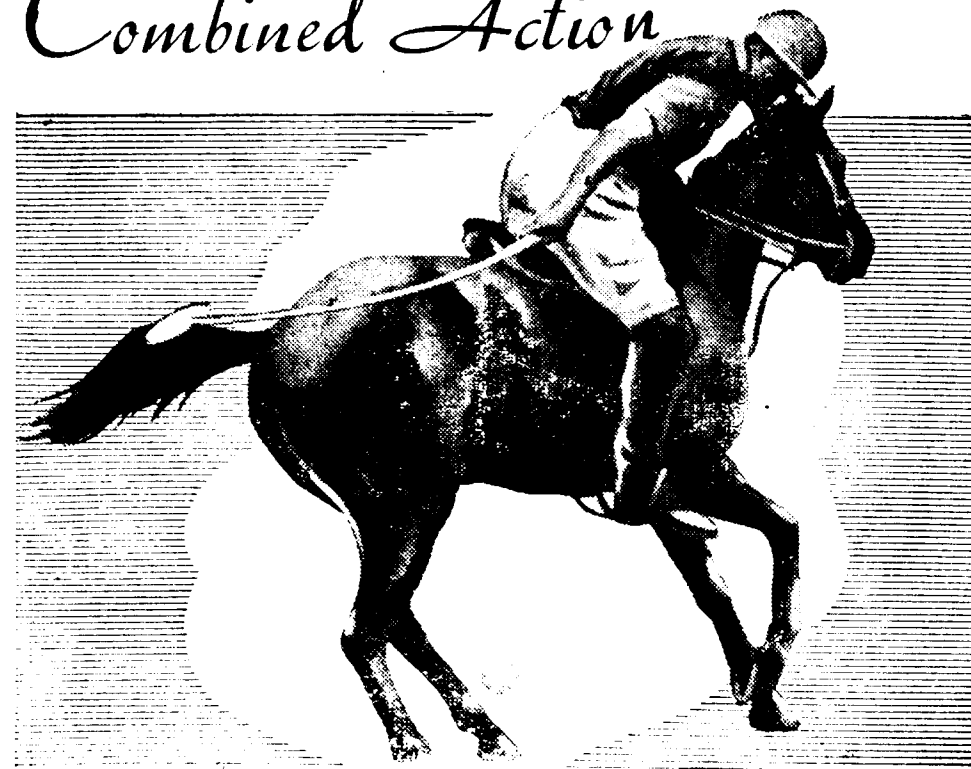
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(1) Preliminary statement by the Medical Research Council, *Lancet*, 1949, ii, 1237.
(2) MOESCHLIN, S. & DEMIRAL, B. *Schweiz. Med. Wschr.* 1950, 80, 373.

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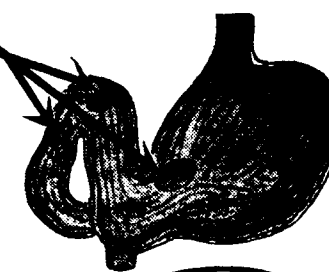
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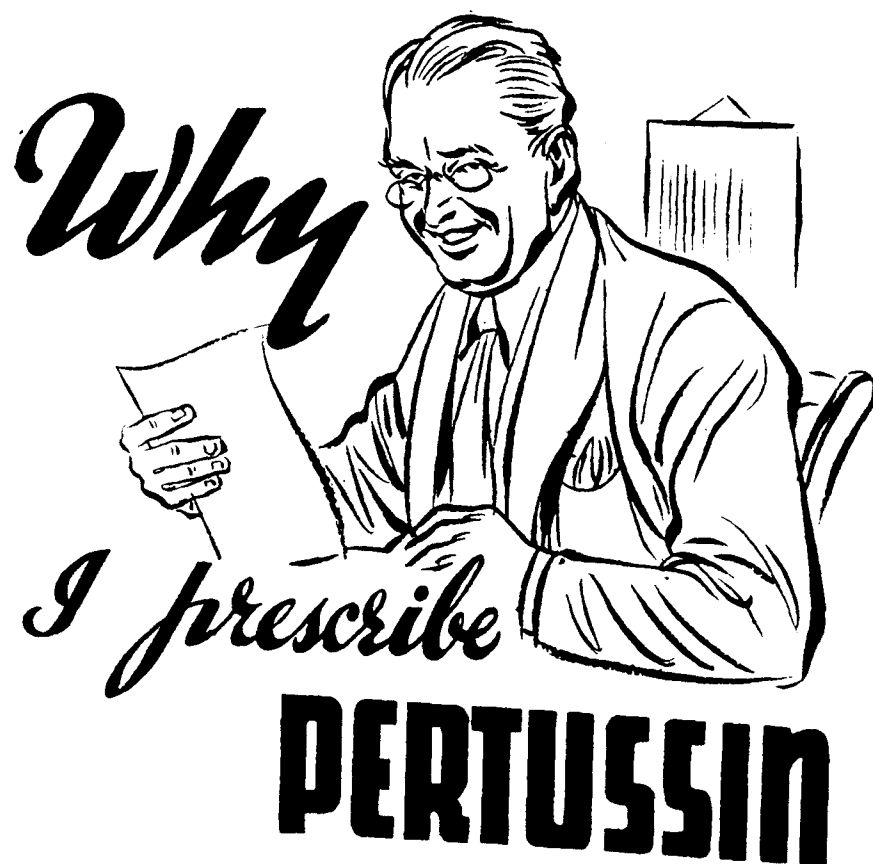


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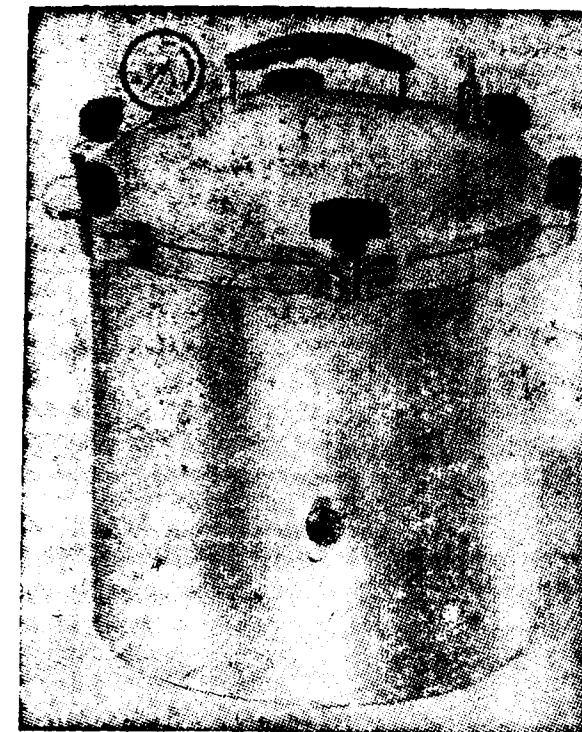
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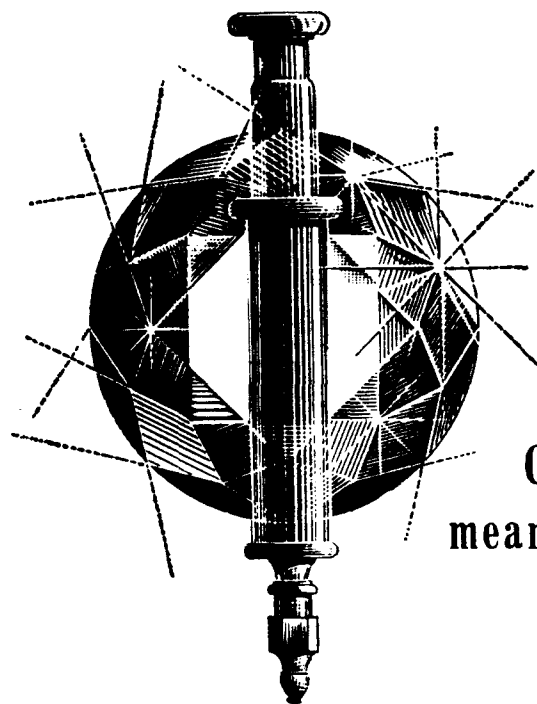
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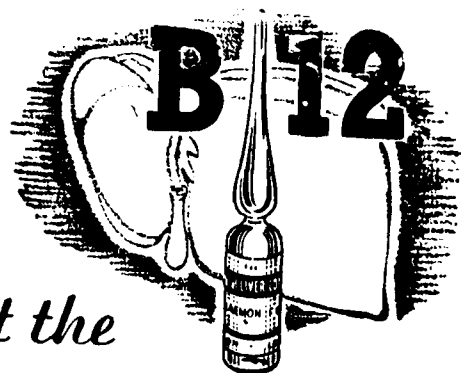
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† Craig, J., Clark, N.S.,
and Clamers, J.D. (1949)

Brit. med. J., 1, 6
Herxheimer, H. (1948) Lancet, 1, 667
Hunter, R. B. and Dunlop, D. M. (1949) Quart. J.
Med., 17, 271
McEvedy, M.B. (1949) Lancet, 1, 825
Reid, T.J., and Hunter, R.B. (1948) Lancet, 2, 806.

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The "Dysenteric type".—The writer has had patients with a history of dysentery a few weeks to a few months prior to establishment of diagnosis of kala-azar by marrow punctures. *Example:* A young adult starting with sour eructations and diarrhoea developed after 2½ months painless enlargement of liver, splenomegaly and loss of weight. On examination the patient had fine thin black pigmentation of the skin, liver 1" below costal margin, and palpable spleen (1½"). 20-8-1949:—X-rays chest: Right cupola of diaphragm elevated. Blood: Total whites 14,800 per cm.m. Differentially 45% polymorphs, 30% lymphocytes, 20% eosinophiles, 5% mononuclears, 0% basophiles. Outside the hospital the patient had daily 1 grain of Emetine for 6 days, but continued to be ill. Admitted into the hospital. A four hourly temperature chart (*vide Temp. Chart*) revealed a double crisis and pyrexia was not felt by the patient. Sternal puncture revealed Leishman-Donovan bodies. Promptly treated with Urea-stibamine, the patient improved and was discharged cured.

The "Pneumonic type".—A few patients are admitted as broncho-pneumonia but respond to usual chemotherapy poorly. Liver and spleen become enlarged slowly, and widal is usually negative or positive 1 in 50. Sternal puncture shows L-D bodies. This type was discussed at a recent Conference of the Association of Physicians in India.

Prognosis.—Mortality formerly about 80% has now become very low, about 10%, with modern treatment. Symptoms improve with antimony treatment and cure is lasting. Resistant cases are also encountered.

Diagnosis.—Kala-azar is confirmed by discovery of Leishman-Donovan body by splenic or hepatic or marrow puncture or lymph gland puncture. The marrow puncture is the most popular as sternal puncture at present.

Shortt and Swaminath (1939) and Henderson (1939) reported Leishmania Donovanii in the nasal mucus. The writer has also studied smears of nasal mucus stained with Leishman stain and has found Leishmania Donovanii in the slides; and this procedure is likely to be positive in patients who are febrile and with a bronchial catarrh. *Example:*—An adult



FIG. 3.

male, 23 years old (*Clinical picture 3*), and admitted for huge

TEMPERATURE CHART

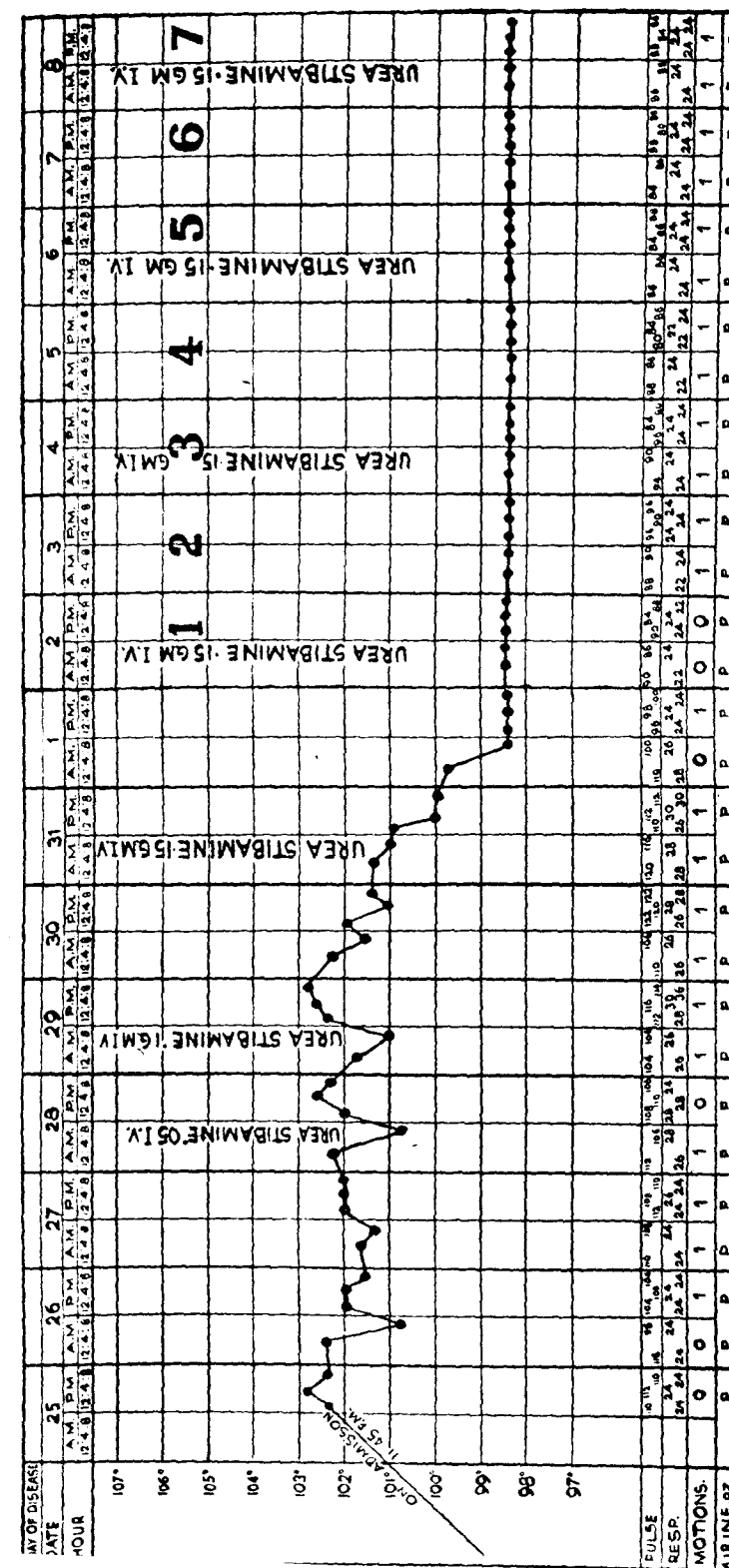
January & February 1951.

Name:—Venkatesan.

Age:—12 years.

Disease: Kala-Azar.

Result: Cured.



splenomegaly and bronchitis. Gel positive strong. Nasal smear stained with Leishman stain and in it *Leishmania Donovanii* identified free and in large cells. Treated with Urea-stibamine and discharged cured.

Blood examinations, cultures (NNN medium), and serum tests, Aldehyde and antimony tests, are useful aids.

Differential diagnosis.—Kala-azar has to be differentiated, from the following :—

- (1) Chronic malaria and this can co-exist with kala-azar.
- (2) Banti's syndrome.
- (3) Typhoid fever. In the writer's opinion, the coated tongue, sudaminal vesicles on the abdomen, progressive fever are also common to kala-azar (typhoidal type) and widal test is unreliable. Again typhoid fever appears to predispose to kala-azar infection.
- (4) Leukæmias.
- (5) Chronic intestinal indigestion in children who exhibit sore throats, low fever, diarrhoea, enlarged liver and simulate having kala-azar very much.
- (6) Renal tumours may be mistaken for kala-azar splenomegalies which get very large.
- (7) Hepatic cirrhosis.
- (8) Schistosomiasis.
- (9) Undulant fever, relapsing fever and glandular fever.
- (10) Syphilis, tuberculosis and lipoidoses.
- (11) Lymphadenoma.
- (12) Endocarditis lenta.

The trying patients belong to the following categories :—

- (1) Early cases.
- (2) Resistant cases. *Example*:—An adult male, 41 years. Admitted on 3-12-'49 and prior to admission had 'a few' injections of Antimony. Diagnosed as kala-azar after sternal puncture. Treated fully and discharged on 31-12-'49. Relapsed after four months with fever and splenomegaly; and again treated fully. Again re-admitted on 3-2-1951 with splenomegaly up to umbilicus and hepatomegaly 1" below costal margin, and with loss of weight and low fever. Treated with blood transfusion as repeated total white count showed less than 2000 per cm.m. Is this resistance to be attributed to previous antimony treatment of small dosage or to an infection with a virulent strain of the parasite?

(3) Cases with hepatic cirrhosis :—Hepatic cirrhosis associated with kala-azar has been so common as to form a desperate group in view of the undesirability of antimony therapy. Such patients are very ill with ascites, bleeding gums or piles, hæmatemesis and malæna, cancrum oris, diarrhoea and albuminuria. To exemplify

the lucky progress of one patient the following is narrated, while many succumbed helplessly. *Example*:—A boy, 13 years old. Admitted for a fever of 10 days' duration on 26-1-1950. Ill-nourished. Phrynoderma present. Liver hard and 3" enlarged, and spleen 1" enlarged. Epistaxis present. Gel strong positive. Treated with Antimony and readmitted on 22-2-1950 for ascites, epistaxis and



FIG. 4.



FIG. 5.

bronchopneumonia. Had previously 2 grams of Antimony. Treated with quality protein (white of 2 eggs daily orally given), diuretics, and liver extract. Improved and discharged. (*Clinical pictures 4 and 5*).

(4) Cases with debilitated heart, pulmonary involvement (tuberculosis, pneumonia) and nephritis, colitis and stomatitis.

TREATMENT.—Prophylaxis:—In India burning down infected huts and cooly lines are effective. Measures against sandfly are advocated (DDT spraying) as also mass treatment.

Local attention involves improvement in food, clothing, and housing. Follow up of gastroenteritis may reveal oral infections.

Curative:—Attention to general health and sanction of food rich in vitamins and quality proteins are essential.

Antimony treatment:—The writer's use consisted of Urea-stibamine and Stibatin. Urea-stibamine is given starting with 0.05 or 0.01 gm. and increasing by stepwise doses on alternate days to a maximum of 0.3 gm. Injections are given intravenously on alternate

days. The total course is scheduled as about 3 gm. for an adult of 100 lbs. weight, and 4.5 gm. for an adult of 150 lbs. weight. The writer does not advocate in ill-nourished subjects a single large dose exceeding 0.2 gm. Early doses are better tolerated after a preliminary dose of 0.25 c.c. of Adrenalin subcutaneously; and further this is an effective therapeutic procedure. Stibatin (G.L.) is for intramuscular use and is intended mainly for children; it is started with 0.5 c.c. and gradually increased to 2 or 3 c.c. and given daily or on alternate days. Ascites and nephritis rule out antimony treatment; and if pneumonia or jaundice sets in, these conditions demand prior attention. Toxicology of antimony consists in coughing, vomiting, diarrhoea, arthritic pains, cardiac depression and nephritis.

Diamido-stilbene is now under trial and may be given in resistant cases or to those sensitive to antimony.

Agranulocytosis in kala-azar responds better to blood transfusions; and the anaemia is benefited by iron and liver extract.

How long is the treatment to be continued? This is given till fever and splenomegaly disappear, blood picture returns to normal (blood cultures negative and marrow puncture negative), and the patient gains weight. Return of serum proteins to normal would be a good test to stop treatment.

As the kala-azar parasite is not recognised inside the nervous tissue or hepatic parenchyma, there may be some element in the tissues antagonistic to the parasite. An oral treatment of kala-azar is welcome and long overdue.

[The writer is thankful to Dr. P. R. Kalyanasundaram, M.B., B.S., Superintendent, Government Royapettah Hospital, Madras, for all the encouragement received.]

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1. Richard P. Strong—Stitt's Diagnosis, Prevention and Treatment of Tropical Diseases, VII Edition, 1945.

Khellin for Cardiac Pain

Khellin, the active principle of *Ammi visnaga* causes active coronary vasodilatation without reducing blood pressure or increasing the pulse rate. This drug has lately been tested by Rosenman *et al* (*J. A. M. A.*, 143, 160, 1950) on 14 cases of angina pectoris. Khellin (Visamin) was given usually for 3 to 13 weeks and in one case for 40 weeks. At other times a placebo was given and sometimes no treatment. The number of Trinitrin tablets taken daily by each patient under these 3 different conditions was estimated. In 7 of the 14 cases the number of Trinitrin tablets was substantially less with Khellin than with the placebo or no treatment. In 6 of the 7 cases capacity for excretion was increased. Khellin also produces bronchial dilatation. It has been used also in bronchial asthma and chronic cor. pulmonale.—(Annotation in *Lancet*, 8.7.1950).

TUBERCULOUS MENINGITIS AND STREPTOMYCIN THERAPY*

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TUBERCLE bacillus is so very protean in nature that it can invade every tissue of the body. It is the insidious onset of tuberculosis, which seeks the corners and crevices of the human system, that makes the early diagnosis and treatment difficult. No organ is exempt—lungs, bones, joints, intestines, genito-urinary tract, brain and meninges. Tuberculous meningitis is one of the saddest manifestations of tuberculosis. Its early diagnosis is difficult; its treatment still more. Till recently T.B. meningitis was considered a fatal disease. The mortality was 100%. Recently, however, we see a welcome gleam in the horizon—thanks to Streptomycin. Cases of T.B. meningitis which have been treated and cured with Streptomycin have now been recorded. Para-amino Salicylic Acid is another chemo-therapeutic substance which is used nowadays.

Tuberculous meningitis is always secondary to a tuberculous process elsewhere in the body. Meninges may be involved in either of two ways. A tuberculous focus *e.g.* in the lungs, may burst into a blood vessel and the bacilli thus disseminated throughout the body. This gives rise to what is called a miliary tuberculosis, the meningitis being only a local manifestation of a generalised disease. Miliary tuberculosis may be confirmed by an X-ray examination of the chest, when the numerous millet-like opacities are seen scattered throughout the lung field. The other route by which the meninges may be involved is through a small focus situated near the neighbourhood of the sub-arachnoid space, which may burst into the space thus giving rise to tuberculous meningitis. Although clinically there is not much of difference between these two types as far as the meningitis is concerned, the distinction is of importance from the point of view of prognosis. The former type is always fatal, but in the latter recovery is possible, though rare.

Case Report.—Four cases of tuberculous meningitis have been treated in this hospital since the beginning of this year (1950). Their respective age and sex are as follow: (a) 30, female; (b) 18, female; (c) 9 months, male; (d) 37, male (case presented at the meeting). Of these the first two cases died, whilst the child was taken away from the hospital against medical advice. Cases (a) and (b) died within two days after admission, before any treatment could be started.

Mr. M. R. B., aged 37, first attended the Medical out-patients' department of our hospital about April, 1950. He complained of a

dull ache over the right side of the head and above the right eye. He had been suffering from attacks of pain since 1948, for which his eyes were examined and nothing abnormal found. In 1948 he was examined by Dr. S. N. Sarma, F.R.C.S., E.N.T. Surgeon, and found to have a deviated nasal septum. He was advised an operation. In 1950 his eyes were again examined and nothing abnormal detected to account for his headache. Mr. M. R. B. was operated for the deviated septum on the 10th May, 1950, and discharged cured after a few days stay in the hospital. On 11th June, 1950, the patient was once again admitted into the hospital for a high, continuous fever of two days' duration.

There was nothing significant in the past, family or personal history of the patient.

On examination:—11-6-'50.—Patient was found to be restless and anxious. He complained of severe headache, more in the occipital region. Photophobia was marked. Bowels—constipated. Reflexes—exaggerated. Marked rigidity of neck and Kernig's sign were present. Temperature fluctuated between 101°F. and 102°F. and never rose above 102°F.

Blood count:—Total W.B.Cs. 8,500 per cm.m. Polymorphs—65%; Lymphocytes—28%; Monocytes—4%; Eosinophils—3%.

Sedimentation rate:—120 m.m. (Westergreen) at the end of 1st hour.

Cerebro-spinal fluid:—Turbid, cob-web formation seen on standing. Cells: 2000 per cm.m., mostly polymorphs (0.5 normal); Chlorides: 630 m.gm. per 100 c.cs. (700–760 normal); Proteins: 100 m.gm. per 100 c. c. (10–35 normal); Sugar: diminished (70–100 m.gms. per 100 c.c. normal).

Although the meningitis continued for nearly a month after the nasal operation, the E.N.T. Surgeon suspected it to be due to meningococcal infection. No meningococci or other pathogenic organisms were, however, seen on microscopic examination of the C.S. fluid. The increase in polymorphs in the fluid favoured the diagnosis, although the absence of leucocytosis or polymorph increase in the blood count and the chemical findings of the C.S.F. were also to be borne in mind.

Parenteral Penicillin was started. 20,000 units of crystalline Penicillin was given intrathecally and 40,000 units intramuscularly every four hours, besides Sulphatriad 1 g. stat and 0.5 g. four hourly. 10 c.c. of Solusepatasine was also given by the intravenous route. To relieve the severe headache, Veganin tablets, sedative mixtures, 50% Glucose solution, 50 c.c. saturated solution of Mag. Sulph. dr. ii etc. were given. The intramuscular Penicillin injections and oral Sulphatriad tablets were continued four hourly for 12 days without any effect. The condition of the patient remained the same, temperature varying between 100°F. and 102°F., headache, photophobia and neck rigidity still persisting. Aureomycin 2 capsules

* A paper read at the Second Session of the Assam Provincial Medical Conference held at Jorhat, under the auspices of the Indian Medical Association and the All-India Medical

(500 m.gm.) 6 hourly was started on the 17th and continued for six days. There was still no response to the treatment.

On 20th June the case was first referred to me. The condition of the patient at the time of my examination was very serious. He complained of severe occipital headache, had a toxic look, photophobia and neck rigidity. The temperature was still high.

X-ray chest: "No definite signs of infiltration, only increased hilar shadows both sides, with prominent broncho-vascular markings."

Fundi: Normal. C. S. Fluid: Cells—850 per cm.m., lymphocytes; Proteins—120 m.g. per 100 c.c.; Chlorides—600 m.gm. per 100 c.c. Sugar—absent.

A typical cob-web formation was seen on allowing the fluid to stand. Fluid was slightly turbid, under tension. No micro-organisms are seen.

Penicillin injections, Sulphatriad and Aureomycin were stopped on the 22nd June, 1950. On the 24th Streptomycin Hydrochloride $\frac{1}{2}$ g. intramuscularly twice daily, besides Para-amino Salicylic Acid 10 g. in 4 ozs. water, 1 oz. every 6 hours was started. The temperature began to fluctuate between 99°F. and 101°F., and, after 14½ g. of Streptomycin had been given, subsided completely. Although the headache still remained along with photophobia and neck rigidity, the patient began to sleep and eat well. Gradually all these symptoms also passed away. A total of 45 g. Streptomycin and 300 g. Para-amino Salicylic Acid were given. Repeated lumbar punctures were not attempted as the patient's general condition was very poor.

1st July, 1950:—C. S. fluid: clear, not under tension; Cells—6 per c.m.m.; Proteins—30 m.g. per 100 c.c.; Chlorides—620 m.gm. per 100 c.c.; Sugar—normal.

12th October, 1950:—Blood sedimentation rate: 11 mm. (Westergreen) 1st hour.

21st October, 1950:—C. S. fluid: clear, normal tension; Cells—nil; Proteins—30 m.gm. per 100 c.c.; Chlorides—700 mg. per 100 c.c. Sugar—normal.

Weight:—150 lbs. The patient weighed only 122 lbs. at the time of his discharge.

Discussion.—The examination of the cerebro-spinal fluid is probably the most essential step in the diagnosis of tuberculous meningitis. The usual features of the C. S. F. in a well-established case of tuberculous meningitis is as follows:

Fluid is under increased tension, slightly opalescent; on standing a pellicle which hangs like a cob-web forms on the surface;

Cells—Lymphocytes predominantly increased (normal 4-5 lymphocytes per cm.m.).

Protein—Increased 100—300 m.gms. per 100 c.c. (normal 10 to 35 m.gms.).

Chlorides—Decreased 600—650 m.gms. per 100 c.c. (normal 700-760 m.gms.).

Sugar—Decreased 20-40 m.gms. or even absent per 100 c.c. (normal 70-100 m.gms.).

On microscopical examination of the pellicle tubercle bacilli may be demonstrated.

In this case the preponderance of polymorphs in the C.S.F. at the first examination, later to be replaced by lymphocytes, and the absence of tubercle bacilli require comment. The high polymorphonuclear count in the early stages is a result of the acute allergic reaction which is present at the onset of the disease. Unless this is borne in mind, the clinician, to quote Boyd, is apt to be misled by the laboratory report (*Ref. No. 1*). Because the meningitis in this case followed an operation on the nose, an ascending infection from the nasal tract was suspected at the beginning. The increased polymorph count in the C.S.F. also favoured this diagnosis. If this were so, pyogenic organisms, staphylococci, streptococci or meningococci, would have been seen in the C.S.F. The absence of tubercle bacilli from the C.S.F. also requires an explanation. The demonstration of tubercle bacilli in the C.S.F. is usually very difficult and varies with different workers and does not depend on the patient. In one of the cases (*Ref. No. 2*) reported by the Streptomycin Advisory Committee, tubercle bacilli were found only after more than 60 examinations; in two cases, after death at the post-mortem, and in four cases, none were found. It was the lack of response to Penicillin and the Sulpha drugs that made us revise our diagnosis. The characteristic chemical findings in the C.S.F. about ten days after the onset of the disease confirmed the diagnosis of tuberculous meningitis. The final proof that the diagnosis was correct was demonstrated by the dramatic response to Streptomycin therapy.

Streptomycin therapy with special relation to T.B. meningitis.—Streptomycin, as is well known, is only a very recent drug, being derived from the soil fungus, *Streptomyces griseus*. The treatment of tuberculosis cases with streptomycin was started in 1946 under the control and supervision of a Streptomycin Advisory Committee. It is, therefore, still too early to assess definitely the value of Streptomycin in the treatment of tuberculosis, and especially of tuberculous meningitis. Many cases which appear for all clinical purposes cured, may have a relapse after a few years. It can, however, be definitely stated that cases of tuberculous meningitis which would invariably have died in the course of two or three months before the Streptomycin era, have now been able to lead a normal existence. The case which I have presented is an instance.

T.B. meningitis cases which are diagnosed early in the course of the disease and which have no other systemic infections (*e.g.* tuberculosis of lungs, bones, glands etc.) are best suited for Streptomycin therapy. The earlier the treatment is started the better the

prognosis. According to the Interim Report of a Sub-committee of the Scientific Advisory Committee, cases can be divided into three clinical groups:

(1) Early:—With minimal physical signs, no neurological signs, and not badly confused;

(2) Intermediate:—Definite meningeal and neurological signs, confused but able to be roused;

(3) Late:—In coma with many neurological signs.

Out of the 21 cases of the first group, eleven cases are progressing well and 7 dead; out of 44 cases from the intermediate group, 24 died and 18 progressing well. In the third group we find the highest mortality—out of 16 cases 14 had died and only two progressing (*Ref. No. 2*).

Age:—As regards the age group, patients between 4 and 17 show the best results. About 50% of cases in this group progress favourably, whilst only 25% of cases below 4 and above 17 years respond to Streptomycin therapy (*Ref. No. 2*).

Tuberculous meningitis associated with generalised miliary tuberculosis has a worse prognosis than meningitis occurring alone. Out of 17 such cases of the former type treated (*Ref. No. 2*), only 3 survived.

Dose and route of administration:—Streptomycin given by mouth is not destroyed in the intestinal tract, but neither is it absorbed. Hence this route is indicated only in order to produce an effect in the intestinal tract itself (*Ref. No. 3*). To produce a systemic effect, it must be given by the intramuscular route, or when the meninges are involved by the intrathecal route. In cases where a spinal block has developed it can be given by a direct cisternal puncture. A dose of 20 mg. per pound body weight is recommended for the intramuscular injections, but it is wise not to exceed 2 g. a day. Doses higher than this are liable to produce toxic effects. 1 g. a day for adults has been found to be most satisfactory. 5 g a day is less toxic but not so efficacious. Streptomycin injections often cause pain at the site of the injection and in such cases may well be combined with $\frac{1}{2}$ c.c. of 1% Procaine solution. It is best that the calculated dose of the drug be divided into four and administered 6 hourly. If this is not possible, it can be given twice a day and rarely as a single daily injection. How long should these injections be continued? The duration of treatment depends upon the clinical state of the patient. The injections may be continued for even three months without any untoward effects.

For children, the dose is calculated according to the body weight—20 m.gms. per pound body weight being an adequate dose. In cases of tuberculous meningitis when Streptomycin is to be given intrathecally, the recommended dose is 100 m.gms. daily dissolved in 5 to 10 c.c. saline administered slowly. For children under

12 years 50 m.gms., and for those under 3 years 25 mgms. is recommended (*Ref. No. 2*). These injections may be given daily for 2 or 3 weeks, then on alternate days for two weeks, and later once a week for months. Intrathecal Streptomycin is very toxic, and, moreover, cannot be administered in general practice. A dreaded complication of intrathecal Streptomycin is the development of a spinal block, and when this develops Streptomycin can be continued by the intracisternal route.

An interesting feature observed is that the level of Streptomycin in the C.S.F. following intramuscular injections is an indication of the state of activity of the disease. Normally after intramuscular Streptomycin, no or very little—2 to 4 micrograms per c.c. of Streptomycin is found in the cerebro-spinal fluid. When there is an active process in the meninges *e.g.*, a relapse in the course of treatment of a case of T.B. meningitis, the Streptomycin level in the C.S.F. rises. In short, an intact meninges does not allow the Streptomycin given by the intramuscular route to be excreted in the C.S.F., this barrier being destroyed when the meninges become inflamed.

Preparations of Streptomycin:—Streptomycin is generally supplied in one of three forms; Hydrochloride, Sulphate or as Calcium Chloride double salt. All the forms have the same effect, but the preparation best suited for the intrathecal route is the Sulphate. Another point to be remembered is that if the Sulphate and the Calcium Chloride salts of Streptomycin are administered simultaneously a precipitate of Calcium Sulphate occurs. Hence a change-over from one to the other of these salts during intrathecal administration is to be avoided. If a change is to be made, several weeks must elapse before it is done. Following the same rule during intramuscular administration is also advisable (*Ref. No. 4*).

Dihydro-Streptomycin is a preparation of Streptomycin treated with hydrogen and a catalyst. It is less toxic than Streptomycin, and has less action on the vestibular apparatus. This preparation is well tolerated by patients sensitive to Streptomycin (*Ref. No. 5*). Although it has less toxic action on the vestibular nerve, it affects the acoustic nerve much more frequently than Streptomycin. Further, it is less effective therapeutically than Streptomycin. Tubercle bacilli resistant to Streptomycin are also resistant to Dihydro-Streptomycin, so that the latter preparation is useful only in cases which are sensitive to Streptomycin.

Toxicity of Streptomycin:—(1) Vestibular damage is the commonest toxic effect of Streptomycin and occurs from the third to the seventh week. The frequency of occurrence of the toxic symptoms increases with the age of the patient, so that Streptomycin administration in a person over 35 years requires constant supervision (*Ref. No. 4*). In early stages or in bed-ridden patients this vestibular nerve involvement may not be detected so easily. Ambulatory

cases may complain of unsteadiness while walking, especially in the dark. On examination, nystagmus, inability to walk along a straight line, Rombergism etc. may be seen. Vestibular nerve involvement is not irreversible, lasting from a few days to years. But the damage done may be permanent, hence the danger of Streptomycin administration.

(2) Streptomycin-resistance of the tubercle bacilli is probably the most important complication we have to fear now. Once this happens, Streptomycin has no further effect on that case. There is another very dangerous result. Streptomycin-resistant bacilli, when they multiply, produce bacilli which are also resistant to Streptomycin, and this strain may infect others. Thus, by the indiscriminate use of Streptomycin, there is a likelihood of pulmonary and other forms of tuberculosis being caused by the Streptomycin-resistant strain of bacilli.

(3) Spinal block. One of the results of Streptomycin treatment is the conversion of the gelatinous exudate at the base of the brain into one of wooden hardness (*Ref. No. 6*). This has the effect of interfering in the circulation of cerebro-spinal circulation resulting in a spinal block. In such cases Streptomycin should be administered by the intra-cisternal.

(4) Albuminuria and granular casts in urine may appear in some cases. With the moderate dosage used at present these abnormalities subside without continuing treatment (*Ref. No. 4*).

(5) Exfoliative dermatitis is an indication for the immediate stoppage of Streptomycin and is treated with Anthisan cream.

(6) Urticaria, rash, pruritus etc. which occur within the first three weeks of treatment indicate sensitivity to the drug, and are counter-acted by the Anti-histamine group of drugs.

(7) Nausea, anorexia and vomiting often begin during the third or fourth week of treatment and are relieved by Anti-histamine drugs.

Para-amino Salicylic Acid in doses of 10 to 12 g. a day, which may be increased to even 16 g. if there are no adverse effects, has a synergistic action with Streptomycin. A total dose of 350 g. may be given without any toxic manifestations. By itself *Para-amino Salicylic acid* is not so effective. But combined with Streptomycin it reduces the toxicity of Streptomycin and also diminishes the development of Streptomycin-resistant strain of bacilli (*Ref. No. 7*).

In conclusion, I would like to say that tuberculous meningitis is a disease in which the patients are virtually snatched from the grave. A disease that was once 100% fatal, is now-a-days viewed with less concern. For this we must thank Streptomycin and *Para-amino Salicylic Acid*. When we read the reports of cases of T. B. meningitis so far advanced that all hopes were being given up,

and had yet responded dramatically to Streptomycin and left the hospital cured, our hopes are raised and our faith buoyed. We feel that at least in the case of Streptomycin we must make an exception to the remark of Sydney Smith, who said, "If all the drugs in the *Materia Medica* were to be thrown into the sea it will be all the better for mankind, and all the worse for the fishes."

My thanks are due to the Principal, Assam Medical College, Dibrugarh, for permission to present the case at the Conference and to publish this paper in the *Journal*.

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Nitrogen Mustard in Rheumatoid Arthritis

The fact that rheumatoid arthritis entails an active proliferation of the synovial membrane, with perivascular lymphocytic nodules in the subcutaneous tissues, endomysium and perimysium and perineural tissues, prompted Shutkin and his colleagues, to investigate the effect of nitrogen mustard in this disease. Six cases of active rheumatoid arthritis were studied. The prescribed dosage of 0.1 mgm. of Methyl-Bis (Beta-chloroethyl) amine hydrochloride per kgm. of body weight was administered intravenously on 4 consecutive days. The responses to the drug, though transient, were, in all instances, great enough and occurred promptly enough to suggest a possible 'cause and effect' relationship. Nitrogen mustard produces depletion of the cholesterol esters and ascorbic acid of the adrenal cortex in experimental animals. ACTH produces depletion of the cholesterol esters and ascorbic acid of the adrenal cortex. Like ACTH and cortisone Methyl-Bis has a lymphopænic effect. The difficulty of differentiating mere coincidence from a cause-and-effect relationship has been attested in recent years by the shortlived popularity of colloidal sulphur, bee and cobra venoms, vitamin D, colloidal gold and other drugs. On continued use these compounds failed to maintain the therapeutic effects for which they were heralded in the initial reports. The similarity in biochemical and clinical response to ACTH and nitrogen mustard justifies further investigation of the latter drug in the treatment of rheumatoid arthritis.—(*Jour. Bone Joint Surg.*, Jan. 1951, pp. 265-266).

ROLE OF ENDOCRINES IN NORMAL MENSTRUATION AND THEIR DISORDERS*

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FROM puberty to menopause the endometrium is constantly under the influence of the ovarian hormones. These in turn are controlled by the pituitary gonadotropic hormones—the follicle stimulating hormone (F. S. H.) and the luteinizing hormone (L. H.). The F. S. H. predominates in the first half of the cycle (the pre-ovulatory phase) and the L. H. in the second half (the post-ovulatory phase). By the rhythmical fall and rise of the ovarian secretions the endometrium undergoes constant changes which consists of its growth, secretion, shrinkage and its shedding. The aim of the ovarian cycle is ovulation. This is accomplished by the growth of the follicle which slowly grows bigger and bigger till the time it bursts releasing the ovum. The ruptured follicle is now transformed into the so called corpora lutea which grows and then shrinks. Before ovulation takes place the endometrium is solely under the influence of oestrogen (produced by the growing follicle in the ovary). After the ovum has been released it comes under the combined influence of the oestrogen and the Progesterone (produced by the corpora lutea). A sudden withdrawal of both these secretions results in the endometrium becoming necrotic. It is shed piecemeal and the raw places bleed freely. This lasts as long as the whole endometrium is shed. The bleeding stops then and the cycle begins over again. The shedding of the endometrium with the concomitant bleeding, constitutes a normal menstruation.

Under the influence of oestrogen, the endometrium becomes a thin layer of mucus cells poor in blood supply. This is the proliferative phase. This prepares the endometrium for the action of progesterone. Under its influence the blood supply is increased, the glands become bigger and the premenstrual endometrium therefore is thick, succulent and oedematous. It is in fact the decidua prepared for the implantation of the ovum. If fertilised, the corpus luteum, instead of shrinking, grows bigger and bigger till a few days before delivery takes place. Discontinuance of progesterone secretion during pregnancy, will result in abortion.

We have thus seen that normal menstruation is due to simultaneous withdrawal of both oestrogen and progesterone. Each of them however plays an independent role. For effective action of oestrogen three things are pre-requisite. First the endometrium should be of a kind sensitive to its action. Secondly the oestrogen concentration in the blood should be of a sufficient degree, as higher or lower levels would lead to anovulatory bleeding or amenorrhœa. The third

* Specially contributed to THE ANTISEPTIC.

is the pituitary gonadotropic control, already spoken about. We yet do not know clearly how each of these plays its part in ovulatory bleeding (normal menstruation). We know, however, their patterns. The oestrogen withdrawal bleeding is brief and scanty. Progesterone deprivation bleeding, on the other hand, is almost like a normal period with regard to its duration, amount and shedding of endometrium. Oestrogen increases the general tone of the uterine muscle and induces frequent contractions of a low amplitude. Progesterone, on the other hand, induces less frequent contractions but they are of greater amplitude. Both these contractions are painless normally. The pain is usually due to unbalance of these hormones which leads to sudden ischaemia and engorgement of the pelvic floor.

I have already told you in the beginning that both these hormones of the ovary are under the influence of the anterior pituitary hormones. During the earlier part of the cycle the follicle stimulating hormone (F. S. H.) controls the development of the graafian follicle. This in due course begins secreting and this counteracts or slows down the secretion of F.S.H. The follicle luteinising hormone (L.H.) begins its action. The waning influence of F.S.H. and waxing influence of L.H. probably marks the rupture of the ripe graafian follicle, when they reach a certain ratio. This is how the normal discharge of the ovum from the ovary occurs. The failure of these ovulatory hormones lead, according to their severity, to some characteristic bleedings which we will now consider one by one.

Oligomenorrhœa (Ovulatory).—The length of the menstrual cycle is increased and generally not more than 6 weeks elapse between 2 successive periods. The pre-ovulatory phase is prolonged, probably due to inadequate secretion of F.S.H., or due to a failure to reach the required F.S.H. and L.H. ratio within a certain period of time. The menstruation is normal in amount and duration.

Amenorrhœa or non-ovulatory oligomenorrhœa.—As the name implies there is no ovulation during such a cycle. There is a complete failure of both oestrogen and progesterone secretion. Especially the oestrogen level is so low that it has no action on the endometrium.

Menorrhagia.—This means profuse bleeding, often prolonged and at frequent intervals. There is ovulation but the ovulatory cycle may be less than 14 days. This condition is probably due to a slight deficiency of progesterone. Consequently there is incomplete shedding of the endometrium leading to profuse irregular bleeding.

Metropathia hæmorrhagica.—In this there is no trace of a menstrual cycle. The bleeding may be of an alarming nature at

times, or it may be so scanty just as a little trickle. The bleeding may go on for weeks or months and so the interval between these bleedings is always very uncertain. There is no ovulation in this condition and the endometrium is therefore always under the influence of oestrogen. The endometrium is very thick and not easily detachable. The shedding is therefore piecemeal and the bleeding only stops when this all is shed.

What occurs in intermenstrual bleeding is not quite clear. It may be due to a fall in the effective oestrogen concentration at the time of ovulation. These bleedings have no great significance except that they cause undue anxiety and inconvenience to some patients. In some the flow is unusually scanty. This hypomenorrhoea should not cause much anxiety since there is no fault with ovulation in such cases.

To distinguish between all these common menstrual disorders a careful history-taking is very important. A detailed menstrual chart is a great help. Such a menstrual chart should have with it a chart showing basal temperatures also. This will show in most cases whether it is an ovulatory or anovulatory cycle. It is said that with secretion of progesterone the morning temperature rises. A sudden rise in temperature and its further maintenance at that level will show the exact date of ovulation and the progesterone activity period. The best and the correct way of diagnosing these various conditions is by an endometrial biopsy. By the thickness or otherwise you can with certainty say which secretion is more or less. This also gives one a chance of excluding cancer. The treatment of the condition also suggests itself.

While explaining to you the normal physiology of menstruation, I have already told you that the uterine bleeding occurs only at a particular threshold of oestrogen in the blood. The oestrogen levels above and below this concentration cause amenorrhoeas. In normal menstrual cycles the increased production of progesterone neutralises the action of oestrogen in the 3rd week of the cycle. Clinically it is easier to raise the level of oestrogen than to lower it. The toxicity of this preparation (Stilboestrol) by mouth is a serious handicap. We shall speak more about this subject while dealing with the treatment of all these various conditions. We have already noticed as to how adequate amounts of progesterone help complete shedding of the endometrium. This knowledge could be made use of in conditions where we want to carry out a complete shedding of the endometrium to stop bleeding, as for example in metropathia hæmorrhagica. Knowledge of this fact is very necessary in treating cases of profuse hæmorrhage in adolescent patients.

The end of a woman's reproductive life is heralded by some peculiar symptoms. It is well to remember that it is not a disease but a normal physiological phenomenon. These active glands

slowly go into retirement. Yet they may at times cause considerable alarming symptoms so much so that many dread its approach. There is no particular fixed age for its appearance and that is why its appearance at a comparatively young life is very often misleading. It is very necessary, therefore, to be familiar with some of its common features. It starts with a feeling of nervousness, excitability, irritability, disturbed sleep or insomnia, depressed states and loss of confidence. The extreme symptoms are profuse sweatings and hot flushes. Together with these there are some menstrual disorders of various natures. These all put together should make one suspect what is coming on, as that is very important while deciding about the line of treatment to be given. A careful history-taking, including the hereditary behaviour and an examination, will save much unnecessary sufferings of these unfortunate patients.

TREATMENT.—Having learnt about the behaviour of the various hormones and their bleeding patterns it is easy to use them correctly in many of these conditions. Now-a-days we have many of these secretions available in synthetic forms. They are all properly essayed. These are convenient forms and most of them can be given by mouth. Where this is impossible there are preparations which can be given by injections. There are also some which could be administered as linguets with action as quick and certain as after an injection. Lastly there are pellets which could be used as grafts. It is therefore better to know what armamentarium we possess in them.

Primary sex hormones (F.S.H. & L.H.) are the best in treating many of the menstrual disorders. Unfortunately they are not available for clinical use. We have, however, serum Gonadotropic hormone prepared from the serum of pregnant mares (sold as Antex by Dumex) and the Chorionic Gonadotropic hormone prepared from the urine of pregnant mares (sold as Physex by Dumex). These are called anterior pituitary-like hormones (F.S.H. & L.H.). They are not the same. These have some limited use in primary and secondary amenorrhoea and female infertility. In the former, the condition is mainly due to dysfunction of the one or the other of the ovarian hormones. Giving of serum Gonadotropic hormone (Antex 3000 I.U. daily for 5 successive days) followed by giving Chorionic Gonadotropic hormone (Physex 15000 I.U. every alternate day in three injections) brings about normal menstruation. In female sterility where the same pathogenesis is at work, namely amenorrhoea or anovulatory menses, treatment on the same line as above is successful in most cases. The diagnosis of sterility as being of functional origin should be correct.

Treatment with Gonadotropic hormones though specific is very costly. We have therefore to talk about treatment with ovarian hormones. This is mainly a substitute therapy and therefore has to

be a tedious and prolonged one, naturally so as it has to be continued till the ovarian function starts normally.

Stilbœstrol (Synthetic Estrone) is probably the least costly and most widely used ovarian hormone. It has this disadvantage that its lowest therapeutic dose and toxic dose are very near each other. It is usually effective by mouth, but when it produces nausea or vomiting when given orally, it can be given by injection. Ethinyl Oestradiol is about 20 to 25 times more potent than Stilbœstrol and where a high dosage is indicated this is the drug of choice. Oestradiol Benzoate is administered by intramuscular route given once or twice a week.

Progesterone (also synthetic) is usually given by intramuscular route. Ethisterone (also a Progesterone) is available for oral use, but it has to be given in about 30 mg. doses daily where about 20 mg. to 25 mg. of Progesterone by injection on alternate days would be sufficient.

Broadly speaking anovulatory type of menstrual cycle is usually due to some physical or metabolic error. Treatment of the underlying condition brings about normal ovulation where the cause is the latter (metabolic). Empirically Thyroid Extract may also be tried in some of these cases. One can also attempt a crude imitation of normal menstrual cycle by giving 3 courses of Stilbœstrol in 0.5 mg. doses each being of 21 days together with Ethisterone in 30 mg. doses from the 14th to 21st day leaving an interval of one week in between two successive courses, when the expected menses should occur if it occurs. This may lead to one or two ovulations (this may be authenticated by keeping a daily temperature chart) and if proper instructions are given may lead to a successful pregnancy in women desirous of having children.

While speaking about the normal menstrual cycle we have seen that during the third week of menstrual cycle Progesterone neutralises the effect of Estrogen. Clinically it is easier to raise the Estrogen level in the blood than lower it and this is made use of while controlling severe anovulatory bleeding. Ethinyl Oestradiol is useful in such cases being about 10-15 times stronger than Stilbœstrol. Oestradiol Benzoate 100,000 I.U. may also be injected intramuscularly every 4-6 hourly. High dosage of Estrin has however to be very rarely and carefully given since that may bring about inhibition of ovarian or pituitary function.

In conditions where incomplete shedding of the endometrium is the cause of continuous bleeding we can use Progesterone either by injection or by mouth. This brings about a sort of a medical curettage in such conditions. By combining this with Estrin one can imitate a normal menstrual cycle and so tide over the difficult bleeding phase till the time a spontaneous remission of the condition occurs. This is very useful in adolescent patients in whom before

the normal balance of ovarian hormones takes place, the bleeding sometimes is very heavy and troublesome.

We know that metrorrhagia is usually due to inadequate corpus luteum secretion. Its substitution does not however give relief in such cases. Methyl Testeviron in 10 mg. daily doses given for over 2 months brings about relief in most of such cases. Care and caution should be taken as mild hirsutism sometimes occurs. This symptom should be an indication to stop the treatment and the condition being reversible rectifies itself in time.

Endocrine treatment is not of much use in dysmenorrhœa. Advantage of course may be taken of our knowledge of painless bleeding in anovulatory cycles and the same may be attempted by giving Stilbœstrol in 3 mg doses daily beginning from the 5th day of the cycle for 14 days. I need not mention here other measures of alleviating these conditions *e.g.* by such measures as sex hygiene, psycho-analysis (auto-suggestion etc.) and neurectomy.

Menopause.—A very careful examination to exclude everything else is in most cases sufficient. This gives the patient the confidence which is all that is required. Sedatives such as Phenobarbital etc. have a very useful role in these conditions and full use should always be made to relieve these patients who are mostly a bundle of nerves. In some cases small doses (0.01 mg. daily) of Oestrogen would help. This should be given over long periods and never enough to bring about a bleeding. Cancer is a much dreaded disease by these patients and no time and energy should be thought insufficient to dispel this fear. Once the desired effect is secured, attempts should be made to reduce this dosage and with the patient's co-operation this is not usually very difficult. Treatment of artificial menopause (as after complete or incomplete hysterectomy) is very difficult and may have to be continued for months or years. Wise gynæcologists therefore always conserve as much of the ovarian tissue while doing a hysterectomy. "Prevention is better than cure" is therefore very true in this condition.

Treatment of (Bronchial) Asthmatic Attacks with Succinic Acid

Ballestero and Hauviller report that the injection of succinic acid intramuscularly or intravenously promptly alleviates an attack of bronchial asthma. The required dose varies between 40 and 150 mg. Repeated small doses are more effective than a single large dose. In 60 per cent of cases the effect is immediate and maintained for about 4 hours. Besides a lessening of dyspnœa, the pulse rate returns to normal, orthopnœa decreases and rhonchi disappear. In stubborn cases the dose is repeated every 3 or 4 hours, unless a paradoxical effect is produced, which is not however common, except in cases of very intense dyspnœa.—(*Eng. Abst. Prens. Med. Argentina*, 36, 1059-65, 1949).

THE ESSENTIAL PRINCIPLES OF WOUND HEALING *

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THE healing of a wound is the most important factor in the attainment of good surgery. This is true not only of wounds caused by violence and trauma, but more particularly made by the surgeon himself. Whipple has stated "a surgeon's percentage of clean wound healing is not only a measure of asepsis, but it is an index of his entire surgical philosophy—his knowledge of the principles of healing per primum—as well as his attitude towards his patients' welfare and towards the improvement of his art and science of surgery."

Our knowledge of wound healing is not complete. In recent years there has been much of experimental work on stimulation of healing by means of wound stimulants and antiseptics. It is not at all unlikely that as the understanding of the intricate chemical processes of healing advances wound stimulants capable of practical usage will be discovered. With recent advances in the research of anti-biotics it is not unlikely a specific wound antiseptic which will be entirely harmless to tissues, but destructive to germs will be discovered. It is certain that even if such substances could be isolated the surgeon still could not ignore other fundamental principles of wound repair. The surgeon should always ask himself: How do wounds heal? How does Nature combat infection? How can the surgeon aid in hastening these processes?

The most ancient of the healing arts has been the care of injuries, and the earliest medical observations of man have concerned themselves with healing of wounds. Even animals by instinct alone have learned something about the care of wounds. Livingstone has noted that the wounded gorilla withdraws the spear from its body and dresses the wound with leaves to allay hæmorrhage. Primitive man carried over with his evolutionary progression, not only a keen interest in wounds, but also methods of dealing with them. Even in ancient times three of the principles of wound healing had been established; *viz.*, the removal of foreign material, the control of hæmorrhage, and the maintenance of rest. Many strange and fantastic conceptions of disease and treatment are recorded, but it is of interest to note how these three principles with increasing refinement appear, disappear and re-appear in surgical writings up to the present day.

In the pre-Listerian days the surgeon was handicapped by a lack of knowledge of bacteria although he undoubtedly suspected their presence. Except for this fundamental lack the ancient surgeons made many keen observations on the healing of wounds and recognised certain factors in the process which we do well to re-emphasize

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to-day. Talmud warns against touching wounds with the hands. Sushruta, the father of Hindu Surgery, mentions cotton, strips of leather, horse hair and bark of trees as suture material of wound closure. The Greek surgeons emphasized the need for cleanliness and prescribed careful cleansing of the hands and nails and the wearing of clean clothing. Theodoric, in the thirteenth century, warned against probing of wounds and taught the need for cleanliness. Henry De Mondeville advised washing of wounds to remove foreign matter. Larrey, Surgeon to Napoleon, recognised the need for the immediate care of wounds. He emphasized the necessity of rest and pointed out the harmful effects of too frequent change of dressings. Diefenbach, in 1850, advised wound excision so as to convert irregular crushed wound edges into clean regular ones, which could be closed primarily. Pirogof, by the introduction of the use of Plaster-of-Paris in war surgery, showed that he recognised the great value of rest in wound repair. It remained, however, for Halsted to develop the rational care of wounds—accidental and operative—based upon a study of the process of repair. His work has left as its greatest heritage an appreciation of the natural healing powers of tissues and the necessity for not handicapping these powers with chemical or mechanical trauma, hæmorrhage, foreign bodies, and infection.

Healing appears to be a natural property of living organisms, which, under certain optimal conditions, proceeds at a definite and measurable pace. One cannot help but marvel at times at Nature's tremendous powers of recovery despite apparently insurmountable obstacles.

Mechanism of wound healing.—Let us assume that we are dealing with a knife wound involving all the layers of the abdominal wall in a young, vigorous, healthy adult. The wound is not infected and suture and ligature material has had no deleterious effect.

Although the wound was made by a sharp instrument cells are traumatized. Crushing of the blood vessels by hemostats causes the death of cells deprived of their blood supply. The injury releases Potassium from the cells which, together with peptones and others protein-split products, produces dilatation of blood vessels. Relative anoxia, and increased percentage of carbonic acid and the concentration of metabolic end-products cause an increase in local acidity, which sustains the vasodilation and results in the exudation of fluid and the migration of leucocytes. The fluid is rich in fibrinogen and globulin. Fibrin is formed, which seals the wound and provides the bridge for the invading cells. This is a phase of traumatic inflammation. The second phase is destruction. The wound is freed of its debris and dead and dying cellular elements. Autolysis and heterolysis are the principal activators in these processes. Trypsin and Pepsin-like autolytic enzymes are liberated by the

dying cells and the polymorphonuclear leucocyte. These enzymes, which are known as leucoproteases, help the polymorphonuclears to engulf the cellular debris and digest it within their substance.

The phases of traumatic inflammation and of destruction together constitute the lag period, during which no gain in wound strength is observed, and the wound surfaces have to be held together by mechanical means by sutures, by splinting, or by constantly maintained pressure. Howes, Sooy, and Harvey tested the tensile strength of abdominal wounds at daily intervals and concluded that a lag period of four to six days occurred. The line of demarcation between the traumatic inflammatory and destructive phases is not well defined. There is apt to be considerable bleeding and both phases may be operating concomitantly.

The third phase is proliferation. This phase is initiated by a so-called formative stimulus, but, exactly what this stimulus is, has never been definitely proved. Gaza attributes it to the traumatic inflammation and tissue anoxia incident to injury. Carrel believes that the active substance is a protein split product and it is probably manufactured by leucocytic ferments from cell debris and fibrin lying in the wound. Baker says that stimulating substance is glutathione. Hammet has produced evidence which indicates that the Sulphahydryl group is the essential stimulus to growth. More recently Loofbourow and his co-workers found a wound hormone, Quinine-adenine-nucleotide complex which is produced by injury to cells. The essential feature of this phase is fibroplasia. The existing fibroblasts play a minor role during this period. This process is carried on by a group of cells of varied origin—mononuclear, non-granular, ameboid, and phagocytic. Because of their diverse appearance, they are grouped under the common term 'polyblasts'. They arise from resting mesenchymal elements present about the blood vessels or from existing histiocytes or macrophages. The polyblasts become transformed into fibroblasts, and together with some of the existing fibroblasts, migrate into the wound defect, guided along the filaments of fibrin. Concomitantly with the migration of fibroblasts, endothelial buds spring from the capillaries and stretch forward into the fibrin mesh, making a way for themselves by their motility and digestive powers. These capillaries first grow as solid tubes of cells which are canalised by the pressure of blood within the capillaries from which they arise. The newly formed capillaries anastomose and become the highways of nutriment for the fibroblasts. Later on in this process—which covers a period of four or five days—fibroblasts begin to branch and collagen is deposited. The formation of collagen is of fundamental importance in wound healing, since it is responsible for the strength of the new tissue. When collagen first appears it takes the silver-stains readily, is immature, affords little strength, and is known as precollagen. At about the tenth or eleventh day the collagen no longer takes the

silver stain, maturation is complete, and the adult collagen affords strength to the wound. The phase of proliferation in wound healing is indicated by gain in strength. Howes and Harvey have shown that this increase in strength parallels fibroplasia, beginning on the fourth day and persisting until the twelfth to the fourteenth day.

At the end of twelve to fourteen days the wound has reached its maximum strength and for all practical purposes is healed. The scar, however, is rich in fibroblasts and blood vessels. Now occurs the final phase of healing, namely maturation during which time the scar becomes paler, less vascular, and cellular. Then follows the period of shrinkage, which occupies several weeks.

The factors which influence wound healing may be divided into those which act directly at the site of injury and those which have an effect of a more general nature and act through the organisms as a whole. The disturbances in healing which we encounter clinically may be more often ascribed to a local disturbance than to some general pathological state. Even in acute starvation healing proceeds as usual unless the starvation actually threatens life itself. Mason has aptly stated "the urge to heal is almost equal to the urge to live; Nature will surmount all obstacles to close a wound." It is certain that both the local and general factors which may delay repair are largely under the surgeon's control.

Local factors

Infection.—Of the local factors which interfere with wound healing, infection has probably received too great an emphasis at the expense of other equally important ones. It can be assumed that every wound, regardless of how it is made—operatively or accidentally—is contaminated. Ives and Hirschfeld have made cultures from clean operative wounds at various intervals from the time of the skin incision to the time of closure and have found that positive cultures can be obtained from each layer in practically cent per cent cases. Meleney has shown that even in well equipped operating room thirty five thousand to sixty thousand bacteria fall upon a sterile field during the course of one hour operation. His studies on infection in clean operative wounds have indicated the relative importance to be attached to various sources of wound contamination as they affect the aseptic operative technique. After assurance that materials and supplies have been properly sterilized and are really germ-free, the sources of contamination in the order of their relative importance are, the nose and throat of the entire operating room personnel, the hands of the surgeon and his assistants, the skin of the patient, and, lastly, the air of the operating room. Lister believed that organisms dropping from the air played an important role in wound infection and developed his elaborate apparatus for spraying the atmosphere. It later developed that this was one of the relatively minor factors. However, with the other sources greatly reduced or eliminated, if nothing is done to

minimize contamination from this source it becomes relatively important again. Hart and his co-workers have attempted to combat this air-borne contamination by exposing the wound to ultra-violet radiation during operation. A large percentage of clean surgical wounds become contaminated and in accidental wounds the percentage is probably higher and the number of contamination organisms greater. Mason, Whipple and others have stressed the fact that healthy wound can successfully exterminate bacteria, but a wound containing old blood, serum, and devitalized tissue becomes an admirable culture medium for bacteria. The problem of prevention of wound infection is related therefore not only to asepsis but also to the mechanism of surgical technique. Experiences in World Wars I and II have demonstrated the necessity of excising devitalized, traumatized, and contaminated tissue in order to obtain primary healing of traumatic wounds. In clean wounds the devitalization of tissue can be prevented. Bacteria destroy tissue because of their ability to produce enzymes that can digest tissue into proteoses and peptones suitable for bacterial diet. The destroyed tissue together with bacteria, bacterial toxins and dead leucocytes must be removed from the wound. The destructive phase of healing is thereby greatly prolonged. The proliferative phase is retarded because areas in which tissue has been destroyed must be filled by granulation.

Trauma:—It is almost impossible to avoid mechanical injury to delicate living cells because of the very nature of the operative act. But this should be reduced to a minimum by gentle handling of tissues, avoidance of rough retraction, careful sharp dissection in place of blunt dissection, the use of knife in place of scissors, gentle sponging, and retraction of tissues with hooks and retractors rather than grasping them with heavy hemostats with the resulting crushing of large masses of living matter. The necrotic tissue must be destroyed or the phase of destruction will be prolonged and the proliferative phase and the final wound healing retarded. The process of autolysis must be more active and large numbers of migratory cells are required to debride the wound. Defects within the wound due to the death of the tissue must be repaired by granulation, and therefore, the process of healing must be more intense and wide-spread. As a consequence serum production in the wound is excessive, and islands of necrotic tissue in a lake of plasma afford a favourable environment for the proliferation of bacteria which are present in all wounds. In the case of accidental wounds, dead or hopelessly devitalized tissues which favour bacterial growth should be removed by sharp dissection.

Blood supply:—Restriction of blood supply to any wound due either to trauma or unwise ligation of blood vessels affects wounds resulting in necrosis. Healing tissues require an unimpeded blood supply because not only is proper nourishment necessary to the reparative process, but there is strong evidence that the stimulus

to repair, and antibodies for combating infection, are products of white blood cells. It is a common observation that wounds on the face heal very quickly due to the abundant blood supply.

Hematomas:—Hematomas interfere with proper wound healing by preventing apposition of the edge, by prolonging the phase of destruction, and by acting as culture media. Furthermore, a clot interferes with local circulation through pressure upon the blood vessels. Halsted has pointed out the need of meticulous hemostasis as a requisite to good wound healing. Reid and Mason call attention to the fact that each ligation produces an additional island of necrosis and adds more foreign material to a wound. They suggest that minor bleeding and oozing be controlled by pressure and that all other bleeding vessels be ligated. The bleeding vessels should be carefully caught so as to avoid the grasping of large amounts of surrounding tissues since all structures distal to the ligature are destined to necrosis. The wound should be dry before closure. Post-operative oozing which is sure to occur from the surface of any wound and may lead to a serious accumulation of blood and serum in the tissue is easily controlled by the use of the pressure dressings after the skin has been closed.

Suture material:—The use of large amounts of foreign material both as ligatures and in the repair of divided tissues pre-disposes towards prolongation of the exudative phase, delays healing, and promotes infection. The suture is the most important of the foreign bodies which the surgeon introduces in a wound, and in most instances the only one. It has been pointed out that the excellent results which Halsted obtained in his operative work were due to his great attention to careful gentle surgery, meticulous hemostasis and the use of fine silk as suture material. To-day there is a tremendous swing among surgeons towards the use of non-absorbable material like silk and cotton in clean operative work of all sorts. Suture material causes foreign body tissue reaction because of its size and quantity and of its chemical composition. Whipple has shown definitely the superiority of silk over cat-gut in clean surgical work. The experiments of Howes on the strength of wounds sutured with cat-gut and silk have shown that the exudative reaction lasts longer with cat-gut and that the full strength of the wound is gained earlier with silk than with cat-gut. Fewer complications follow the use of silk as shown by Shambaugh's study. The length of stay of cat-gut in a wound is uncertain and its premature absorption may lead to separation before healing is firm. Whatever the type of suture material used, it should be the finest in size that will hold the tissues in apposition. It should not have greater strength than the tissues sutured since if tension gets too great the tissues will tear through.

Electro-surgery:—Ellis has shown that after electro-surgery or electro-coagulation for hemostasis, the destructive phase is prolonged

and wound healing is delayed. Fibroplasia is withheld until the necrobiotic zone produced by the current is removed.

Suturing:—The suturing of skin or other tissues under tension is another factor which predisposes to delay in healing due to constricting type of necrosis.

Foreign body:—The use of unnecessarily large drains and excessive amounts of large calibrated suture material prolongs the lag period and delays fibroplasia. The introduction of wicks and tubes into clean wounds with the idea of leading out infection too often serves to lead it in.

Dehydration:—Exposure of wounds to the warm dry air of the operating room and the heat of the operating lights causes dehydration and death of the superficial layers of the exposed areas and thus adds unnecessary necrotic tissue to the wound and prolongs the destructive phase. This may be prevented by keeping tissues moist at all times with saline packs.

Frequent change of dressings:—Too frequent change of dressings interferes with the immobilization of the part, disturbs the healing wound edges, and subjects the wound to possible secondary contamination. Until some definite indication arises, the dressings placed on a wound at the time of operation need not be disturbed until the sutures are removed. Of course if the symptoms of infection arise, if we fear subcutaneous hæmorrhage has occurred, or if we are dealing with an already infected wound, there is the necessity for change of dressings.

Inadequate apposition:—In case of inadequate apposition, dead space must be filled by granulation. This phase of healing is therefore prolonged.

Immobilisation and rest:—Mason has stated that motion during the lag period of wound healing disrupts the fibrin bridge and prolongs the lag period. During the proliferative phase motion may stretch the newly forming scar with resultant weakening of the delicate new tissues.

General Factors

Age of patient:—Du Nuoy's studies reveal that wounds heal faster in young than in adult animals and the rate of healing is inversely proportional to the age of the animal. Clinically we are familiar with the delayed period of healing in the aged, but we all know that healing does occur in the aged as well as the young and often the diseased condition rather than age alone is the more important factor.

Water balance:—Delayed healing in dehydrated animals is consequent to impairment of circulation and to nutritional changes in the region of the wound. Hyperhydration causes tissue oedema, interferes with venous return and delays healing. Whipple and Mason have stressed the importance of proper fluid balance in the healing of wounds.

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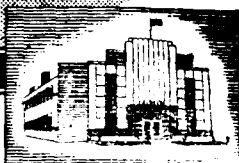


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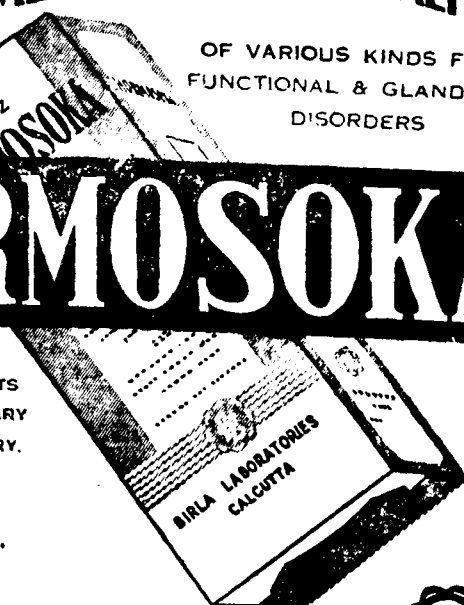
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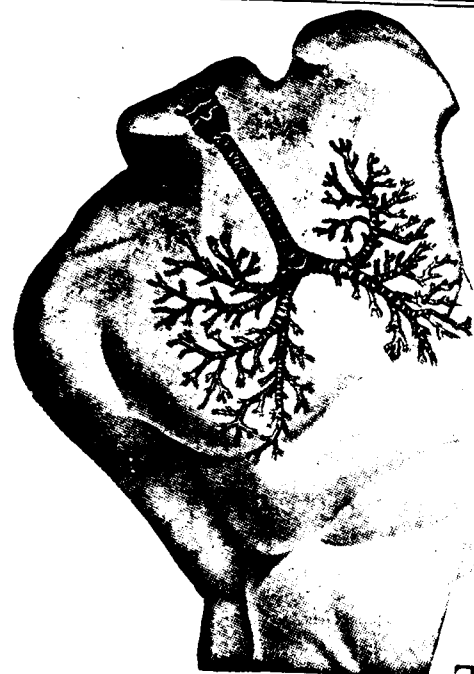
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Diet:—Clark noted a short lag period in protein-fed animals, a prolonged lag period in fat-fed animals, and an intermediate lag period in animals fed with diets rich in carbohydrates.

Hypoproteinaemia:—In 1938 Thompson, Ravidin and Frank showed that hypoproteinaemic dog is incapable of normal fibroplasia. Fibroblasts did not appear till the seventh day. These experiments were substantiated by the frequent occurrence of disruption of abdominal wounds in depleted patients.

Vitamins:—Saitta has reported the absence of wound healing in experimental animals maintained on diet deficient in vitamins A and B. These results have not been confirmed. Vitamin C deficiency as a cause for disturbances in wound healing was suggested by Sokolov in his study of post-operative wound disruption. Experiments on guinea pigs placed on diets, low in vitamin C showed that wounds healed poorly, more slowly and with less tensile strength. Hunt has shown that precollagen devoid of holding power is the variety laid down in scorbutic animals. He concludes that this vitamin in good concentration is of greatest importance in wound healing. There is ample proof, many times confirmed both experimentally and clinically, that vitamin C is necessary for the formation of collagen in the tissue repair and further that the development of tensile strength in wounds is retarded by a partial or complete vitamin C deficiency. Vitamin K has a very essential role in the control of hæmorrhage in relation to prothrombin deficiency. Of special significance is the employment of vitamin K in jaundiced patients.

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CHORDOTOMY AND FRONTAL LOBOTOMY IN THE TREATMENT OF UNBEARABLE PAIN*

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THE description of the known anatomical pathways of the pain fibres in the central nervous system, however, does not tell us the mechanism by which pain is appreciated. To determine that, it is necessary to understand the integration which pain stimuli undergo on their way to the cerebral cortex. Such an understanding is difficult to obtain since our insight can be gained only by assigning function to structure in the light of the defects produced when a portion of the pain system is destroyed. It is apparent that pain is not consciously appreciated below the level at which a lesion will abolish it. One may then state that consciousness of pain arises from structures at or above the mesencephalon, for a lesion of upper pons will permanently abolish the appreciation of pain from peripheral stimulation. This statement is based upon the clinical findings in cases of thrombosis of the superior cerebellar artery, (Russel, Mills) and the result of pontine tractomy (Dogliotti). Above the level of mesencephalon are the thalamus, hypothalamus, and cerebral cortex, all of which may play a role in the appreciation of pain. Let us first consider the effect of the cortical lesions of the appreciation of pain. It has been repeatedly emphasized that small cortical lesions produce little or no impairment of the appreciation of pain from peripheral stimulation. Yet Forester maintains that immediately after a cortical ablation of the posterior central convolution all sensory modalities may be affected. This impairment is certainly shortlived. Large lesions of the cerebral cortex and underlying white matter will, however, at times produce a hypalgesia of mild or severe degree. Evans (1934) reported two cases of parietal lobe lesions in which pain sensibility was reduced on the contralateral side. I have seen a number of cases presumably suffering from cerebral lesions but unfortunately unconfirmed anatomically, in which a severe hemiplegia was associated with a hyperaesthesia of such magnitude that the sensations evoked by pin prick, heat or cold would not be distinguished. They were all perceived as a disagreeable painful impression. Such severe disturbances may be confined to one extremity; perhaps a more rigid test of the cortical role in the perception of pain would be the ability of the hemispherectomized individual to appreciate pain. Unfortunately few detailed studies of the sensory modality have been made in such cases. Dandy states that in his cases following hemispherectomy, sensation was not grossly diminished in the face and that the point of a pin was recognised. Over the remainder of the body cutaneous sensation was said to be abolished but pain was experienced when joint was

moved or a muscle compressed. In Gardner's case twenty months after hemispherectomy the perception of gentle pin prick was impaired over the contralateral half of the face, but over the remainder of that side of the body was lost. Firm pressure with a pin was recognised as painful.

CASE 1.—An adult male suffering from a large glioma of the right cerebral hemisphere was operated on January 28, 1941. The cerebral hemisphere exclusive of the basal ganglia was removed. Prior to the operation recognition of the pin prick was much impaired throughout to the left side, although on movement of somewhat paretic left shoulder, pain was perceived. Five days after operation pin prick was recognised over both malar prominences and said to be of equal intensity. Over the dorsum of the left and right hand, it was said to feel sharper than on the corresponding points on the opposite side of the body. On the tenth post-operative day the response to pin prick on the two sides of the body seemed to be equal. The patient's responses to pin prick on the left side of the body were unreliable, but he seemed to differentiate pin prick from touch over the left internal malleolus and left forearm. Twenty-five days after operation pin prick was appreciated on both sides of face, perhaps more acutely on the left side. It was felt in the left forearm and lower leg, but his responses were not so accurate to stimulation of these points. When seen on June 1, 1941, the appreciation of pin prick was normal over both sides of the face. Recognition of pin prick appeared practically normal on the left side of the body and left extremities although there may have been some delay in response. The patient died approximately one year after the operation. Certain general conclusions are valid, namely:

(1) Appreciation of pin prick over the face and the left side of the body appeared to be little disturbed.

(2) Pain was perceived on passive movement of the left extremities.

This is a remarkable case in that appreciation of pain from peripheral stimulation was so little altered. Certainly many patients with much smaller cortical lesions may produce varying degrees of hypalgesia from practically no impairment to a severe loss of appreciation of pain. It is uniformly recognised that the disturbance in the face is much less than in any other part of the body. Where is the appreciation of pain in these cases? According to Head, "Pain is one of the elements of sensation that is brought into consciousness by the essential organ of optic thalamus". It is then pertinent to examine the state of this subcortical ganglion after hemidecortication. We have not such an access to man. Fulton, several years ago, studied thalamus of a decorticated chimpanzee which, of the sub-human primates, is probably man's nearest neighbour. Of great interest is the fact that such a thalamus is severely degenerated. Almost all of the anterior nuclei, the larger dorsomedial nucleus and

* Specially contributed to THE ANTISEPTIC.

the pulvinar are degenerated. Except for a scattering of abnormal, pale cells and occasional normal cells complete degeneration is present in the nuclei ventralis posterior and lateralis dorsalis, the medullary lamina within and about the thalamus including the nucleus centromedianum. In particular, the ventralis posterior nucleus in which the spinothalamic tract terminates, contains only a few palely staining neurons. The remainder is gliosis. It is possible but improbable that the few remaining cells of the nucleus ventralis posterior of thalamus mediate the sensory modalities which persist after hemispherectomy. These cells are equally available to the terminating fibres of the medial lemniscus and should be able to receive impulses from this as well spinothalamic tract. Post-proprioception is abolished after hemispherectomy. Moreover, from the clinical aspect there is evidence that the thalamus is not the main site at which the pain is appreciated after removal of cerebral cortex on one side, namely, that pain is appreciated within two days of the operation. The mechanism which seems most likely to account for this appreciation of pain, is a pathway to the ipsilateral thalamus and the cortex of the normal hemisphere. The possibility has been stressed by Dusser de Barenue who found after strychnization of a small area of the cerebral cortex of the monkey, hypersensitivity to superficial modalities of sensation in the corresponding limbs on both sides and to deep sensibility in the contralateral limb. This same phenomenon was seen when strychnine was injected into the thalamus. He then concluded that superficial sensibilities are represented bi-laterally in both the thalamus and cerebral cortex and there is clinical evidence for this theory. Unilateral chordotomy may not relieve intolerable monomelalgia which disappears completely upon subsequent section of the opposite spino-thalamic tract. After a study of the thalamic syndrome case which showed extensive destruction of the thalamus and, in particular, the nucleus which receives the spino-thalamic tract, the appreciation of pain is still possible. This observation and the previous discussion of the state of the thalamus following hemidecortication are strong evidence against the view that thalamus is the only subcortical site at which pain is appreciated. Further evidence may be adduced from the results of mesencephalic tractomy in which, I believe, all the spino-thalamic fibres may be sectioned and yet the patient appreciates a certain type of pain several weeks after operation. It is, therefore, evident that the spino-thalamic tracts are not the only carriers of painful impulses to the higher centres. Probably the spino tectal tracts are concerned in this function. It would therefore appear that there are three levels at which pain may be integrated. The highest level is the cerebral cortex. Integration at this level produces the normal appreciation of pain which may be illustrated by a pin prick. This sensation is highly coloured by associated tactile and pressure impressions, which give it a localization in the body scheme as well as the appreciation of an actively pointed instrument. The

appreciation of the stimulus at this level is modified by the state of activity of the other cortical centres so that the perception may be aggravated or inhibited. Thus an individual may sustain a painful injury in a state of excitement without appreciating any painful sensation. On the other hand, there seems to be evidence that focussing the attention on the stimulus will increase the intensity of the perception and may give rise to anticipatory state of anxiety or agitation. Thus, the pain of a phantom limb, which appears to be, at least to some extent, upon the basis of hypersensitive receptive mechanism probably at the cortical level, may be relieved by the cortical sensory representation of the part. Possible a prefrontal lobotomy removing the influences which tend towards a fixation upon that one sensory aspect might accomplish the same end. The second level of integration of pain is the thalamus. In the nucleus ventralis posterior the pain fibres are congregated with fibres from the same somatic focus carrying other superficial sensory modalities and proprioception. From cells of this nucleus fibres pass to the adjacent nuclei and to the post-central convolution of the cerebral cortex. These to the cerebral cortex probably represent the final path for sensation. Those to the adjacent nuclei allow more complex integration at the thalamic level and additional paths by which one of the primary sensory modalities may reach the cerebral cortex. Thus the fact that pain is relatively little influenced by small cortical lesions is the result of the numerous pathways which are open to it to reach the cerebral cortex. The function of the thalamus is thus not so much the appreciation of pain as its integration with other sensory modalities. The third and lowest level of integration of pain is the tectum mesencephali. This is the centre which in phylogenetically primitive life perceived pain but which in normal man rarely functions in that capacity. The guiding principle governing the surgical treatment of intractable pain has been to interrupt the pain conducting pathways in the nervous system so that painful impulses from the affected regions may no longer reach the sensorium. This may be done at variety of levels and such operative procedures as resection of terminal neuromas in amputation stumps, neurotomy and posterior rhizotomy, antero-lateral chordotomy section of the sensory route of the gasserian ganglion, intramedullary trigeminal tractomy and probably also sympathectomy for causalgia, are all established examples of the application of this principle to particular circumstances. Recently in excising the appropriated area of the post-central gyrus for painful phantom limb de Gutierrez Mahoney has extended this principle, for he has removed that part of the brain where the painful impulses presumably reach consciousness. This guiding principle will, I feel sure, always govern the surgery of pain as most patients requiring operative relief can be benefited by its application but occasionally, for reasons which we do not understand, operations based upon it fail to give relief, and it is in such circumstances that

a new method of attack, first advocated in 1946 by Freeman and Watts offers prospects of amelioration of symptoms. This method is bilateral frontal lobotomy. After frontal lobotomy they stopped complaining of pain, but since our attention was focussed on the mental condition, we looked upon it as merely relief of *psychalgia*. As the patients returned for follow-up examinations and when questioned about their previous symptoms it was found that some had no recollection of any pain. Others admitted that they had pain when questioned about it, but according to their families, never mentioned pain unless some one else brought up the subject. When we first learned that pain was still present a relapse was feared, but there was a difference even though our records showed that the individual might use the same terms to describe the pain after the operation as he used before. The attitude was different. Fear seemed to have gone; the pain was still present, but it was a sensation than a threat. While in the physiological sense pain is a sensation like heat, cold and vision, clinically it is more complex, more embracing. If we employ the definition in the American Oxford Dictionary that pain is bodily and mental suffering, the effects of frontal lobotomy become more readily understood. When a patient describes his pain as unbearable, unendurable, or intolerable, he is clearly emphasising his subjective reaction to the sensation. Objective evidence of suffering is also likely to be present in the form of sweating, tachycardia and alertness to defend the painful part. The influence of attitude upon the pain threshold is relatively uniform and stable within the limits of ability of the subject to maintain an unprejudiced and detached attitude. Realising that most patients are neither disinterested nor objective in the attitude towards pain, their physician and the medicine he prescribes had a suggestive value and may modify not only the reaction of the individual to pain but it may even raise the pain threshold.

Chordotomy.—Chordotomy of the anterolateral pathways of the cord, as proposed by Spiller, has stood the test of time. Forester was the first to introduce chordotomy in the cervical region. Others performed at a level below the nipple, and, for this purpose, second and third thoracic laminae are removed. Olivecrona performs chordotomy always in the cervical region. It is necessary to perform chordotomy at a level several segments higher in the cord than the apparent distribution of pain because of the wellknown anatomical fact that the pain and temperature fibres ascend many segments within the cord before they cross completely to the opposite side and ascend. Likewise, it should be possible to abolish pain which originates on one side of the body by sectioning the anterolateral tract of the opposite side. Such a procedure usually fails. Consequently, bilateral chordotomy is preferable.

Operative technique.—*Anaesthesia local*:—Cervical laminectomy is done, dura and arachnoid opened, excessive fluid is

sucked out. Radicular anaesthesia is done before chordotomy is attempted. Dentate ligament is grasped with a mosquito forceps and is cut lateral to the forceps. By it the cord is gently rotated and an avascular area is selected for section. A small piece of the cutting edge of a shaving blade is taken and held by a mosquito forceps with the cutting edge pointing to the cord. The point of the blade is inserted immediately anterior to the pial origin of the dentate ligament and is directed toward the central canal of the spinal cord. The incision is then completed by swinging the point of the knife ventral-ward so that it emerges from the cord at the origin of the motor root. The deeper the incision, the higher will be the loss of the sensations of temperature and pain. The pathways (spino-thalamic tract) conveying these sensations are composed of fibres having their origin in the opposite side of the body, entering the sensory root of that side and shortly passing across and ventral-ward in the cord, successive fibres entering at higher levels, as they cross, come to lie farther from the surface. This Lamellar arrangement of the spino-thalamic tract is such that the lowest sacral segments are represented by the most superficial portion of these tracts. Hence, the deeper the incision, the more fibres will be cut and higher will be the level of anaesthesia. The incision is done in successive steps and the patient is asked to move his leg at every step as a control that you have not entered the lateral cortico-spinal tract (the pyramidal).

Frontal lobotomy.—Moniz and Lima (1936) performed the first operation on the white matter of the frontal lobes of the brain, for the relief of mental illness. At first they introduced alcohol through the Burr holes made in the vault of the skull, but later on by means of wire loop they cut six cores on either side, each one centimeter in diameter, at various levels in the frontal lobe. Fiamberti (1937) approached the frontal lobes through the roof of the orbit. Freeman and Watts (1937) planned the operation of lobotomy.

Opt. anaesthesia local reinforced by intravenous Pentothal if necessary (preliminary lateral views of skull to identify the position of coronal suture). A disc of bone one inch in diameter was removed on each side of the skull five centimeters behind the outer margin of the orbit and six centimeters above zygome. A dura to dura measurement is made with a calipers of pelvimeter type. After opening the dura, a brain cannula is inserted to a point one centimeter short of the mid-line. The needle is swept upwards, downwards and outwards to divide most of the white matter. Hydrogen Peroxide is injected in the cannula and cortical edges separated to let Hydrogen Peroxide out to bring about haemostasis. Discs of bone were replaced and closure instituted with interrupted silk suture. Incidence of post-operative haematoma is four to twelve per cent. This operation can be termed Freeman's blind lobotomy.

Olivecrona uses brain spatula for dividing the white matter and bring about hæmostasis under direct vision by everting the cortical edges of the brain. Lobotomy has been employed in intolerable pain due to carcinoma, tabes dorsalis, causalgia, phantom limb, thalamic syndrome and atypical facial neuralgia.

Case Summary

CASE 1.—Carcinoma:—Patient, female, sixty years old, had a lump in the breast and had been treated with some type of caustic which burnt off the right breast as well as a portion of two ribs underlying the breast so that when she breathed one could see pleural movements under the skin. The carcinoma had been present since 1939 and she spent most of the time in bed from 1941 to 1946. Numerous injections into the brachial plexus and paravertebral region resulted in an atrophic, flail limb, with a moist cyanosed hand and exquisitely painful whole arm, from neck to finger tips. She whimpered when the arm was approached and cried aloud when it was manipulated. Paravertebral block would cause a slight alteration in the character of pain but no definite relief. Frontal lobotomy of the standard type was carried out on 16th May, 1946. Following operation narcotics were withheld and the patient had a severe withdrawal reaction with restlessness, tachycardia, fever and delirium. It was necessary to put her back on narcotics and gradually reduce the dosage. During the following days she improved generally but still objected to any manipulation of the arm. It was noted on several occasions that the patient responded to examination by rapid and deep respirations but in between times she talked rapidly and cheerfully, giggling frequently and entertaining her visitors by verbal sallies.

Comment:—A year later, the patient stated that the pain was just as it was before the operation and yet she does not talk about it. She is rather carefree and her arm is a nuisance rather than a constant reminder of permanent invalidism.

CASE 2.—Thalamic Syndrome:—On July 4, 1944, a printer had a stroke which produced weakness and numbness of the left side. Pain had persisted in the left side ever since the stroke and gradually got worse. It was particularly severe in the distal part of the extremity, i.e., below the knee and below the elbow and nervousness made it worse. It was described as being like pins and needles and it burned and he felt as if the arm and legs had been skinned. Standard lobotomy was performed on 31st October, 1946, and the patient immediately ceased complaining. Ice applied to the left hand produced severe burning pain, but the pain was only momentary. Before operation Morphine was required to control pain, otherwise it continued for hours. The patient returned to work as proof reader three months after operation and had continued to be regularly employed.

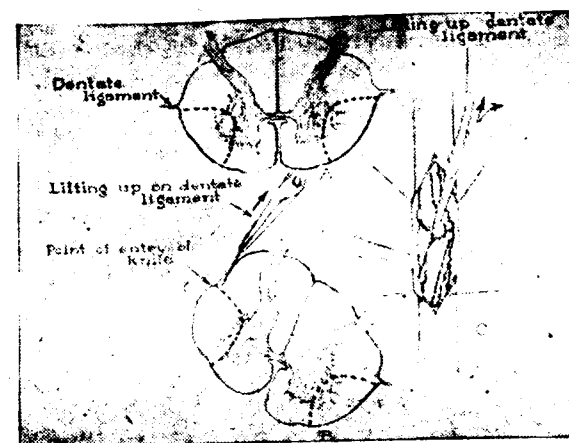


FIG. 1. Incision for chordotomy.



FIG. 2. X-ray of probes in situation.



FIG. 3. X-ray of probes in situation.

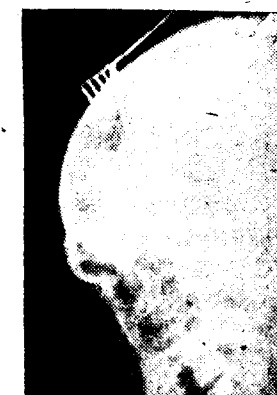


FIG. 4. X-ray of probes in situation. The left probe is more posterior.

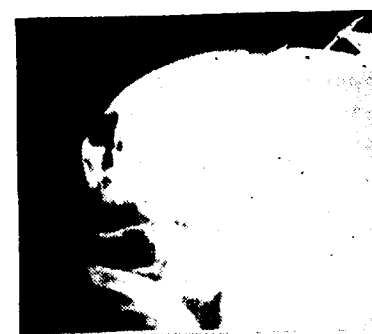


FIG. 5. X-ray of probes in situation.

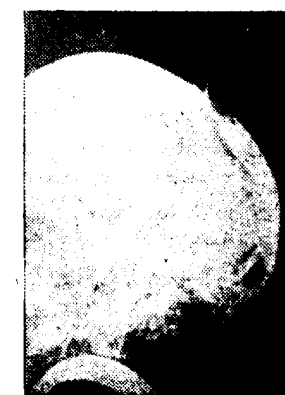


FIG. 6. X-ray of probes in situation.

CASE 3.—Causalgia:—Patient, male, on January 21, 1944, received a penetrating wound of buttock thigh and colon with sciatic nerve injury. This colon was closed and colostomy was performed. He had severe pain in the legs. The patient described the sensation as a deep pain in the sole of the left foot, calf, and burning in the buttock.

In addition, he had a surface pain which was sharp and shooting in character chiefly on the lateral part of the leg and thigh.

The pain was aggravated even by gentle stroking of skin of the leg. Sensation to pain, heat and cold were diminished below the level of L2 although any stimulation of the left lower extremity brought on pain. He had lost 62 pounds of weight. The patient required narcotics every 2 to 4 hours. A standard frontal lobotomy was performed under local anaesthesia on 7th February, 1947. Narcotics were discontinued and patient gained 40 pounds in weight. At the end of the three months, he was walking with a cane.

CASE IV.—Phantom limb:—Patient, male, had a jeep accident on December 8, 1945, and received a severe injury of the brachial plexus. January 1946.—Median and ulnar nerves were explored and soon afterwards the patient developed causalgia characterized by persistent pain in the dorsum of the hand. Rhizotomy of C7, C8 and D1 dorsal sympathectomy and rhizotomy of D2, D3, stellate ganglionectomy and removal of middle cervical ganglion, and finally amputation of the arm, failed to relieve the pain. Narcotics eased but did not relieve the pain. He wept and thought of killing himself. A standard frontal lobotomy was performed on February 7, 1947, with relief of distress. He continued to have pain but no longer required narcotics. The phantom limb remained as before but did not interfere with his enjoyment.

CASE V.—Patient, male, 67 years, complained of constant dull left facial pain during the past three years. In 1945 post-root section of the left gasserian ganglion was performed for ticdouloureux. Two subsequent procedures directed at the ganglion were without success. In 1946 bulbar trigeminal tractotomy was performed to no avail. On examination patient complained of dull pain on the left side of the face with suggestion of trigger mechanism in the left second division. A unilateral frontal lobotomy was performed on 22nd October, 1947. A week after the first operation.—During the first 24 hours after the operation he had incontinence, lethargy and indifference to speaking. On the fifth post-operative day he was allowed out of bed and he had no complaints of pain, he received no opiates. A month after surgery, he described with clarity the presence of the facial pain. He appeared relieved of suffering. No opiates were necessary.

Discussion.—The relief of suffering in such a wide variety of patients suggest that the mechanism does not involve the interruption of specific pain pathways, despite the evidence of thalamic

degeneration following frontal lobotomy. Preservation of the response to painful stimulation noted in such patients also suggest that the interruption of the specific afferent pain tracts is not responsible for the relief of suffering. In addition, the therapeutic effect of unilateral frontal lobotomy, whether it be on the right or left side, makes such explanation less tenable. The relief of psychosymptoms is the result of the limitation of the spread of stimuli to different cortical areas, thereby preventing integration of present stimuli with past memories and habitual responses. Monitz feels that the result of frontal lobotomy depends upon the breaking of the constellation of synapses which play a part in Pavlovian conditioning. The fact that Schilder was unable to produce conditioning to pain responses in certain patients with impaired body image lends support to this inference. The concept of the vicious circle elaborated effectively by Livingston is helpful in explaining the basis of chronic pain of psychic and organic origin. Psychic irritants may bombard fronto-thalamic areas, organic irritants mediated through long circuiting afferent pathways as described by Fulton allow for bombardment of internuncial pools at these forward areas. I wish to elaborate a concept of suffering as distinct from a concept of pain. Such a concept includes an understanding of the pain-complaining patient, whether his pain be primarily of organic or psychic origin. In a concept of suffering, whether pain be described as a sensation, a perception, or an emotion becomes academic. Passage of time in illness tends to obliterate significant differences between organic and psychic irritants. Convergence of these adverse influences, whether from soma to psyche or psyche to soma obtains in chronic pain states. The fusion of these adverse inter-relationships form the basis of suffering. An engram of suffering must include fronto-thalamic association pathways. In the relief of unbearable chronic pain, frontal lobotomy, in its truest sense, becomes surgery for the relief of suffering rather than surgery for the relief of pain, unlike chordotomy where there is relief of pain rather relief of suffering.

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Effects of ACTH in Gout

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ACETYLCHOLINE AS THE HORMONE FOR GASTRIC SECRETION*

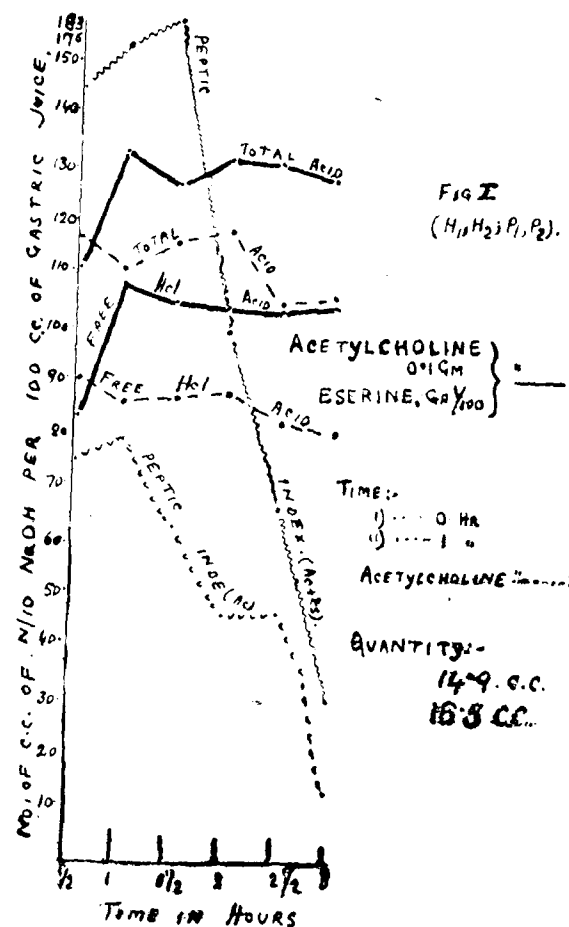
BINDESHI PROSAD SINHA, M.D. (Gen. Med.),
Bihar Medical Service, Patna.

EVER since the discovery of 'gastrin' in the pyloric mucosa by Edkin (1902), the explanation of its effect by Popieski (1920) as due to histamine content, there has been a storm of criticism from Klein (1933), John Gray (1937) and Babkin (1944). The role of the pyloric region in the hormonal mechanism was not accepted in the beginning by Gregory and Ivy (1941) but later on was accepted by Grossman, Robertson and Ivy (1948). This hormone

is present in cats, dogs and pigs. Harper (1946) obtained it from hog's pyloric mucosa and Uvnas (1945) from human cadavers. The role of histamine in the actions of gastrin has been further investigated by Komarov (1938, 1942), Uvnas (1943, 1944, 1948) and Kahlson (1948). They obtained a protein-like substance from the pyloric mucosa, analogous to that obtained by their predecessors, who had extracted a non-protein substance. This water-soluble gastrin, in its purest form, had an enhanced effect on the secretion of the free Hydrochloric Acid of the gastric juice but not on the pepsin activity and it did not contain histamine. MacIntosh (1938) and Babkin (1944) suggested the theory that Acetylcholine produced

at the vagal endings liberated histamine locally in the parietal cells.

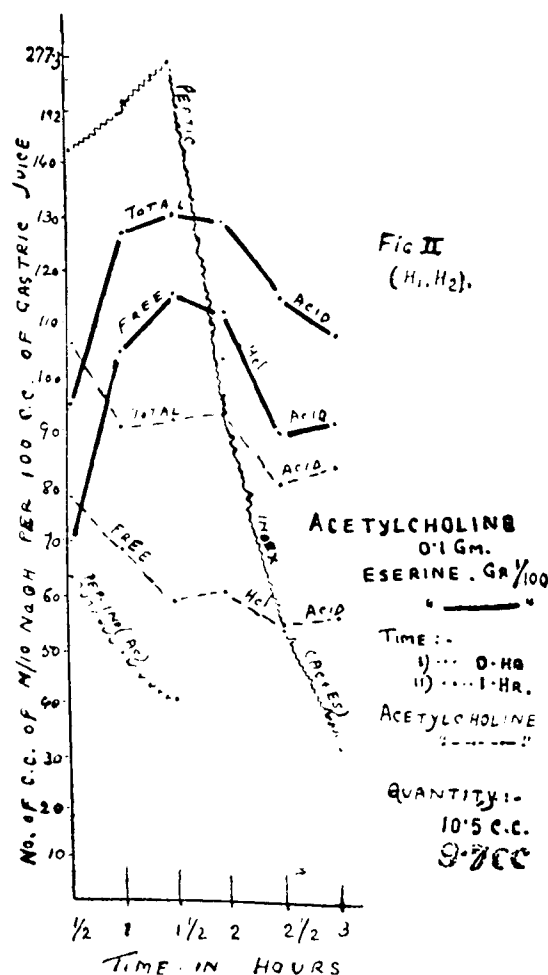
In view of this position, the present series of investigations were carried out in an attempt to associate Acetylcholine with gastrin. The role of Acetylcholine in enhancing gastric secretion has been



* Specially contributed to THE ANTISEPTIC.

observed by MacIntosh and Krueger (1938), Gray and Ivy (1937), Bloch and Necheles (1938), Necheles, Motel and Kosse (1938), Manville and Munroe (1937-1938), King, Comfort and Osterberg (1944). Wilkinson (1932) found no definite effect and Uvnas (1948) a reverse effect. Sinha, (1947a; 1948b; 1949d.) in re-investigating the earlier observations on the inhibition of gastric secretion by Atropine Sulphate in the Heidenhain and Pavlov animals, noted an augmentation by Acetylcholine (Sinha, 1950e.) A further investigation showed that Acetylcholine had augmentary action on gastric secretion.

METHODS.—Two Pavlov and two Heidenhain dogs weighing 9-13 kgm. were selected (Sinha, 1948c). Acetylcholine (British Drug House) and Physostigmine Salicylate (Burroughs Wellcome & Co.) were used. They were studied in two groups, viz., Acetylcholine and Physostigmine Salicylate together and Physostigmine Salicylate alone. In the former group 0.1 gm. of Acetylcholine with 0.65 mgm. of Physostigmine Salicylate was given intramuscularly, twice with an interval of one hour, immediately after a basic meal of meat without extractive. In the latter, 0.65 gm. of Physostigmine Salicylate was given parenterally by the intramuscular route in three doses, immediately after the meal, half an hour later and one hour after the meal. In the case of the oral route, the same quantity of Physostigmine Salicylate (3 tablets, i.e., 1.95 mgm.) was added at the beginning of the meal. Gastric acidity was estimated by Tøpfer's indicator and the Phenolphthalein method, and pepsin activity by the Fuld method. The results were expressed as the average reading of 12 consecutive days titration of the gastric juice in each group of animals (a) Heidenhain alone; and (b) Heidenhain and Pavlov together. Pavlov



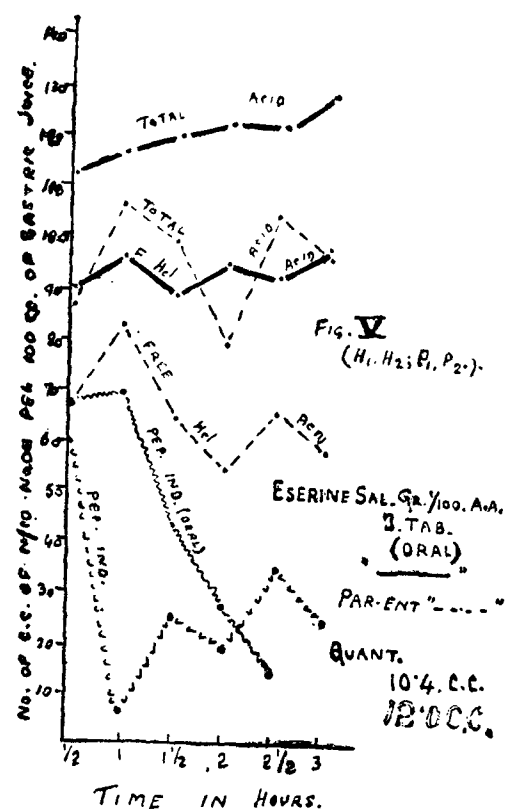
Comparative data—1 (Vide Fig. 1) (Heidenhain and Pavlov together)
Dated 19-10-1945 onwards

ACETYLCHOLINE AND PHYSOSTIGMINE			ACETYLCHOLINE	
Time in hours.	Pepsin Index	No. of cc. of N/10 NaOH per 100 cc. of gastric juice	Pepsin Index	No. of cc. of N/10 NaOH per 100 cc. of gastric juice
Half	143.9	83.6 cc. 110.4 cc.	74.6	90.9 cc. 116.4 cc.
One	176.0	108.0 cc. 132.3 cc.	78.3	85.8 cc. 109.1 cc.
One and half	183.9	103.9 cc. 124.1 cc.	63.9	84.8 cc. 113.9 cc.
Two	98.6	102.8 cc. 128.4 cc.	42.6	84.6 cc. 114.6 cc.
Two and half	66.6	100.5 cc. 127.3 cc.	42.6	79.6 cc. 101.1 cc.
Three	31.1	100.7 cc. 123.8 cc.	10.6	77.1 cc. 101.8 cc.
Average of quantity of juice per hour :—				
First	...	5.7 cc.	First	... 7.3 cc.
Second	...	4.4 cc.	Second	... 5.8 cc.
Third	...	4.8 cc.	Third	... 3.4 cc.
Total quantity ... 14.9 cc.			Total quantity ... 16.5 cc.	

Comparative data—2 (Vide Fig. 2) (Heidenhain alone)
Dated 19-10-1945 onwards

ACETYLCHOLINE AND PHYSOSTIGMINE SALICYLATE			ACETYLCHOLINE	
Time in hours	Pepsin Index	No. of cc. of N/10 NaOH per 100 cc. of gastric juice	Pepsin Index	No. of cc. of N/10 NaOH per 100 cc. of gastric juice
Half	138.8	70.0 cc.	64.0	77.9 cc.
		94.9 cc.		105.6 cc.
One	192.0	104.9 cc.	50.0	68.3 cc.
		127.0 cc.		91.3 cc.
One and half	277.3	113.6 cc.	42.6	59.0 cc.
		132.0 cc.		93.0 cc.
Two	96.0	110.0 cc.	* Not done.	61.9 cc.
		129.3 cc.		93.6 cc.
Two and half	53.3	89.6 cc.	"	55.0 cc.
		111.6 cc.		83.0 cc.
Three	32.0	90.3 cc.	"	55.6 cc.
		106.6 cc.		84.9 cc.
Average of quantity of juice per hour :—				
First	...	4.7 cc.	First	... 6.0 cc.
Second	...	3.9 cc.	Second	... 2.1 cc.
Third	...	0.9 cc.	Third	... 1.6 cc.
Total quantity... 10.5 cc.			Total quantity ... 9.7 cc.	
* Paucity of gastric juice.				

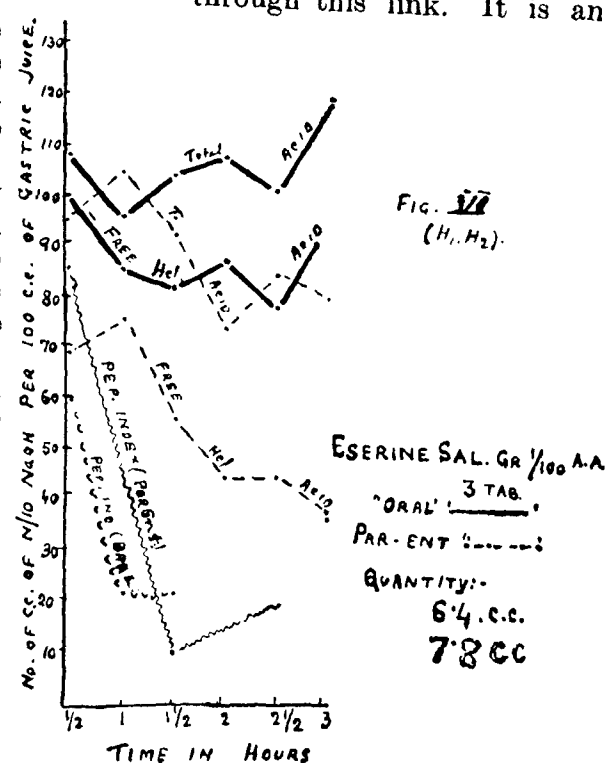
* Paucity of gastric juice.



accepted fact that the gastric juice in miniature pouch of the Heidenhain animal is formed due to the chemical phase of gastric secretion, hence any modification of the pouch secretion could be due to the varying action of the gastric hormone. The integrity of the sympathetic system remained unchanged *via* vascular sheath (portal). A parasympathetic effect in the pouch secretion, in view of its denervation, could be possible only through the intervention of the chemical phase. Acetylcholine could not be liberated in the Heidenhain pouch due to juice

secreted in the first hour, but was secretagogue in the next two hours, particularly in the third hour period. Thus eserisation was delayed. The oral method of administration had a more potent action than the parenteral on the acidity of the gastric juice.

Discussion.—The above results would seem to indicate that either Acetylcholine caused some alteration locally in the gastric hormone of the main pouch or had general effect on the system. Heidenhain pouch, if at all it had connection with any vital organ of the body, was so *via* portal circulation, with pyloric region of the main stomach. Changes in the main stomach would be reflected on the secretory activity of the pouch through this link. It is an



Comparative data—5 (Vide Fig. 5) (Heidenhain and Pavlov together)
Dated 22-11-1945 onwards

Time in hours	ORAL		PARENTERAL	
	Pepsin Index	No. of cc. of N/10 NaOH per 100 cc. of gastric juice	Pepsin Index	No. of cc. of N/10 NaOH per 100 cc. of gastric juice
Half	66.6	89.4 cc. 111.9 cc.	60.6	66.6 cc. 86.6 cc.
One	69.3	95.0 cc. 116.1 cc.	5.3	82.9 cc. 106.4 cc.
One and half	42.6	88.9 cc. 118.4 cc.	26.6	65.7 cc. 100.6 cc.
Two	26.6	94.6 cc. 121.6 cc.	18.6	54.4 cc. 79.9 cc.
Two and half	16.0	92.5 cc. 119.3 cc.	31.9	67.3 cc. 105.1 cc.
Three	* Not done.	97.9 cc. 127.6 cc.	21.3	57.1 cc. 96.9 cc.

Average of quantity of juice per hour:—			
First	3.6 cc.	First	4.0 cc.
Second	3.7 cc.	Second	3.3 cc.
Third	3.1 cc.	Third	4.7 cc.
Total quantity	10.4 cc.	Total quantity	12.0 cc.

* Paucity of gastric juice.

Comparative data—6 (Vide Fig. 6) (Heidenhain alone)
Dated 22-11-1945 onwards

Time in hours	ORAL		PARENTERAL	
	Pepsin Index	No. of cc. of N/10 NaOH per 100 cc. of gastric juice	Pepsin Index	No. of cc. of N/10 NaOH per 100 cc. of gastric juice
Half	58.6	99.6 cc. 107.7 cc.	85.3	68.6 cc. 94.6 cc.
One	21.3	84.0 cc. 94.9 cc.	* Not done.	75.3 cc. 105.8 cc.
One and half	21.3	81.3 cc. 103.3 cc.	10.6	54.6 cc. 93.0 cc.
Two	* Not done.	86.6 cc. 106.1 cc.	Not done	44.3 cc. 75.3 cc.
Two and half	"	77.0 cc. 96.3 cc.	21.3	44.6 cc. 85.0 cc.
Three	"	93.6 cc. 118.3 cc.	Not done	36.6 cc. 81.9 cc.

Average of quantity of juice per hour:—			
First	3.2 cc.	First	3.6 cc.
Second	1.6 cc.	Second	2.0 cc.
Third	1.6 cc.	Third	2.2 cc.
Total quantity	6.4 cc.	Total quantity	7.8 cc.

* Paucity of gastric juice.

non-existence of cholinergic nerves (Goodman and Gilman, 1944). Still Acetylcholine had its effect on those animals.

The most likely explanation was that Physostigmine Salicylate preserved Acetylcholine at the nerve endings of the main stomach and not in the denervated pouch. Thus the pyloric region of the main stomach in response to both exogenous and endogenous Acetylcholine formed modified gastrin, and this being circulated via the portal circulation acted according to its changed composition on the mucosa of the miniature pouch. The alternative possibility of generalised Acetylcholine of the system having its action through the portal circulation was not feasible in view of the very active enzyme, Cholinesterase (Stedman, Stedman and Easson, 1932).

The importance of Choline in ordinary life is well-known. MacIntosh and Krueger (1938) have impressed the importance of Choline in the foodstuffs which exert a definite secretagogue effect, namely, liver contains 700 mg. of Choline per kg., skin, muscles 15-20 mg., commercial meat is presumed to contain very considerable quantity of free Choline. Beef contains 750 mg. of Choline per kg. The role of vagi causing hypersecretion in the peptic ulcer patients has been observed by Dragstedt and Schafer (1945) and Orr and Johnson (1949).

So taking into account all the facts and the figures of the experimental observations in Heidenhain animals, and the critical review of the role of Acetylcholine in the gastric secretion, it becomes obvious that Acetylcholine had a principal role in the chemical phase of gastric secretion.

In such circumstances, it is quite tentative to presume, though premature from the logical evidences thus put forth, that the 'gastrin' of Edkin is controlled by Acetylcholine besides its unsettled association with histamine.

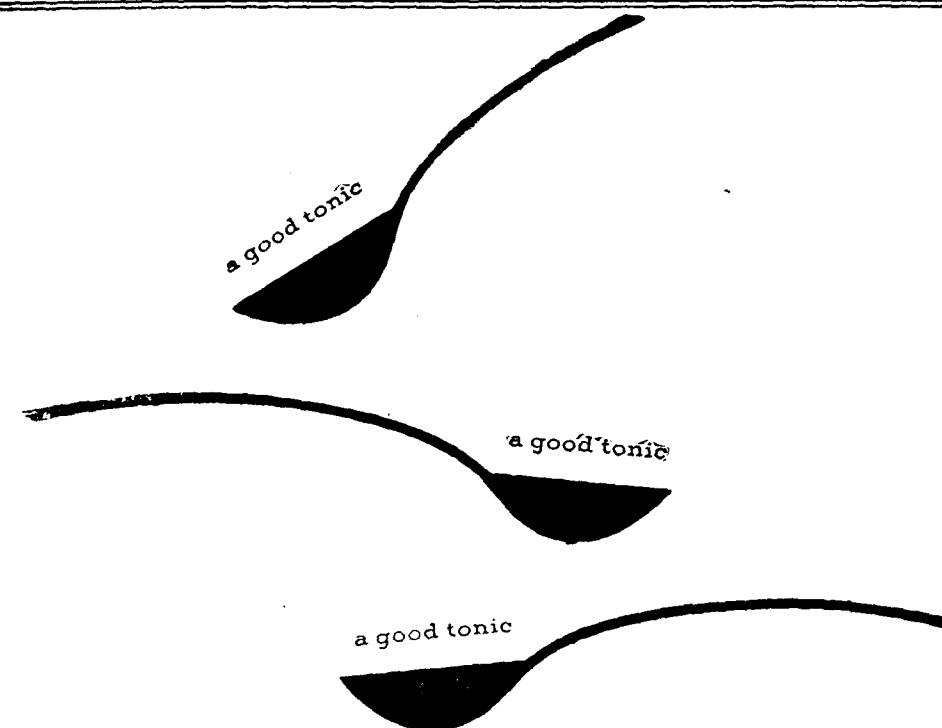
Summary.—The parenteral administration of Acetylcholine and Physostigmine Salicylate had a greater augmentary effect on the quality (acidity and pepsin) of the gastric juice than Acetylcholine alone in Pavlov and Heidenhain animals.

The parenteral and oral administration of Physostigmine Salicylate had an augmentary effect on the quality (acidity and pepsin) and to some extent on the quantity of the gastric juice in those animals.

The possible site of action of Acetylcholine in Heidenhain animal is discussed.

It is suggested that Acetylcholine may play a part in the production of gastrin.

Acknowledgement.—I am indebted to Dr. B. Narayana, Principal, the P. W. Medical College, Patna, India, for his help and permission to do the investigation in his laboratory as a Patna University Research Scholar, and to my wife Mrs. Lakshmi Sinha with whom during accidental discussion the problem of Acetylcholine evolved.



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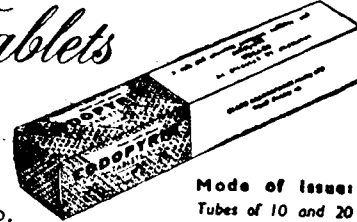


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Insulin and Cortisone in Arthritis

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Cases and Comments

CHLOROMYCETIN AS AN ANTIBIOTIC

With report of a case (Typhoid complicating Acute Pulmonary Tuberculosis, undergoing Collapse Therapy)

AMAL CHAKRAVARTY, M.D. (Cal.),
Burdwan.

LIKE the other antibiotics, Penicillin, Streptomycin and Aureomycin, Chloromycetin has been hailed with appreciative enthusiasm by the medical profession. True it is, that it is not a wonder drug in the sense that it fails to save lives, given late in a fulminant case of typhoid, or that it cannot always prevent hæmorrhage or perforation, in the enteric cases, but introduced early and in proper dosage, it can surely be counted upon, almost as a specific drug, in typhoid. Similarly, its efficacy has been well proved in rickettsial diseases: undoubtedly, it is of value, in many urinary tract infections—except perhaps, those due to *B. pyocyaneus* and *proteus vulgaris*. In brucellosis, varied pneumonic conditions and in some venereal diseases, it competes well with Aureomycin. As a matter of fact, both the two recent antibiotics, Aureomycin and Chloromycetin, have action on a wide range of organisms, but whereas Aureomycin mainly acts on gram positive organisms and certain viruses, Chloromycetin has action chiefly on gram negative organisms.

As an antibiotic, Chloromycetin has been obtained from a certain species of *Streptomyces*—*Streptomyces Venezueles*. It can however be synthesized, and, perhaps, it is the first antibiotic to be obtained, in large quantities, by either natural fermentation or chemical synthesis. The synthetic product is known as "Chloromphenicol". Chloromycetin is a crystalline substance neutral in reaction, containing Iodine and non-Ionic Chlorine. It is slightly soluble. Its absorption from the gastro-intestinal tract is rather slow and therefore it produces a marked effect on the intestinal flora. Slow absorption is also responsible for its persistence in the blood for 12 hours or more. It is excreted out in urine, in high concentration, and can be traceable still after 2-3 days, making it an effective drug, in urinary tract infections. The action, so far known, is not bactericidal, but bacteriostatic, and, though the general view is to the contrary, yet organisms have been found to turn resistant to it, though temporarily. The minimum effective concentration of the drug in blood is 10 mg. per c.c., which is easily maintained, even with 8-12 hourly suitable oral dosage. Oral route is the route of choice, though rectal administration after multiple puncture of the capsules have been found to give effective therapeutic results.

The dosage scheme has been variously suggested. The earlier high dosage scheme has, however, rarely any advocate now, (*e.g.* initial dose 50 mg. per kilo wt. given in 2 doses, at an hourly interval, followed by .25 gm. capsules, 2 hourly, till afebrile and then .25 gm. capsules 4 hourly for 7-10 days). Such a high dosage usually gives rise to vascular collapse, and, further, 2 hourly spacing, is a source of irritation and annoyance to the tired patient. 2 hourly, 3 hourly, 4 hourly, 6 hourly, even 12 hourly dosage schemes have been suggested and also put into practice. In view of toxic manifestations with high dosage and difficulty of administration with frequent dosage and further with the knowledge gaining ground, that effective therapeutic concentration is maintained well with 8-12 hourly dosage, the dosage scheme has been appreciably modified. It has been found that 60 mg. per kilo weight per day spaced out in 4-6 hourly intervals for 7-10 days is sufficient enough. For an average adult an initial dose of 1 gm. (1 capsule hourly) followed by .5 gm. 4 hourly, till temperature becomes normal, changing to .5 gm. 6 hourly for the first 24 hours of afebrile period, followed by .5 gm. 8 hourly for 6-7 days (totalling 16-18 gms.), has been found to give appreciably good results.

In cases where dosage used is proper and well-timed, response usually occurs in 48 hours, and, in some cases, within 72 hours. In short Chloromycetin is an effective drug and can be counted as somewhat specific in enteric group of fevers though its effectiveness is much more pronounced in typhoid, compared to para-typhoid group of fevers. Therapeutic failures, however, do occur and toxic manifestations in severe forms, though rare, have been met with frequently in a mild form.

Therapeutic failures and toxic manifestations can be summed up as follows:—

- (1) There is no safe guarantee against relapse occurring, even with best calculated dosage scheme.
- (2) Effects are neither rapid nor consistent in para-typhoid fevers.
- (3) Fails to prevent perforation and hæmorrhage.
- (4) Nausea, vomiting, tympanitis, mild diarrhoea are initiated, or aggravated, if present beforehand. Further, by its bacteriostatic effect on intestinal flora, synthesis of vitamins is prevented, and glossitis, stomatitis may originate as a result.
- (5) Even after control of pyrexia, oliguria, and sometimes retention of urine, due to spasm of vesical sphincter, occur in toxic cases.
- (6) Sudden onset of vascular collapse, with sub-normal temperature, rapid thready pulse and cold clammy extremities have been met with in high dosage therapy. Mollaret and his colleagues on the basis of animal experiment, explained the vascular collapse as due to sudden liberation of sufficient dose of endotoxin from the too

rapidly killed virulent typhoid bacilli with high dosage of Chloramphenicol. Deaths under such circumstances have been reported.

7. Rashes and cerebral irritations have also been cited by some as untoward effect.

Even in the face of so many drawbacks cited above, some of which are real and some apparent, the fact remains that Chloromycetin properly used and early instituted in cases of typhoid group of fevers, can certainly be relied upon in the majority of cases to effectively cut short the period of illness, modify the course of the disease, and to turn it towards the path of recovery, and from that point of view it can, without doubt, be considered a remarkable achievement. In corroboration of the above, a case is cited below, of a patient suffering from acute exudative pulmonary tuberculosis, undergoing AP therapy, who had superimposition of typhoid fever, which was rapidly controlled with Chloromycetin, enabling the original pulmonary condition to be kept in check with the continuance of collapse therapy.

L. B. R., a girl, aged 16, came under my treatment on 22-9-'50 for what appeared to be a case of acute and active pulmonary tuberculosis, mainly involving the right lung, with patchy affection of the left lung. She complained of having fever, even at rest, of a high fluctuating intermittent type, duration one month. Had dry irritable cough with scanty expectoration, and stitchy pain in the right side of chest. Exhaustion, asthenia, anorexia, rapid loss of strength and weight and active night sweats.

On examination:—She was thin built, appeared run down, anæmic, peevish, irritable and psychologically depressed. Respiration slightly hurried and to some extent laboured, intercepted frequently by bouts of irritable cough. Right lung: breath sound diminished in intensity in general, being harsh and bronchial at zones; crepitations—fine, medium and coarse, as also rales widely scattered throughout the right lung field. On the left midzone anteriorly and laterally air entry was deficient but no adventitious sound could be heard. Upper respiratory tract—N.A.D. Neck glands—not palpable. Spleen and liver could not be felt. Abdominal glands—not felt, peritoneal tenderness—nil. Heart—N.A.D. Pulse rate rapid and proportional to temperature.

X-ray—3 days later (25-9-1950) showed extensive, soft exudative active lesions with spread—with evidence of breakdown. Coalescence of exudative lesions with a filmy pleuritic haze in lower zone. Almost the entire lung field was involved. Hilum was pronounced and there was no formative fibrotic reaction.

Similar type of lesion on the left lung field but with scanty and patchy involvement of left midzone and lower part of upper zone peripherally with prominent bronchovascular shadow. Sputum examined on 26-9-'50 showed small number of A.F.B.



Skiagram—Cardiac shadow—normal. Diaphragm—normal. Air entry in right lung fair. Hilar prominent. Air entry less and woolly infiltration seen and thickened pleura at the base. Suggestive—Tubercular infiltration in the left lung.



Skiagram shows left lung partially collapsed. Right lung—normal.

Considering of the predominantly unilateral lesion with sputum positivity, it was decided to start AP on the right side. Primary AP was done on 29-9-'50. After the 5th refill (19-10-'50), patient became completely a pyrexial. Cough became occasional, with no expectoration. Pain chest and breathlessness were absent. Her appetite returned, she looked cheerful and apparently was gaining in weight and health. She had her 6th refill on 26-10-'50. On the same evening, she complained of malaise and distaste for food. Next evening fever went upto 100°F and for the next 3 days fever persisted and gradually ranged higher and higher. She was examined on the 5th day of fever—there was nothing in the history or findings suggestive of a pleural complication, exacerbation of lesion on the contralateral lung, peritoneal or intestinal complication, or spread to distant organs. She complained only of mild headache, loss of appetite—distension

of abdomen, constipation and scantiness of urine. Urine sent for culture showed no growth of organisms. Blood count showed average total count, with 35% lympho in differential count. Skiagram taken on 27-10-1950, i.e. a day after the sixth refill and on the second day of the present illness, showed optimum collapse of right lung. Lesions were well jammed together, desired amount of collapse being prevented by 3 bands of adhesions. The lesions on the opposite lung showed no evidence of spread, rather they were undergoing fibrosis. There was no pleural effusion.

AP CHART OF LBR:

Date	Pressure			Remarks
29-9-'50.	-12	200 cc.	-8	High fever.
	-8		-4	
1-10-'50.	-14	325 cc.	-8	
	-6		-3	
4-10-'50.	-12	400 cc.	-6	
	-4		0	
8-10-'50.	-12	400 cc.	-6	
	-6		0	
13-10-'50.	-10	450 cc.	-5	
	-5		+1	
19-10-'50.	-13	450 cc.	-5	No fever.
	-5		+1	
26-10-'50.	-11	475 cc.	-6	Fever started in the evening.
	-3		+2	
3-11-'50.	...	...	...	A. P. refill postponed: Fever 8th day (Widal positive). Chloromycetin started.
4-11-'50.	-10	375 cc.	-6	No fever again.
	0		+2	
13-11-'50.	-11	500 cc.	-6	No fever again.
	-2		+2	
23-11-'50.	-11	500 cc.	-5	No fever again.
	-2		+2	
6-12-'50.	-6	250 cc.	-5	Thoracotomy done (4-12-'50). No fever.
	-2		+1	
17-12-'50.	-12	400 cc.	-4	No fever.
	-3		+1	

Clinical and radiological evidence therefore negated any possibility of a pleural complication or spread of the lesion in the pulmonary field or to extra pulmonary distant organs, which are the usual possibilities to explain the reappearance of fever and its persistence. On the 8th day of fever, fever ranged between 102°—104° F., tongue well coated in dorsum, tympanitis moderate degree, pulse bradycardiac, no respiratory distress or symptom. Lung still collapsed. No evidence of effusion or cardiac embarrassment or mediastinal shift. Spleen just palpable.

As there was nothing to explain the continued pyrexia, and as there was a history of good many cases of enteric in the locality then, it was decided to send blood for widal, as there was some difficulty with blood being cultured. Widal was strongly positive for TH and TO with 1/250 dilution and over. This, together with the clinical picture taken with the background of endemicity of enteric, was sufficient to suggest the diagnosis of typhoid. She was immediately put on Chloromycetin 4 capsules stat (in hourly divided doses) and 2 capsules 3 hourly. Temperature was controlled in 26 hours' time. Dose of Chloromycetin was spaced out to 2 capsules 6 hourly and then 2 capsules t.d.s. for 7 days. She was due for the 7th refill on 3-11-1950 on the day Chloromycetin was started. It was decided to postpone the AP refill, in view of the potential danger of cardio-respiratory embarrassment, which may add to the gravity of typhoid fever.

With quick control of pyrexia by the next day i.e. (2nd day of Chloromycetin) and evidence of re-expansion of the affected lung, the question of flare-up of tuberculosis and the sinister influence of one on the course of the other and *vice versa* came up for consideration. It was therefore decided to maintain collapse of the lung with the usual refill, with the simultaneous control of typhoid by Chloromycetin. She stood the refill well. Since then she is having AP refills. She had thoracotomic cauterization of the bands and has been progressing well with collapse therapy. She had had no relapse of fever, though 2 months have passed since.

Conclusion.—Since the advent of Chloromycetin, numerous reports have been published mostly claiming its effectiveness in various diseases. Therapeutic failures and toxic manifestations have been pointed out by others. The writer is of opinion that its advantages far outweigh the disadvantages and with judicious selection of cases and with early administration of proper dose, Chloromycetin can be banked upon as a life-saving measure. The case cited above definitely shows that but for Chloromycetin the case surely would have fared worse and that, during the stormy period of the illness, it could be well conducted through as collapse therapy had a safe cover under a screen of Chloromycetin.

TONSILLECTOMY WHEN FIRST LINE OF DEFENCE FAILS

MOHINDAR SINGH,

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TONSIL is a large mass of lymphoid tissue, surrounded by a capsule (a condensation of areolar tissue covering the muscles which separate it from its muscular bed) and has protective functions against bacterial infection as first line of defence of the body. In its attempt to act as a barrier it hypertrophies and may itself become infective, an incubator of microbes, and, then, instead of protection, it becomes a focus of infection and a potential danger.

Once it becomes infective, chronically hypertrophied, and not responding to medicinal treatment with Sulpha drugs etc., it must be taken out. In order to ascertain sepsis, pressure should be applied over the anterior pillar by the end of a tongue depressor or a probe. If a cheesy-looking purulent debris is seen extruding from the follicles, the tonsil is septic.

Methods employed for tonsillectomy are:—(a) Guillotine and (b) Dissection method under local or general anaesthesia. In my cases under reference I employed dissection method under local anaesthesia for the following reasons:—

- (1) All these cases were adults with chronic hypertrophied tonsils, some with fibrous adhesions.
- (2) Good hæmostasis is secured. In all my cases under reference bleeding during and after the operation was almost negligible.
- (3) Surgeon can see what he operates and hence danger of mishaps such as abnormal course of carotid etc. are avoided.
- (4) Unpleasant effects of general anaesthesia are avoided.
- (5) Being a rural area suction pump arrangements are not available, and thus local anaesthesia prevents the possibility of aspiration of blood and infected material in the lungs.
- (6) Pain and discomfort during and after the operation are far less.

A day before the operation coagulation time was determined and 10% 10 c.c. Calcium Gluconate (Sandoz) given I.V.

Pre-operative medication.—Morphia gr. $\frac{1}{4}$ with Atropine gr. $\frac{1}{100}$, 45 minutes before the operation. Local spray of throat with 10% Cocaine thrice at 5 minutes interval. Just before the operation $\frac{1}{2}$ % Novocaine with 8 minims Adrenalin 1/1000 to an oz. 40–50 c.c. of the solution was injected in the tonsils. Three injections of 3 c.c. are given in the region of anterior pillar and two into the posterior pillar behind the capsule in each tonsil, thus completely anaesthetising the space between the capsule and the surrounding tissue.

Operation.—With the aid of tongue depressor, grasp the tonsil with volsellum and pull it towards the midline, out of its bed between faucial pillars so as to stretch the pillars. Make an incision around the upper pole close to the body of the tonsil. Stretch the capsule with iris scissors and with blunt dissection strip the tonsil from its bed and carry it below the lower pole of the tonsil. Thus tonsil will be separated except a pedicle in the centre which is extracted out with a snare. Look for any bleeding vessels. Before operating on the other side pack the wound with dry gauze. Normally there is no bleeding; if there is, the bleeding vessels may be secured and tied with cat gut.

AFTER TREATMENT.—For the first few hours apply cold compresses over the neck and small pieces of ice to suck. Re-examine the patient after 2–3 hours to detect any bleeding vessel. (Reactionary hæmorrhage appears within 4 hours of the operation). At night give sedative like Gardenal, and, if pain is severe, Morphia may be given. On the 2nd day patient can take weak tea, jelly etc.; some antiseptic gargles like Dettol are useful. Penicillin Lozenges are very good as they prevent excessive sloughing.

COMPLICATIONS.—1. Reactionary hæmorrhage occurring within 3 hours of the operation. 2. Secondary hæmorrhage occurs in 5–7 days after the operation and is due to the separation of the slough which forms on the surface of the bed of the tonsil. The bleeding point is deep in the bed of the granulation tissue and pressure is the only useful way to stop it. Deep under stitching can be tried. 3. Sepsis.

In my cases described below the recovery was uneventful without any complication:

CASE 1.—H.S., 14 years, male, reported off and on with recurrent attacks of cough, dyspnoea, bronchial asthma. The trouble would subside under treatment. Thorough examination of the patient was done to find out some infective focus, and both tonsils were found hypertrophied and septic. Adenoids were enlarged. On 16.4.50, tonsillectomy was done, and the adenoids were removed with curette. Patient made an uneventful recovery. To this day there has been no recurrence of the attacks and the boy is enjoying good health.

CASE 2.—J. K., 35, S. F., was referred to me by a doctor for recurrent attacks of asthma. On examination septic hypertrophic tonsils were seen. Tonsillectomy was done on 6.5.50 with uneventful recovery. No complaint of recurrence of symptoms has been received so far.

CASE 3.—P. K., 30 years, female, was suffering from dry irritable cough, repeated attacks of acute tonsillitis, anorexia, indigestion, vague sorts of body pains and chronic ill health. Duration two years. On examination she was frail, anæmic. Tonsils were highly

infected and hypertrophied. She was operated on 10-5-'50. Since then she is enjoying good health.

CASE 4.—Miss B., aged 18 years, was referred to me by a physician for recurrent attacks of tonsillitis. Tonsils were hypertrophied, infected and had fibrous adhesions. Operated on 13-5-'50 with an uneventful recovery.

CASE 5.—G. K., 20 years, female, gave history of dry irritable cough, repeated attacks of sore throat, loss of appetite, feeling of tiredness in the evening since a year. Medicinal treatment gave no relief. Tonsils were markedly hypertrophic and septic. Patient was operated on 20-5-'50. No complaint has ever been received since then.

CASE 6.—P. K., 30 years, female, admitted with recurrent attacks of peritonsillar abscess, chronic ill health, anæmia. Tonsils were found hypertrophied and septic. Operated on 7-7-'50. During the operation patient started respiratory failure and both the lungs were full of wheezes and rhonchi. Respiration became laboured. After the operation Coramine 1·7 c.c. with Camphor in oil 1 c.c. was given. Patient improved in an hour's time and made an uneventful recovery.

CASE 7.—A. K., 50 years, female, was admitted with history of asthma of 5 years' duration. Attacks were frequent and patient would often pass in status asthmaticus. Had been treated at various places with no amelioration in the condition. On examination she was found to have septic hypertrophied tonsils and pyorrhœa in a fairly advanced condition with shaky teeth. She was operated on 11-8-'50 and made an uneventful recovery. All the teeth were extracted out. Since then patient was almost free from the attacks. Only once she got a mild attack when exposed in a cold winter night. Her general health too has considerably improved.

CASE 8.—F. K., aged 18 years, was admitted with chronic S.O.M. Both drums had central perforation and the ear was discharging offensive purulent discharge. Hearing was very much decreased. Both the tonsils were hypertrophied and septic. Operated on 12-9-'50. Since then the discharge from the ears has ceased and hearing has considerably increased though still below normal.

Discussion.—Eight cases are described wherein after tonsillectomy the other complaints due to absorption of toxic material in the body either completely subsided or markedly improved. No untoward effect or complication was observed, except respiratory failure coming in during the operation in one patient.

TWO INTERESTING CASE NOTES

DR. B. K. SEN,

Assistant Surgeon, Rly. Dispensary, Dabhoi, Baroda.

A FEMALE child of a Guard, aged 5 years, had an attack of fever, followed 24 hours later by violent convulsions of the left side of the body. I was sent for, and I saw the following conditions :—

(1) The patient in an ill-lighted and ill-ventilated room in an unconscious state with violent convulsions (unilateral) of the left side of the body.

History of the case :—(1) Fever with chill and rigor, duration 24 hours. (2) Convulsions with unconsciousness, duration 1 hour; onset sudden.

Family history :—Parents are in good health. No history of congenital diseases or any hereditary diseases. V.D.—denied.

Present illness :—The child had a high rise of temperature associated with chill and rigor 24 hours back, which came down to normal within 4—5 hours with sweating even without any medical treatment. The next morning, i.e. after 24 hours, she has developed these present conditions.

On examination :—The child is of good health and well nourished. She is unconscious. Violent convulsions of the left side of the body only with alternate rigid contraction and relaxation, which is much marked on the muscles of the face and upper and lower limbs. The facial muscles of the left side had more convulsions. The saliva dribbles out of the mouth and the left angle of the mouth is deviated to the right side of the face as the muscles of the right hand side get an upperhand. The left upper limb is moving with alternate rigid contraction and relaxation, also with clenching of the fists. The left lower limb too is having the same. The contraction and relaxation is uniform throughout the whole side and it is about 15–20 times a minute. She is perspiring at this stage. Auxillary temperature 97·8 F; Rectal temperature 102·2° F.

Abdomen :—N.P.D.; Stool—passed once in the morning. Tongue—clean and moist. Spleen—slightly palpable; Liver—N.P. Heart and lungs—N.P.D. Respiration—normal.

Pulse :—Quick, but proportionate to the temp. V/T—good. Pupils—dilated. The left one is more dilated than the right. Reaction to light present; pupillary reflexes—absent. Planter reflex is flexor type. Knee and ankle jerks could not be elicited due to spasms more marked there. Superficial reflexes in the abdomen and chest of the left side little impaired.

Blood slides—not drawn as none has got microscope in this area.

History revealed that mosquitoes are much in evidence in that place and the child is accustomed to sleep outside the mosquito curtain.

P.D.—On the typical history, mode of onset of temp. and spleen enlargement gave me the clue to diagnose it provisionally as cerebral type of malaria.

TREATMENT :—(1) I at once injected Quinine Bihydrochlor 3 grs. I.M. and, to my utter surprise, the convulsions stopped totally within 10—12 minutes of injection. (2) Then she was given Pulv. Paludrine i.e. Paludrine 0·1 gm. with Soda Bicarb gr. x divided into 3 powders, 1 t.d.s. (3) Mist alkali 5 vi 3 ii t.d.s. After that the child never suffered from malaria. Pulv. Paludrine as prophylactic bi-weekly and weekly was continued.

N.B.—Pulv. Paludrine was administered by making a paste with honey, by which process the kiddies take it without giving much trouble.

CASE 2.—The following condition was seen, when I went to see this boy of 7 years old :

(1) The boy was unconscious, (2) violent convulsions with alternate contraction and relaxation of the whole body.

History revealed temperature of 2 days' duration, onset slow and gradual. On the 3rd day the boy developed this present state. For the last two days the relatives took medicine from another doctor, the remnant of which on examination seemed like mist. alkaline to me.

Family history—Revealed nil.

Present illness :—(1) The boy had slight temperature of gradual onset for the last two days; (2) cough with slight expectoration. Duration 2 days; (3) in the night, the temperature was little more and the boy complained of chill; (4) the temperature did not come down by the medicine of that doctor and on the 3rd day morning, the boy got unconscious and developed these convulsions of uniform distribution throughout the whole body. No motion from previous day.

On examination :—Temperature axillary—103.6 F. Tongue—moist and coated. Tonsils—+. Spleen—enlarged, 2" below the costal margin, a little harder in consistency. Liver—N.P. Lungs—moist, wheezing rales and rhonchi on both lungs, few in number. Heart—N.P. Pulse—rapid. V/T—good. Respiration—normal. Abdomen—distended and tymphanitic. Urine passed as usual. Pupils—both dilated. Reaction to light is absent. Pupillary reflexes absent. Superficial and other reflexes—not impaired. Knee jerks etc. could not be ascertained due to spasms of those parts too.

Laboratory examination :—Omitted due to lack of facilities.

P.D.—Made as malaria with bronchitis.

TREATMENT :—(1) Inj. Quinine Bihydrochlor 5 grs. I.M. stat. (convulsions less than before within 5 minutes). (2) Ice bag on the head. (3) Glycerin enema resulting in plenty of normal stools. (Now abdomen is soft.) (4) Paludrine 0.3 gm. tab. 1 1/3 tab. t.d.s.

One hour after the injections the relatives of the boy came to my dispensary and informed me that the convulsions have stopped totally, but the temperature did not come down to normal. In the night I visited the boy, who was taking tea alright, except for a little temperature. He was given a Sulphatriad tablet during bed time as a prophylactic, to be continued also for avoiding bronchopneumonia. Next morning he was shifted to his native place, Baroda, and no further report was made.

Points for discussion.—(1) Both the cases immediately responded to Quinine. (2) Paludrine given to all of my patients irrespective of age without side-effects. (3) Both the cases on the clinical feature come in the category of cerebral type of malaria.

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THE FIGHT AGAINST DISEASE

THE Hon'ble Shri. B. GOPALA REDDY, Finance Minister, Government of Madras, who deputised for the Health Minister and presented the demand in the Madras Legislative Assembly for the Medical Services, took pardonable pride in the fact that the Madras State has a larger and closer network of medical institutions than any other State in India. While it is permissible to compare the position in the Madras State with that obtaining in other States, to prove that Madras stands on the vanguard in the fight against disease, it is not the correct way of judging how the Madras State has acquitted itself in the discharge of its prime responsibility towards its citizens. Maybe the United States of America and the United Kingdom, which are rich and prosperous from every point of view, have made tremendous advances in the field that it would not be fair to compare the position obtaining there with that prevailing in this State. But it is permissible to ask whether the position obtaining here compares favourably at least with that prevailing in a neighbouring Asian Country, viz., Ceylon. It would be within the recollection of our readers that the Hon'ble the Health Minister of the Government of India, in the statement she issued on the Second Independence Day, made such a comparison and expressed her regret that India had not made as much progress as it had been possible in that small neighbouring country which also had remained under foreign tutelage along with India till recently. Instead of therefore comparing the position obtaining here with that in the other States in India itself, it would have been better and would have shown a greater sense of appreciation of the needs of the situation if the Finance Minister had made larger provision under

this head with a view to go ahead and attain parity at least with Ceylon.

We are not unaware of the plea put forward on behalf of the Governments, both Central and States, that howsoever anxious they are to develop nation-building services, financial stringency blocks their path at every turn. In the budget memorandum presented to the Legislative Assembly, Madras, along with the budget statement for the year 1951-'52, figures are supplied to indicate the progress of expenditure on these services since 1945-'46. That very statement shows that, while provision for Education has nearly trebled during this period, the provision for medical services has not kept pace with it. (It has only risen from 180 lakhs in 1945-'46 to 312 lakhs in 1951-'52). If we dive deep into the accounts of the twenties and compare it with the present position, we would find that while the revenues of the State had more than trebled within the past three decades, the provision for medical services has not been proportionately increased. We do not grudge the increasing provision made under the head Education, but Medical Service is as much important, if not more important, than education. The Government of Madras should have been more liberal in providing for that Department than what they have actually done. The reason lies in the wrong notion that seems to be prevalent in the minds of those holding the reins of administration, as is evident from the speech of the Finance Minister himself in presenting the demand for medical services. "In the present condition," he said, "Governments have to concentrate first on productive schemes which would increase the wealth of the State and then take up social services." Is there any scheme more productive of wealth than that of prevention and treatment of disease and assuring positive health to the people? None of the so-called productive schemes drawn up so far or are likely to be prepared in the future stand a fair chance of being implemented unless top priority is given to the prevention and treatment of disease. The sooner this truth is realised the better will be the prospect of the implementation of the so-called productive schemes. Then and then only can the statement of the Finance Minister that "there is no question of want of appreciation of the need for providing facilities for prevention and treatment of disease and for maintaining public health" have any real meaning.

The Finance Minister stated that subject to the limitations of the shortage of personnel and funds, they have made considerable advances, and he catalogued the various improvements that have been effected: That they are earnest about the development of the indigenous systems of medicine; that they have taken steps to construct a new Medical College at Madura and to make the Guntur Medical College a full-fledged one; that they are bringing new institutions into existence and improving existing ones wherever the need was greatest; that they are increasing the bed strength in many

hospitals; that they have taken up in right earnest the question of improvements to District Headquarters Hospitals to make them more or less self-contained, to obviate the need for patients going to Madras for treatment; that as a first step in this direction, these hospitals would be provided with facilities for Obstetrical and Gynaecological work and diagnostic facilities including pathological laboratories; that a number of small schemes have been undertaken to effect improvements to Taluq Headquarters institutions; that they are paying and propose to pay equal attention to urban and rural needs; that in addition to the existing 21 Health Centres, provision is made for one more in 1951-'52; that free treatment is being extended to patients whose income is Rs. 100 or less; that special allotments for costly modern drugs have been made to enable treatment of indigent patients in Government Hospitals; that the first Register of Dentists has been prepared and a Dental Council will soon be constituted to secure that only qualified men dealt with the dental ailments of people; that a Pharmacists' Registration Tribunal has been constituted to tighten up the production, sale and use of drugs and medicines; that they have brought about the unification of the two classes of Civil Assistant Surgeons; and so on and so forth. We admit that these and many others mentioned by him are no doubt considerable improvements on the past, but the question is whether they are sufficient to meet even the minimum requirements of the present situation.

Let us take the statement of the Finance Minister that they are paying, and propose to pay, equal attention to rural and urban needs. But in another place in the same speech the Hon'ble Minister has stated that the problem of rural medical relief is primarily the responsibility of local bodies and that Government can only help them through grants. It is a well-known fact that the sources of income of these local bodies are inelastic, their obligations are great, and that the help given by Government to these bodies through grants is but a drop in the ocean. How can then these local bodies with considerably restricted sources of income cater to the ever-growing needs of the rural areas as well as the Government cater to the needs of urban areas? We hear the woeful tale every now and then of some of these rural institutions being closed down for lack of personnel. No wonder it is so, for the terms offered to the practitioners are unattractive and the conditions of service humiliating in the extreme. And the position cannot be bettered unless and until the pay and conditions of service of medical men and women serving in rural areas are made attractive and honourable respectively. It is not possible for the local bodies with the limited means at their disposal to make their pay attractive, unless the Government come forward to give larger and larger grants to them. Then and then only can the claim of the Government that they are paying, and propose to pay, equal attention to the needs of the rural and urban areas be justifiable.

In regard to the shortage of personnel, the Hon'ble Minister appears to think that the production of 150 more medical graduates a year by the establishment of a Medical College in Madura and the raising of the Guntur Medical College into a full-fledged one would be sufficient to meet the requirements. As admitted by him, the output of doctors at present under the modern system of medicine is barely adequate to meet wastage due to death, cessation of practice etc. Will the increase of production of graduates by 150 a year after some years be sufficient to meet the requirements? We think not. We had the news only the other day that there is one physician for every 700 of the population in the U.S.A. It may not be possible for us to attain parity with the U.S.A. at least in a foreseeable period of time. But even to provide, according to the scheme of the Bhore Committee, many, many more medical graduates will be required. And the establishment of one more college and raising the status of another would certainly not be sufficient to meet the minimum requirements which are growing day by day with the increase in the population. The Government must therefore provide for the admission of more and more students in the existing colleges by the introduction of the shift system or otherwise and establish more and more colleges in the near future. Then and then only can the requirements be at least partially met.

The Finance Minister's statement that "the Government have decided to expand the system of Honorary Medical Officers so that ultimately honorary officers and stipendiary officers would be in the ratio of 3 to 1" is very encouraging. Had the system introduced in the twenties, not been given the step-motherly treatment by those in authority then but given all the encouragement and help that it deserved, the ratio would by now have been almost reached. It is no good crying over the past failures. Let the profession be heartened by the declaration of policy and give to the Government all the help and co-operation that it is possible for it to give. It will not then be long before the ratio is reached and the number of private practitioners gaining institutional experiences and skill is increased, to the best advantage not only of themselves but also of the community they are devoted to serve. A word to the Government also in this connection. If the scheme is to be made the success that it deserves to be, proper care should be bestowed by them in the selection of candidates. It is in the hands of the medical practitioners that the sick and ailing entrust their lives. It is therefore incumbent on the Government to see that the best among them are selected. If this cardinal principle is ever borne in mind, the objective is bound to be achieved and the scheme is bound to succeed, helping the Government to cut down considerably the overhead charges and devoting it to the extension of medical facilities.

THE FIRST STEP

It is fitting that Travancore which had been in the vanguard of the fight against disease in the whole country by providing 10% of its revenues for the improvement of public health and which had taken kindly to mass B.C.G. vaccination in the fight against the fell disease, tuberculosis, should be the first State chosen for the establishment of the Tuberculosis Demonstration and Training Centre, under the joint auspices of the W.H.O., the U.N.I.C.E.F., the Government of India and the State itself. Of the eight centres decided upon for the East, three have been allotted to India; and Trivandrum, New Delhi and Patna have been chosen for the establishment of these centres. The Trivandrum Centre was opened on May 20, by H. H. the Rajapramukh, before a distinguished gathering of officials, non-officials, members of the medical profession and WHO experts. The Rajapramukh very rightly availed himself of the opportunity to state that a great deal of progress on the preventive side had already been achieved in Travancore by the Public Health Department, advised and assisted by the Rockefeller Foundation, especially in regard to filariasis, mosquito control work, etc., and that during the past two years a proper and systematic attempt in the direction of prevention of tuberculosis had been made there. The soil is therefore congenial and the very creditable record of 81,000 B.C.G. vaccinations since the movement was started augurs well for the future of the area.

As it has been repeatedly pointed out by experts, more than 500,000 people die in India of tuberculosis, every year, and for every death there must be at least five infected cases, spreading the infection further. Mass radiography is being attempted in many countries to detect such infected cases and provide them with treatment. India is a very vast country, with a huge population. The resources of the Governments are very limited. They have been able so far to provide only 119 clinics and 10,300 beds out of a total minimum requirement of 3,500 clinics and 500,000 beds. It would not be possible for the States to start a mass radiography plan for the detection of infected cases as has been done in some countries in the West. In the circumstances we have to think of a plan which, while not costly and beyond the means of the Governments, Central and States, would at the same time help in the detection of infected cases so as to arrange for their treatment. The tuberculin test helps in the detection of infected cases, and B.C.G. vaccination is the best means we can adopt under existing conditions and financial stringency to arrest the spread of the disease.

There was of course some objection at the outset to this measure in Madras, due possibly to a genuine fear that the remedy might prove worse than the disease, but the experience of the working of the scheme since it was inaugurated has proved that their fears are groundless. There has not been so far, to our knowledge, a single report of the dreaded reaction taking place. It can therefore

now be said without any fear of contradiction that the measure has been given a fair trial even in the environmental, social and economic conditions prevalent in our country and that it has come out of it unscathed. In the circumstances the time has come for taking positive steps in the direction of its extension on a wide scale. The establishment of the Training and Demonstration Centre in Trivandrum is the first positive step in the direction which, we trust, will soon be followed up by the establishment of the other two sanctioned Centres in New Delhi and in Patna. May this Centre and the two more Centres to be established in the near future, in the words of Prof. TYTLER, Consultant, T.B. Laboratories, WHO, "serve as seeds in the proper soil for development throughout the country."

The establishment of these Centres is not the end itself. It is only a means to the end. And the end is the bringing about a tuberculosis-free population in this country. This requires hard work. The social workers can play a great part in bringing about that millennium. As stated by Dr. S. MAJUMDAR, Special Officer, Tuberculosis Control and Industrial Hygiene, Directorate of Health Services, Government of Bengal, in his thoughtful article on "The Place of the Social worker in Anti-Tuberculosis Campaign in India," "the organisation of social work in India is still in its infancy, partly due to political background of India and partly due to the rapidly changing conditions during recent years. Persons responsible for administration paid very little attention to the solution of social problems and occasionally offered spasmodic patronage only to non-official and missionary organisations engaged on social work". Fortunately conditions are rapidly changing and persons in charge of the administration have begun to take an active and abiding interest in many States in social welfare organisations. These organisations are spreading slowly and steadily, and it should be the aim of the Central organisation to establish branches in every place which has a population of 2,500 or more people. Besides, workers should be trained in this anti-tuberculosis work to be of real service to the community. This would involve additional expenditure which many of the Central organisations may not now be in a position to bear. The Governments, Central and States, must come to their aid. We also understand that the Tuberculosis Association of India proposes to make the Tuberculosis Seals Sale Campaign a regular annual feature for raising funds to carry on its work. Provided the people are made conscious of the great importance and usefulness of the noble task the Association has undertaken, it should not be difficult to raise many times the amount that was collected during the recent campaign. And a portion of the fund thus raised can usefully be set apart for the training of social workers in the anti-tuberculosis campaign. If men and women with vision, flexibility of outlook on life and, above all, with wide sympathy, are selected for this work and well trained for the task, the investment will bring about a steady decline in the cost of treatment and hospitalisation.

Gleanings From Medical Press

SURGERY

Vascular foramina and arterial supply to distal end of femur.—(*J. Bone and Joint Surg.*, Oct. 1950, pp. 867-874).

Dr. Rogers and Dr. Gladstone of the Columbia University, New York, made an anatomical study of the arterial supply to the lower end of the femur and of the foramina through which the arteries and veins pass. They found that osteal branches of the genicular arteries and veins enter all the foramina. Clinically this generous vascular supply explains the lack of ischaemic necrosis after fractures of the lower end of the femur.

Arteries supplying the proximal portion of femur and acetabulum.—(*J. Bone and Joint Surgery*, Oct. 1950, pp. 856-866).

Howe and his co-workers at the University of Rochester were unable to find either in the standard anatomy text-books or in various articles on this subject, a detailed description of the gross relationship and distribution of arteries to the hip region. To obtain this information they dissected out 40 human adult hips by gross anatomical methods. After describing individually the arteries supplying this region, with very good illustrations, they conclude (1) the blood supply to the acetabulum, to the trochanters and to the neck of the femur is abundant and is derived from several arteries; (2) nourishment of the femoral head in the adult is supplied by the foveal and cervical arteries but to a greater degree by capital branches of the medial femoral circumflex artery which course along the neck to enter the femoral head at the articular rim. The vulnerability of these vital arteries explains the high incidence of avascular necrosis of the femoral head.

Ambulatory therapy for thrombophlebitis with rutin and vitamin C.—(Marshall, W., *Amer. Jour. Surgery*, lxxx, 1, 52-56).

Marshall discusses the more modern concepts of etiology and treatment for thrombophlebitis and presents his clinical findings with the use of a rutin preparation and ascorbic acid. He treated with significant success cases of thrombophlebitis by administering two tablets three times a day after food, of a rutin preparation which contained rutin 20 mg. ascorbic acid 150 mg. and calcium citrate 0.25 mg. The results obtained were 'startling' and a severe case responded to this treatment within 3 days; the examination of the previously involved area a month later indicated complete absorption of the thrombosed area and at the time of this report a year later, the patient was quite well. The adequate treatment for thrombotic involvements of varicose veins should include the use of medications which assist the involved areas by repairing the initial damage, e.g., rutin and ascorbic acid. These eliminate the omnipresent induration, swelling and painful areas with discolouration, in a remarkably short period of time. The economic aspect of this therapy is an important factor with each patient, for an early return to his duties is a great and decided advantage. This therapy, adds the author, is not meant to supplement other methods for treating such conditions; it should be considered merely as a therapeutic adjunct to the others.

Complications of anticoagulant therapy.—(*Surgery*, St. Louis, 26, pp. 957-970, 1950).

Lilly and Lee describe five previously unreported deaths and 5 serious post-operative complications which resulted from anticoagulant therapy. These cases came to the attention of the authors without any effort on their part to conduct a special investigation. It is their considered opinion that these five cases, represent only a fraction of the complications which have occurred in their community during recent years. They

stress that reliable laboratory procedures for the estimation of prothrombin levels are not available.

Dicumarol is a hazardous therapeutic agent at best, and may assume the role of a fatal poison. It may cause a sudden, severe and fatal hemorrhage in post-operative patients, even when carefully controlled. *There is no justification* for employing anticoagulant therapy in phlebothrombosis, and thrombophlebitis, limited to the lower extremities below the groin, because venous interruption is a more certain, much safer, quicker and much less expensive method for the control of this condition. The prophylactic use of anticoagulants in post-operative patients is fraught with real dangers. Correct bed posture, properly supervised exercises and adequate rest will accomplish the same results safely and economically.

Streptomycin therapy in tuberculous peritonitis developing in cases of tuberculosis of Fallopian tubes.—(Leonardo, R.A., *Am. J. Surg.*, p. 945, Dec. 1950, Vol. 80, No. 7).

In a few recent cases of tuberculosis of the Fallopian tubes in which a tuberculous peritonitis also developed excellent results were obtained by the use of streptomycin. This antibiotic was injected into the peritoneal cavity, especially after a paracentesis, before removing the trocar—or it may be given parenterally. A few surgeons have even injected streptomycin in the adnexal masses. Many of these cases apparently are completely cured by this antibiotic and many an operation may thus be avoided.

Identification of blood donors with a fluorescent dye.—(*Jour. Lab. Clin. Med.*, 35, 4, 634-637, 1950).

Blood banks are often faced with the problem of donors who offer to give blood at intervals too frequent for their own physical well-being. Persons of this type are found in every group of donors, irrespective of the motives which prompt them to come often for a blood donation. They give false statements, fictitious names and other identifying papers.

Hoyt *et al* of the Hyland Laboratories of California report on a solution to this problem, by marking donors at the time of bleeding with an invisible dye. This dye though truly invisible under ordinary light fluoresces strongly under a long wave ultraviolet illumination. The dye is C.S. 20, and is used as a solution of a fluorescent chemical mixture in an isopropanol and water base. The technique of marking blood-donors involves swabbing of the dye on a selected finger at the junction of the nail with the cuticle where it remains, in spite of daily washings, for 3 weeks, often longer. Applied in the outer-portion of the external ear canal it remains for a considerably longer time. The dye is not irritating.

The donor's hands are examined in a viewing box, so constructed as to cut out extraneous light. The box uses an ultraviolet light type E.H.4: 100 W: high intensity mercury lamp with suitable filters fitted to a circular holder. The dye now used, C.S. 20, is not yet ideal as it cannot always be detected after 3 weeks following application. Search is being made for even more tenacious (harmless) fluorescent dyes and for dyes of colours (other than blue) that will prove satisfactory for skin and nail markings.

Effect of certain steroids on rheumatoid arthritis.—(*Arch. Inst. Cardiol.*, Mexico, 19, 475-612, 1950).

Robles Gil and Gomez Mont report on the results obtained by them in 30 patients with rheumatoid arthritis treated with several substances of a chemical formula resembling steroids elaborated by adrenals. The patients were given a daily intramuscular dose of 100 mg. of pregnenolone for a week followed by daily administration of 300 mg. of the same substance by mouth for one month. The treatment resulted in a disease of joint pain and of local inflammation, increase of movements of the joints and improvement of the general condition in 22 of the 30 patients. Testosterone did not show any beneficial influence in rheumatoid arthritis.

Risks in the use of testosterone in treating breast cancer.—(Leonardo Richard, A., p. 864, *Am. Jour. Surg.*, Dec. 1950).

Twenty patients with advanced cancer of the breast were recently treated with large doses of testosterone: a few were definitely benefited; the rest showed slight improvement, if any at all. In all cases recurrences occurred later. The drug caused increases in the retention of potassium sodium and protein nitrogen, with resultant increase in water retention—a dangerous condition to induce in cardiac patients. Besides, over 200 mg. of this hormone per month (by injections) may cause masculinization. For these reasons, and because either surgical or X-ray castration produces similar results, many authorities now consider that *testosterone therapy should be dispensed with altogether*, in advanced cancers of the breast.

Epistaxis—(L. W. Pratt, M.D., Waterville, Maine, Condensed from the *Journal of the Maine Medical Association*).

Epistaxis, one of the perennial problems encountered by the general practitioner, is most terrifying for the patient, and in many instances presents difficulties for the physician. Fortunately, most nosebleeds stop spontaneously. A little pressure on the alae of the nose and a moderate amount of time are all that are required to stop most cases of bleeding. There is a more persistent group, however, which requires medical attention, and sometimes does not respond readily to therapy. It is this problem with which we are especially concerned.

The major causes of epistaxis are as follows: (1) trauma, physical or chemical; (2) systemic disease, such as hypertension or infectious diseases, blood dyscrasias, or malignant tumours; and (3) local nasal disease.

The most commonly encountered nosebleed is epistaxis digitorum, caused by the repeated or rough application of the fingernail to Kiesselbach's area of the nasal septum. This responds well to the application of pressure to the alar cartilages, to a small tampon of

adrenalin or hydrogen peroxide, or to electrocoagulation.

Bleeding is a common sequel of nasal fracture. This may originate anywhere within the nose or paranasal sinuses. It is generally easy to control by pressure or packing. Many stop spontaneously. In any case of nasal fracture, as in any case of head injury, reduction of the fracture should be deferred until it has been definitely established that there is no cerebrospinal rhinorrhea or intracranial injury.

Chemical trauma produces an ulceration of the nasal mucosa over the cartilaginous septum which is best treated by removal of the patient from the atmosphere of chemical irritation, and by mild applications to the ulcer.

The bleeding produced by systemic disease is usually the most difficult to control. That of hypertension is likely to involve any area of the nasal membrane, but frequently affects the vessels in the posterior nares or in the nasopharynx. The difficulty in these instances is in locating accurately the bleeding point. It is purely a mechanical problem of reaching far back into the nose and packing or electrocoagulating the point of bleeding.

Nasal hemorrhage due to blood dyscrasias is also difficult to control, as the vascularity of the entire nasal mucosa is involved. Any local manipulation is likely to result in more bleeding. This type of epistaxis is often best left alone if the severity of the bleeding is not too great.

Infectious diseases, especially the granulomatous types, may produce ulcerative lesions of the nasal membrane. These may be controlled temporarily by cauterization, and permanently cured by correction of the underlying disease wherever possible.

The common cold, or tumors of the nose, nasopharynx or paranasal sinuses, may produce nosebleed. These bleeding episodes are best controlled by electrocoagulation, and by treatment of the tumour when present. If, however, the bleeding originates within a sinus, local treatment of the nose is of no help. The procedures of choice are either opening of the sinus cavity and

packing, or electrocoagulating the bleeding area.

Packing the nose is a procedure which should not be undertaken without due consideration of the possible complications. It is often difficult to pack a nose satisfactorily. It is uncomfortable to the patient to have it packed for a day or two, and it is unpleasant to have the packing removed. A more grave situation, however, is the likelihood of complications arising from this procedure. Blood may be forced into the sinuses or middle ears, and unless the patient is fortunate and the packing is changed at least every 24 hours, suppuration of either of the sinuses or the

middle ears may supervene. Removal of the pack frequently starts the hemorrhage again.

These complications are obviated in most cases by electrocoagulation of the bleeding point. This is a simple procedure which eliminates the necessity of packing. The technic of electrocoagulation is first to anesthetize the area with topical anesthesia. The area is coagulated by application of the bipolar electric current with a long slim electrode, insulated throughout its length except for the tip. The current is applied while the area is under direct visualization of the operator. —*Digest of Treatment*, Oct. 1950.

OPHTHALMOLOGY

Treatment of trachoma.—(*Br. Jour. Ophthalmol.*, 34, 30, 1950).

Duke-Elder and his co-workers report a series of 8 cases of trachoma treated by one drop of aureomycin at 3 or 4 hourly intervals for ten days with very good results. Though this series is too small to warrant a final conclusion the therapeutic results are such that the authors express the opinion that "aureomycin will cure the disease in an incredibly short time". The optimum dose and mode of administration are not yet settled but certainly in the 8 cases satisfactory results followed the simple and economic routine of one drop at four hourly intervals. The response was not more rapid in 2 patients treated with three hourly drops. [Aureomycin eye-ointment is now available in collapsible tubes and are very convenient to use at short intervals].

In the *Br. Jour. Ophthalmol.*, 29, 98, Sorsby advocated sulphonamide therapy: (1) If secondary infection is present

eliminate it by oral administration of a sulphonamide. Sulphamezathine in an initial dose of 2 g. for an adult with a maintenance dose of 1 g. at 6 hourly intervals for seven days. If sulphamerazine is used 8 hourly intervals will do. (2) If many follicles are present they should be expressed mechanically. (3) If there are no follicles, or after they have been expressed daily painting of the affected palpebral conjunctiva with Sodi. Sulphacetamide 30 per cent should be carried out for 6 to 12 weeks. Sulphacetamide ointment 6 per cent in a suitable base should be instilled thrice daily into conjunctival sac. There is no need to use any other reagent apart from sulphonamides locally except atropine where the corneal condition calls for it: where there is much pannus, daily massage with a clean glass rod over the affected cornea is helpful. [Aureomycin appears therefore to be more rapid and active in its action than sulphonamides which represented a great advance over previous therapeutic agents.]

PÆDIATRICS

Management of the premature baby.—(Refresher course for General Practitioners' Series). Dr. Alan Moncrieff, M.D., F.R.C.P., Nuffield Professor of Child Health, in the University of London, (*Br. Med. Jour.*, 12-11-'49).

Although figures in connection with prognosis are somewhat contradictory, the position can be summed up by saying that except for a slightly increased risk of cerebral trauma at birth the prematurely born infant has as good a

chance as any other baby of growing into a normal and useful citizen.

Details of management discussed here are deliberately planned for what may have to be carried out in the patient's home. Some think that this is a better place for premature babies than a hospital; others believe that the hospital can offer facilities and apparatus far superior to those available in a house.

General management.—If premature labour has set in and a small baby is expected certain preliminary steps can be taken. It is wise to give the mother a dose of vitamin K. A cot or a basket should be prepared with lined sides to prevent draughts. If time permits an oxygen cylinder should be obtained, with a close-fitting rubber mask or a nasal catheter for administration.

After the baby is born it should be wrapped in a warm towel, and placed head downwards in the cot or basket, which should be suitably tilted. Gentle wiping out of the mouth and gentle aspiration with a rubber catheter will make sure that the air passages are clear. If available, oxygen may be administered for a short period to produce a good saturation of the arterial blood. If respiration is feeble carbon dioxide from a "sparklet" apparatus may be used, or some device improvised to secure a degree of rebreathing.

The room in which the baby is to be nursed must be kept warm—70 F to 75 F (21 to 24 °C) is ideal—in addition to the careful use of hot-water bottles in the cot or the employment of an electric blanket pad (which can be hired in some areas). The aim is to keep the baby's rectal temperature not below about 98 F. (36.7 °C), but this is sometimes not achieved for a few days. The temperature should certainly be taken and recorded four-hourly.

When the baby has recovered from the initial shock and is breathing well and a good colour, the nurse may give it a gentle cleansing. This is most efficiently accomplished as a modified blanket bath with soap and water and a soft flannel, exposing only a small portion of the skin at a time. Drying should be carried out by gentle dabbing

with a warm, soft towel, followed by a suitable baby powder (olive oil is messy, an inefficient cleaning agent and not always sterile). The normal procedures for care of the eyes and cord should be carried out. Napkins can be applied, and the baby dressed in a gamgee jacket, boots, gloves and a bonnet, leaving only the face exposed. The bedclothes must not be too heavy. (Before this dressing-up, however, the weight should be obtained if the baby's condition permits, for it is a most valuable base-line from which to judge subsequent progress). The infant should be left in its cot and disturbed as little as possible, except to be moved from one side to the other from time to time to promote full expansion of the lungs. Oxygen may still be required at intervals if the colour does not remain good.

All these measures are necessary at first, but from the start the programme of management must be designed to speed up the process of maturation.

Feeding.—Methods.—Most premature infants are too weak at first to suck at the breast, so that easier methods must be tried in order to decrease strain of the baby, after breast-feeding. These are: sucking at an ordinary bottle; the use of a Breck feeder (a small bottle with a rubber nozzle at the end opposite the teat, like the old-fashioned fountain-pen filler, by which positive pressure can be exerted); a spoon or pipette to drop the feed into the mouth; or tube-feeding by a catheter passed down the oesophagus through either the nose or mouth.

The first thing to establish after the baby is born is whether or not he can swallow. A little sterile water from a spoon can be tried. If there is no swallowing reflex, tube-feeding will clearly be necessary. If the baby can swallow, the next thing to ascertain is whether or not sucking can be carried out. If sucking proves possible a Breck feeder is the simplest apparatus; if not, a spoon or tube should be used according to the ability to swallow. The experienced nurse can soon determine a way of mixing the methods of feeding—one or two tube feeds and the rest by spoon, or starting the feed with a bottle

and finishing with a spoon when the baby gets tired of sucking. Here, too, progress must be made and each day should see an attempt to take the baby a stage up the scale—tube, spoon, bottle with the object of getting him to the breast.

Feeds:—Breast milk is the safest and the most easily digested food. All premature babies should receive it at first even if it cannot always be continued. For the first 24 hours sterile water in small sips should be used, and during this period efforts to secure a supply of breast milk can be made. Only a few ounces a day will be required at first and should be obtainable without much difficulty from any nursing mother or from a maternity unit. It should be boiled and diluted to one-fourth strength for the very small babies and to one-half strength for the medium and larger-sized babies. Meanwhile the baby's own mother's supply of colostrum and milk should be obtained by manual expression.

By the end of a week or 10 days the breast milk can be given undiluted. If a supply proves impossible to obtain and no more can be got from the baby's own mother an alternative has reluctantly to be used. To avoid subsequent changes a choice should be made of a dried milk, either one of the so-called humanized varieties or a half-cream brand.

Times of feeding:—Quantities and intervals of feeding are related. It must be remembered that small babies require relatively more food than full-term infants. If the basis for a 7 lbs. (3 kg.) baby is $2\frac{1}{2}$ oz. of breast milk per pound (150 ml. per kg.) body weight per day, then the smaller infant may require as much as 3, $3\frac{1}{2}$ or even 4 oz. per pound before a steady weight gain is achieved. But, as with normal babies, such a full feed programme should not be attained too quickly. If the largest feed, in volume, is achieved by the seventh or tenth day, this is usually safe. If dried cow's milk is being used progress should be slower and for the smallest babies the full size (and strength) not reached until a little later. With the smallest infants this

will usually mean beginning with feeds of 30 to 60 minims (1.8–3.5 ml.) every hour by day and two-hourly by night. Gradually this is increased to 1.2 oz. two-hourly by day and three-hourly by night, until 1 oz. is taken every three hours round the clock. If the mother's breast milk supply has been established the infant may be tried at the breast at least once a day if over 4 lb. (2 kg.) in weight at birth, or when this weight is achieved.

Whatever the feed a start should be made with vitamin supplements when the infant is a month old. Vitamin C, as ascorbic acid, in 25 mg. daily dosage, can safely be given before this. Vitamins A and D are best given as a vitamin concentrate to allow 1000 to 2000 units of vitamin D daily, and such dosage—twice the requirements for a full-term baby—should be continued throughout the first year. Iron is also best administered early, say at two to three months and given in Mackay's mixture in a dosage of 1 gr. (65. mg) three times a day.

Two other medicaments are also worthy of mention. Some paediatricians give all babies vitamin K after birth to prevent hypoprothrombinæmia, and, as already suggested above, if premature labour is anticipated this vitamin can be given to the mother also. Thyroid extract has a useful part to play. If the baby is particularly sluggish and difficult to rouse and has a sub-normal temperature, the metabolism can certainly be stimulated by giving the equivalent of 1–10 gr. of thyroid extract per pound (14.4 mg. per kg.) body weight daily. This should generally be administered for a few days only, after which the increased food intake will itself stimulate metabolism.

Thyroid extract is the only safe stimulant for the premature baby. Brandy appears to be used fairly frequently, but it is irritating to the stomach and intestines and if given in stimulating dosage may produce a dangerous gastro-enteritis. If the baby is kept adequately warm and gently handled brandy should be unnecessary. If anybody needs it, perhaps the doctor and nurse should be considered.

Hæmolytic disease of the newborn.—(*Jour. Lab. Clin. Medicine*, 35, pp. 24–28, 1950).

Lucia and Hunt of the Blood Grouping Laboratory, University of California Medical School, examined 25,416 blood specimens for blood grouping and Rh estimation. 11,649 of these were from obstetric patients. The data were tabulated according to Rh and ABO blood groups. Since there is evidence to indicate that ABO compatibility between mother and child may influence the intensity of Rh immunization, the data were also grouped for this factor according to the Rh characteristic of the mother. Classifications were also made on the bases of (1) the incidence of ABO blood groups; (2) incidence of primigravid and multigravid women; and (3) incidence of hæmolytic disease in the newborn.

The results of the observations have been thus summarised:

(1) The pregnancies of ABO blood groups in the Rh positive and Rh nega-

tive populations of the obstetric sample varied slightly and insignificantly.

(2) There is no relationship between the incidence of Rh positive and Rh negative types and ABO blood groups.

(3) The numbers of the primigravid and multigravid women in this series were found to be approximately equal.

(4) The incidence of the ABO blood group compatibility between the mother and child was found to be 100 per cent among mothers of group AB. ABO compatibility was found to be present in 93% of group A mothers.

(5) Of a total group of Rh negative women only 4.3% bore infants which suffered from hæmolytic disease of the newborn.

(6) Of the group of Rh negative women who showed ante-partum sensitization, 45.4% bore infants who were afflicted with hæmolytic disease of the newborn. 50% of the affected infants died of the disease.

OBSTETRICS AND GYNÆCOLOGY

Fœtal mortality in post-maturity.—(*J. Obst. Gynaec. of Br. Emp.*, 56, pp. 386–393).

McKiddie states that if post-maturity itself could cause fœtal death before the onset of labour, then it might be assumed that it could also weaken the fœtus, thus predisposing to fœtal distress or death during the course of labour. To discover how often fœtal death might be attributed to post-maturity the records of all cases at the Aberdeen Maternity Hospital were examined for the years 1940 to 1944 and for 1946. In this series prolongation of pregnancy was the sole criterion of post-maturity. Births were regarded as premature if labour took place more than 7 days before the expected date of delivery; full term seven days before to 7 days after the expected date of delivery; post-mature, more than 7 days beyond the expected date of delivery. If dates were doubtful as was the case in 1211 of a total of 8014 deliveries, the deliveries were excluded from this study. Of the remaining 6803 deli-

veries 1795 were premature, 3306 (nearly half) were full term and 1642 post-mature. Reviewing experimental physiological work the author finds that in post-maturity the fœtus increases in size as it becomes post-mature; oxygen saturation of the circulating fœtal blood gradually diminishes and at term the efficiency of the maternal uterine circulation becomes impaired.

Although compensatory fœtal mechanisms exist, these are not adequate in the large post-mature fœtus to counter-balance the impaired maternal circulation. This is shown by the diminution of oxygen saturation in the blood of the post-mature fœtus. Prolonged exposure to such conditions would lead to fœtal asphyxia in utero. Analysis of cases in the Aberdeen Maternity Hospital suggests that the proportion of still-births is higher in post-mature infants than in infants at term; the percentage of still-births rises with the degree of post-maturity; the unexplained still-birth figure rises with the degree of

post-maturity; foetal distress is more common in post-mature babies and seems to be related to the degree of prematurity.

Progesterone and anhydrohydroxy progesterone compared.—(*Jour. Lab. Clin. Med.*, 35, 2, pp. 265-270, 1950).

An effective orally administered progestational hormone has long been sought. It is widely believed that orally administered progesterone is rendered biologically inert. No controlled study had however been made in human beings to support this widely held concept. Dorfman *et al* (*Endocrinology*, 42, 77-80, 1948) showed in 1948 that orally given progesterone is followed by excretion of appreciable amounts of pregnandiol in the urine.

Bickers tested the hormones on 2 groups of patients and found (1) Progesterone administered orally to the human being is biologically active in a dose of 120 mg. daily over a period of 5 days when administered after a preliminary priming of the endometrium with mixed natural oestrogen in a dose of 4000 I. U. every day for 20 days. A progestational response of varying degree can be induced in patients who have had a bilateral oophorectomy or who have amenorrhoea secondary to functional ovarian failure. The endometrial response may be that of a fully developed progestational endometrium. In most cases there is a marked invagination of the glandular epithelium, basal migration of the epithelial cell nuclei, abundant secretion in the lumen of the glands and a tendency toward decidua-like change in the stroma.

(2) Anhydrohydroxy progesterone is an effective progestational hormone in a dose of 120 mg. daily for 5 days at the end of a 20 day period of oestrogen priming. Its effect on the endometrium is however slightly inferior to progesterone. Secretion in the gland lumen, and tendency toward decidua-like cell formation in the stroma are absent.

Diethylstilbestrol in nausea and vomiting of pregnancy.—A preliminary report.—(M. H. Bertling and John C. Burwell, Greensboro, N. C.

Am. J. Obst. & Gynec., 59, 461-62, Feb. 1950).

Beginning on October 23, 1948, stilbestrol therapy was instituted in those prenatal patients in our practice who complained of nausea and/or vomiting of pregnancy. No other supportive measures were employed in order that the drug might stand or fall, as far as possible, on its own merits. Complaints were unsolicited, but when the patient volunteered the presence of nausea as a factor in discomfort, therapy was instituted. Five milligrams of diethylstilbestrol orally each day were administered without any attempts at psychotherapy or other supportive measures. This dosage is sufficient quite frequently to initiate nausea in the nongravid female.

Thirty-one patients received this medication, 18 primigravidas and 13 multigravidas. Treatment was instituted at the time of the first complaint, in this series ranging from the eighth week through the fifteenth week, one-half being started from the ninth through the eleventh week of gravidity. Results appeared in the vast majority by the end of the first week of therapy. Twenty-two patients, or 70 per cent, obtained complete relief and were classed as cures. Eight patients, or 26 per cent, showed marked improvement and no longer complained of discomfort. One patient out of the 31 failed to show any definite beneficial response.—*Obstetrics and Gynecology*.

Anovulatory menstruation and sterility.—(*Br. Med. Jour.*, 6-5-1950, p. 1093).

In answer to a question "how should one treat anovulatory menstruation in a case of infertility in which all possible local causes have been excluded?", the following notes are furnished by the *Br. Med. Journal*. Various methods, hormonal and radiotherapeutic, are used in an attempt to produce ovulation but the results have been variable. This is particularly true of women who are having regular uterine bleeding. Two alternative lines of hormone therapy appear to offer the best hope in such cases.

(a) Ten intramuscular injections of

500 international units serum gonadotropin (F.S.H.) every day, followed by ten intramuscular injections of chorionic gonadotropin (L.H.) one every day. This 20 day course is started on the 3rd or 4th day of the cycle, the first day of a period being counted from, and should not be given during more than 2 successive cycles. If it occurs at all, ovulation is most likely on the first or second day after the change over from one preparation (F.S.H.) to the other (L.H.). Coitus should be timed accordingly.

(b) *Stilbestrol* 1 mg. thrice a day by mouth on the eleventh, twelfth and thirteenth days of a 28 day cycle might "shock" the pituitary into releasing the luteinizing factor necessary for precipitating ovulation.

The problem of abnormal uterine bleeding.—(Joseph Rogers, Tufts College Medical School, Boston, Mass. *Bull. New England M. Center*, 12, 71-79, April 1950).

The purpose of this paper is to present a proposed classification of abnormal uterine bleeding based on etiologic mechanisms. It contains a report of the observations of a projected five-years study of women with a complaint of abnormal menstruations.

There were 267 cases of abnormal uterine bleeding representing 42 per cent. of the total of 639 admissions to the gynecologic ward for the year reported.

The cases were classified according to the following etiologic mechanisms of bleeding: functional, mechanical, pregnancy, vascular, and miscellaneous. The cases of functional bleeding were divided into three groups according to the state of the endometrium, i.e., secretory, proliferative or atrophic. The cases listed under mechanical causes included bleeding associated with benign lesions of the cervix, fibroids, polyps, and malignant growths of cervix and uterus. In the third class the accidents of pregnancy included patients with ectopic gestations and spontaneous and induced abortions. The fourth class consisted of patients with uterine bleeding as a symptom of generalized vascular disorder. In the fifth class were grouped those patients whose bleeding was associated with pelvic inflammation, disorders of thyroid function, endometriosis, and those for whom no accurate cause of the bleeding could be demonstrated.

Follow-up studies were conducted in the first and fifth groups. From the basis of the present experience, bleeding from functional causes was, in the great majority of instances, not sufficient to warrant radical surgery. In this group justifiable hysterectomy must usually be dictated by other indications. The problem of accurately determining the cause of abnormal uterine bleeding is discussed. It is hoped that such an etiologic classification will aid in the understanding of the mechanism of uterine bleeding.

—*Obstetrics and Gynecology*.

MEDICINE AND THERAPEUTICS

Incompatibility of vitamin B₁₂ and ascorbic acid.—(*Jour. Am. Pharm. Assoc.*, 39, p. 361, 1950).—Trenner and co-workers have carried out investigations on the report (previously made by one of them) of the incompatibility of vitamin B₁₂—Ascorbic acid mixtures. A number of additional facts have been gathered, which are of great practical significance. Kacza Wolf and Folkers (*J. Am. Chem. Soc.*, 71, p. 1515, 1949) described a second biologically active chemically distinct analogue of vitamin B₁₂ which they named vitamin B_{12a}. This and other possible analogues appear

to have considerable significance in connection with the compatibility of certain B₁₂ concentrates and ascorbic acid. Trenner *et al* have found that aqueous solutions of highly purified crystalline vitamin B₁₂ preparations showed a much higher degree of stability in the presence of pure ascorbic acid than previously reported. Thus aqueous solutions containing 20 micrograms of pure vitamin B₁₂ per c.c. and about 20 mg. of pure ascorbic acid per c.c. were found to lose about 1.5% of their vitamin B₁₂ content per day when stored at room temperature. The pH of such solutions

were found to be between 2.5 and 3.0. Vitamin B₁₂a, on the other hand, tested under the same conditions, showed almost complete loss of colour and activity in one day or less.

The examination of a number of commercial vitamin B₁₂ preparations for ascorbic acid compatibility revealed that they covered the whole range of compatibilities from complete loss of activity, through partial loss, to practically complete stability after 48 hour test periods. The authors interpret such results as evidence of the presence in varying amounts of ascorbic acid-incompatible analogues of vitamin B₁₂ in some commercial preparations.

Acute anthisan poisoning—Report of fatal cases.—(Br. Med. Jour., 13.5.1950).

Dr. M. Tobias reported the death of a child 21 months' old from accidental swallowing of six 100 mg. tablets of anthisan (B. M. J., 1, iii, 1950). Rives *et al* reported a similar occurrence in a child of 16 months who swallowed tablets of methapyrene hydrochloride. Miller and Pedley described a third accident, again in a child of 16 months.

On June 26, 1949, a healthy female child aged 16 months who was on holiday with her parents at a seaside resort was found in her cot at about 10 a.m. playing with a box of anthisan tablets, which she had reached from a bedside cabinet. Her hands, lips and tongue were stained green from the tablets which she had been sucking. Her general condition was not affected and she continued to play. The tablets contained 0.1 g of anthisan. The actual number taken was unknown but probably was not more than six. As the child appeared normal the mother took her out on the promenade from 10–15 a.m. till noon when she was returned to her cot in the hotel. About 12.30 p.m. the child's condition had changed; she was moaning, was unconscious, had muscular twitchings and a profuse catarrhal discharge was foaming at the mouth and nose and had convulsions. She was taken to the local hospital where she was found to be dead. Death had occurred about 3 hours after eating the tablets.

The post-mortem findings at necropsy clearly showed acute poisoning due to mepyrmine maleate.

The use of antibiotics.—(Jour. Am. Med. Assoc., 1-10-49, pp. 315-317).

The problem of the proper antibiotics to use in the treatment of infectious diseases was comparatively simple till recently and the choice lay between penicillin and streptomycin or both. During the past year, however, the appearance of aureomycin and chloromycetin, which possess wide and effective ranges of action, has made the problem of choosing the most effective of the four somewhat difficult to the practitioner. Drs. Long, Chandler, Bliss, Bryer and Schœnbach of the Johns Hopkins University School of Medicine have assessed the current information concerning the choice of antibiotics and proposed adequate dosage schedules. They have also discussed the toxic reactions that may occur when these agents are used in the treatment of infectious diseases.

The four questions which arise in selecting the drug are:—

- (1) Which antibiotic will be most effective?
- (2) What is the relative toxicity of the agent in the dosage prescribed?
- (3) With what ease can the compound be administered?
- (4) What will the cost of the antibiotic or the auxiliary costs of its administration be to the patient?

All these are important but the last two are very much more to the point in these days of high costs. When, however, a life is at stake, neither the patient nor the doctor should count the cost. The authors have made out 5 tabular statements which are extremely simple, but furnish most valuable information for the general busy practitioner. These tables are given below for prompt reference in daily practice:—

Tables I, II and III present in general terms the antibiotics of choice for the treatment of infections of average severity. In Table IV, the dosage schedules of aureomycin and chloromycetin used at present for children are

outlined and Table V outlines their dosage for adult patients. These recommendations, are necessarily tentative, particularly because information regarding the comparative values of aureomycin and chloromycetin, when used therapeutically against some infections, is still scanty.

TABLE I.—Present day use of Antibiotics in Infections.

Type of Infection or Disease	Penicillin G	Streptomycin	Aureomycin	Chloromycetin
1. Group A beta haemolytic streptococcal	1	3	2	—
2. Alpha haemolytic streptococcal	1	2	2	—
3. Faecal streptococcal	2	—	1	—
4. Pneumococcal	1	3	2	—
5. Gonococcal	1	2	3	3
6. Meningococcal	1	—	U	U
7. Mild staphylococcal (or moderate)	1	—	2	—
Severe staphylococcal	1*	—	2*	—
8. Acute Brucellosis	—	—	1	1
9. Whooping cough	—	?	?	U
10. Tularemia	—	2	1	U
11. Typhoid	—	—	2	1
12. Moderate Infl: meningitis	—	—	1	U
Severe Infl: meningitis	—	2 + S. D.	1 + S. D.	U

Key:—(1) Indicates first choice; (2) second choice; and (3) third choice. A blank signifies that the antibiotic is of little or no value. ? = Doubtful. U = Effect unknown. S. D. = Sulphadiazine.

* Combined therapy is used with advantage.

TABLE II.—Present day use of Antibiotics in Infections.

Type of Infection or Disease	Penicillin G	Streptomycin	Aureomycin	Chloromycetin
1. Urinary Tract Infections:—				
(a) Escheria coli	—	2	1	1
(b) Aerobacter aerogenes	—	2	1	1
(c) Proteus vulgaris	—	2	—	1
(d) Pseudomonas aeruginosa	—	1	—	2
(e) Faecal streptococci	2	—	—	—
2. Tuberculosis	—	1	U	U
3. Chancroid	—	1	1	U
4. Friedlander bacillus infections	—	1	U	U
5. Food poisoning—Salmonella infections	—	—	?	?
6. Bacillary dysentery	—	—	U	U
7. Plague	—	1	U	U
8. Subacute bacterial endocarditis:—				
(a) Alpha streptococci	1	—	2	—
(b) Strepto. faecalis gr. 1	1*	1*	1*	—
(c) Staphylococci	1*	—	2*	—
(d) Gram-negative bacilli	—	1*	1*	1*
9. Trachoma	1	U	U	U
10. Surgical condition of bowel (Pre-and post-operative).	—	1 + SS	U	U
11. Pulmonary conditions (Pre-and post-operative).	1	1	U	U

Key:—(1) Indicates first choice; (2) second choice; and (3) third choice. A blank signifies that the antibiotic is of no value. ? = Doubtful. U = Effect unknown. S. S. = Succinyl Sulphathiazole.

* Combined therapy is used.

TABLE III.—Present day use of Antibiotics in Infections.

Type of Infection or Disease	Penicillin G	Strepto- mycin	Aureo- mycin	Chloro- mycetin
1. Rickettsial disease	—	—	1	1
2. Primary atypical pneumonias	—	—	1	1
3. Psittacosis	2	—	1	U
4. Lymphogranuloma venereum	2	—	1	U
5. Anthrax	1 + S.D.	—	1	U
6. Syphilis	1	—	U	U
7. Yaws	1	—	U	U
8. Granuloma inguinale	—	—	U	U
9. Rat-bite fever:—	—	1	1	U
(a) <i>Spirillum minus</i>	—	—	—	—
(b) <i>Streptobacillus moniliformis</i>	2	—	1	U
10. Gas gangrene	—	—	—	—
11. Influenza	1 + S.D.	—	U	U
12. Common cold	—	—	—	—
13. Rheumatic fever (prophylaxis only)	1 or S.D.	—	—	—

Key:—Same as for Table I.

TABLE IV.—Dosage Schedules of Aureomycin and Chloromycetin for Children

Severity of illness	AUREOMYCIN		CHLOROMYCETIN	
	Initial priming dose in mg. per kg. of body weight	Total daily maintenance dose in mg. per kg. of body weight	Initial priming dose in mg. per kg. of body weight	Total daily maintenance dose in mg. per kg. of body weight
Moderate	Oral* 10	Oral† 25 to 50	Oral* 60	Oral† 30 to 60
Severe	Oral* 20 Intravenous‡ 5	Oral† 100 Intravenous‡ 15	Oral 60	Oral 60-120

* The oral priming dose should be split into three parts and given at hourly intervals for 3 doses.

† The oral maintenance dose should be split into 6 parts and one part given every 4 hours.

‡ The intravenous priming dose should be given in one dose.

§ The intravenous maintenance dose should be split into 3 parts and one should be administered every 8 hours.

TABLE V.—Dosage Schedules of Aureomycin and Chloromycetin for Adults

Severity of illness	AUREOMYCIN		CHLOROMYCETIN	
	Initial priming dose: mg. per kg. of body weight	Total daily maintenance dose: mg. per kg. of body weight	Initial priming dose: mg. per kg. of body weight	Total daily maintenance dose: mg. per kg. of body weight
Moderate	Oral* 10	Oral† 30	Oral* 60	Oral† 30 to 60
Severe	Oral* 15 Intravenous‡ 5	Oral† 50-60 Intravenous‡ 15	Oral 60	Oral 60 to 120

* The oral priming dose should be split into three parts and given at hourly intervals for 3 doses.

† The oral maintenance dose to be split into 6 parts and one part given every 4 hours.

‡ The intravenous priming dose to be given in one dose.

§ The intravenous maintenance dose to be split into 3 parts and one to be given every 8 hours.

Prognostic significance of idiopathic pleural effusion.—(Falk, A., *Diseases of Chest*, 18, 6, 542-561, Dec. 1950).

The role of the so-called "idiopathic" pleural effusion as an important early manifestation of tuberculous infection is not readily recognized by many physicians who thus lose an opportunity for control of the tuberculous process in its initial phase. Pleural effusions occur as complications in the bacterial or viral pneumonitides, rheumatic fever, invasion of the pleura by neoplastic tissue, lymphoma, congestive heart failure, renal disease and tuberculosis. The incidence of patients with idiopathic pleural effusion reaches its peak at about age 20 and the majority are age 30 or under. A recent study of 1365 cases noted a peak incidence at 16 in males and a wider distribution at 17 to 22 in females. Males predominate in the adolescent and adult groups. The frequency of pleural effusion as a manifestation of tuberculosis in the age group cited has been considered by many to be a reaction subsequent to the development of tuberculin sensitivity during a primary tuberculous infection. The signs and symptoms of post-primary pleural effusion are variable in their onset, severity findings and duration. As much as 400 cc. of fluid may be present in the pleural space and not demonstrable by usual antero-posterior chest film but lateral decubitus films may reveal even small quantities of fluid. The tuberculin skin test is almost invariably positive in primary pleural effusion, usually to a fresh preparation of first strength P.P.D. or 1:1000 O.T. The E.S.R. is usually increased and falls to normal values with the subsidence of the clinical signs and the effusion; but it is most important that this early return of E.S.R. to normal values should not be considered an evidence of complete subsidence of the tuberculous process and an indication to permit the patient to resume activity. The pleural fluid should be submitted for bacteriological study and although only 35% positive results are reported by the most careful investigators a negative finding is not evidence of the absence of a tuberculous process.

The pleural fluid sugar content has recently been found to be a diagnostic aid in the tuberculous aetiology of a pleural effusion (*Dis. Chest.*, 15, 325, 1949). Values below 30 mg. per 100 cc. were considered diagnostic of a tuberculous aetiology based on cases with fluid which later proved to be tuberculous. Values between 30 and 60 mg. per 100 cc. were considered presumptive evidence and those above 60 mg. per 100 cc. as *nontuberculous* in origin.

TREATMENT:—May be divided into 2 categories, (a) that of the acute period with the problem of the effusion and (b) that following the acute period directed toward control of the underlying process. Any course of treatment must have as its basis the recognition of these effusions as a manifestation of frank, active and early tuberculosis. The acute phase of the illness with its fever, chest pain and development of fluid is best treated symptomatically. The pain usually subsides rapidly as fluid forms. The removal of the accumulated fluid in the pleural space has been a problem which has been approached in several ways depending on frequency and quantity aspirated. It is possible that even short delays in evacuating fluid, (in the hope of letting it get absorbed) may produce chronic thickening of the pleural membranes and spontaneous coagulation of the exudate, with great impairment of the pulmonary function. Anti-coagulants such as sodium citrate and heparin have been injected into the pleural space to prevent coagulation of fluid and deposition of fibrin but this has not been successful in most cases. The residual damage to the lung ventilatory function occurring from fibrin deposition, is a real grave danger.

The use of antibiotics like penicillin and aureomycin during the acute phase of a primary pleural effusion has no effect. Intrapleural instillation of penicillin is also of no value and some feel this increases the effusion and fibrin deposition. Streptomycin has been suggested in the treatment of pleural effusion of either suspected or proved tuberculous bacteriologic identity. This is not sound procedure as it may lead to emergence of resistant tubercle bacilli. P.A.S.

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is, however, an agent of value in treating patients with extensive bilateral effusions, continued fever, toxicity. Very favourable response has been reported to such therapy (*Minutes of 8th U.S. Veteran Adminis. Conference, 1949*). The use of streptomycin intrapleurally in primary pleural effusion is of no value, though it may be tried in selected cases of post-primary pleural effusions, which have not responded to other treatment. The primary or idiopathic pleural effusion is not infrequently followed by tuberculosis, of the reinfection type. 15% of cases of pulmonary tuberculosis have had a previous pleurisy with effusion, and numerous reports in literature show the incidence of pulmonary tuberculosis following idiopathic pleural effusion to range from 17 to 50%. An analysis of the reports shows that the greatest incidence usually occurred within the first year following the pleural effusion.

The conclusion is inescapable that the practising physician stands thus in a most important position with regard to the recognition and adequate treatment of the patient with pleural effusion. Control of the effusion by adequate and timely aspiration is essential to avoid pleural changes and subsequent impairment of pulmonary ventilatory function as an added complication.

Combined anti-amœbic and anti-bacterial treatment of intestinal amœbiasis.—(*Am. Practitioner*, Sept. 1950, Vol. 1, No. 9, pp. 960-965).

The factor of bacterial infection plays an important role in amœbic dysentery; control of both infections, the amœbic and bacterial, by means of the 'synergistic' action of two drugs was tried with significant success by Dr. Seneca of New York and Dr. Henderson of Bloomfield. Their studies which were started in the Middle East in 1947, comprised 43 cases of whom 33 alone were followed up for a sufficiently long time. Amœbiasis was diagnosed by identification of *E. histolytica* in stools. Repeated stool examinations were done

during and following the course of treatment. These patients were observed for 3 to 24 months.

Chiniofon (anti-amœbic drug), and Thalamyd (bactericidal drug) were the drugs used. As soon as the laboratory diagnosis of amœbiasis was made, the patient was given 3 tablets of Chiniofon (0.25 gm.) and three tablets of Thalamyd (0.5 gm.) three times a day after food. Treatment was continued for 10 days followed by a week of rest. Most patients developed frequent bowel movements when the 2 compounds are given at the same time. So the drugs were used separately. The treatment is to begin with Chiniofon for a week or ten days followed by Thalamyd for 7 to 10 days. These 2 drugs are used alternately for 3 to 4 months during which period the patient becomes symptom-free, puts on weight, the appetite increases, and amœbæ disappear from stools. Since most of these patients have a secondary macrocytic hypochromic anemia a supplement of iron and vitamins is usually given orally.

In the 33 cases thus treated and followed up, the combined use of Chiniofon and thalamyd effected clinical and laboratory cures in 32 cases.

Two new drugs for amœbiasis.—(*Am. Pract.*, Sep. 1950, 966-968).

Chronic amœbiasis is difficult to eradicate. In a paper presented to the Annual meeting of the American Society of Tropical Medicine, at Memphis, Dr. W. H. Shlaes and his co-workers of the Cook County Hospital, Chicago, (Illinois), report very favourable results on the combined use of a soluble iodine compound—ethyl-diiodo-cinnamic acid (Schering) and an insoluble iodine drug—diiodo-hydro-methyl-stibasol (Schering). The two drugs were administered in doses of one and a half grammes each daily for 10 to 14 days; then stopped for a week or two and repeated for 10 to 14 days. Favourable results were obtained in 80% in a series of 54 cases, treated and followed up for 6 months.

Corrigendum

With reference to the advertisement of Messrs. Brahmachari Research Institute which was published in page 15 of the May '51 issue of the 'Antiseptic', the address should be "82-3, Cornwallis Street, Calcutta-4" instead of "2-3, Cornwallis Street, Calcutta".



"Vitamin B₁₂ per unit of weight, is the most effective antianemic substance known." C. SPENCER ET AL., *J. Am. Med. Ass.*, 122:1001, 1949

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SQUIBB vitamin B₁₂ concentrate

now in plentiful supply

- ▶ essentially painless, protein-free aqueous solution
- ▶ approximately the same cost as Liver Extract

1 cc. ampuls, each ampul containing 15 micrograms of vitamin B₁₂. Boxes of 5.

Dosage for 15 microgram RUBRAMIN is the same as that for 15 unit Liver Extract.

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Manufacturers and Distributors of
Squibb Products in India.

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BRAND

**Folic acid with Liver
and
Vitamin B - Complex**

Each tablet contains :

Folic Acid Conc.	..	5	M. Gms.
Vit. B ₁	..	5	"
Vit. B ₂	..	1	M. Gm.
Vit. B ₆	..	0.2	"
Nicotinic Acid	..	20	M. Gms.
Liver Conc.	..	45	"

**Indicated in all types of
Macrocytic anaemia,
Vit. B Deficiency and Sprue.**

Procurable everywhere from all the leading Chemists or apply to Manufacturers

Navaratna Pharmaceutical Laboratories,
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COCHIN.

The Folic acid concentrate which is added to this product is obtained from fresh liver. The concentrate contains Folic Acid in the free as well as in the conjugated forms. In addition to this, the Folic Acid concentrate is also rich in all the other compounds of the Pterine class which play an important role in blood regeneration.

The Liver extract fraction is extremely rich in the anti-pernicious anaemia factor and all the other secondary factors like Tyrosine, Xanthine and certain peptides. In addition to this, B-Folin is reinforced with synthetic Vitamins of the B - complex group. B-Folin should therefore prove very useful in all types of Macrocytic anaemias especially those associated with sprue. It can definitely be given with very good effects in cases of pernicious anaemia.

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5% Glucose in Normal Saline (Pyrogen-free)

For intravenous, intramuscular hypodermic or rectal administration.

Indicated in:

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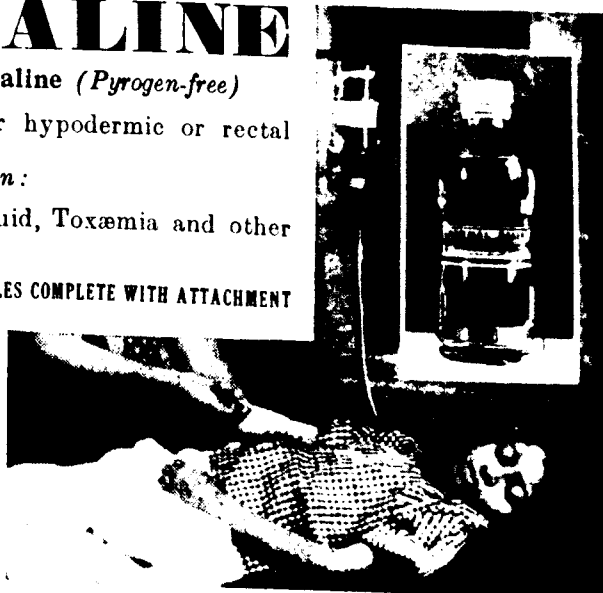
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Theophyllin $\bar{c}$ ethylenediamine, a xanthine group of diuretic acting as analeptic, indicated in circulatory and respiratory disturbances e.g. angina pectoris myocarditis, claudication intermittens dyspnoea of cardiac origin.

Obtained in tube of 20 tablets $1\frac{1}{2}$ grains each for oral purpose and 6 ampoules of 10 c.c. each in a box.

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Theophylline $\bar{c}$ ethylenediamine $\bar{c}$ phenylethylmalonylurea.

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(Nikethamide B.P.)

Indication in respiratory and circulatory disturbances, as a stimulant in shock, collapse, narcotic poisoning, infectious diseases, specially pneumonia, typhoid fever, measles etc. In surgical shock anaesthetic and post-operative, and maternal distress after child birth.

Supplied in boxes of 6 & 12 ampoules of 1.2 c.c. and 2 c.c. each for intramuscular use, and box of 3 ampoules of 5 c.c. each for oral use; 14 c.c. of 25% solution—flavoured.

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PARA-AMINO-SALICYLIC-ACID
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OF 200, 500 AND 1,000 TABLETS



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PHARMACEUTICAL WORKS
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LITERATURE ON REQUEST

The Modern Yeast Therapy in
Conjunction with Tannic Acid

Intestiform

COMPOSITION

Each tablet contains

Paex Medicament (Dry Yeast)	3 gr
Tannic Acid	15 gr
Activated Carbon	0.19 gr
Kaolin	0.38 gr
Excipients	2.43 gr

INDICATIONS:

TROPICAL NUTRITIONAL DIARRHOEA,
ULCERATIVE COLITIS, DYSENTERY AND SPRUE

ASSOCIATED DRUG CO., LTD. YERCAUD (S. INDIA)

For
**HYPOCHROMIC
ANEMIA**

Hepaplex

WHOLE LIVER EXTRACT
FORTIFIED WITH VITAMIN
B-COMPLEX, C & FOLIC ACID.

Each ampoule of 2 c.c. represents :-

HEMOPOIETIC PRINCIPLES FROM 50 gms. OF
FRESH SHEEP LIVER AND :-

VITAMIN B ₁	50 mg.
VITAMIN B ₂	5 mg.
VITAMIN B ₆	6 mg.
VITAMIN C	100 mg.
NICOTINIC ACID AMIDE	60 mg.
CALCIUM PANTOTHENATE	15 mg.
FOLIC ACID	5 mg.

PACKINGS:

BOXES OF 3, 6, 25 and 60
AMPOULES OF 2 c.c. EACH.

Introduced by **PHOENIX DRUG HOUSE LTD.**

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DIGESTIN

for impaired digestion

COMPOSITION:

Each Fluid Drachm represents :-

Pepsin	...	...	2.5 grs.
Papain	...	...	2.5 grs.
Vitamin B ₁	...	...	0.0125 gr.
Sodium Glycerophosphate	...	...	2.0 grs.
Potassium Glycerophos	...	...	2.0 grs.
Magnesium Glycerophos	...	...	1.0 gr.
Manganese Glycerophos	...	...	0.025 gr.
Flavouring Essence	...	...	1/20 m.
Syrup Simplex up to	...	...	1 fl. drachm.
Alcohol	...	...	17.0% Proof.

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In conditions involving muscles, tendons, and joints, Poultice Heat has been recognized by Physicians the world over.

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MUSCLE SPASM Painful muscle spasms which interfere with motion and local blood supply are relaxed by applications of *Antiphlogistine Poultice Heat*, which lasts for hours.

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WHERE Induction of Labour is therapeutically indicated Indulabo Paste is used now by many doctors with perfectly safe results. The paste is useful right from the twelfth week after conception up to the full term according to indications. The preparation of Indulabo Paste is based on an original German formula which has been perfected by years of clinical trials and research in our laboratories by reputed physicians.

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Pancreatic hydrolysate of	
Codliver Oil	Liver and spleen
	30% v/v.
Vitamin A&D	4725 I.U.
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Folic Acid	15 mg.
Riboflavin	5 S.U.
Nicotinic Acid	5 mg.
Vitamin C	115 I.U.
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Creosote	0.4%
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Extracts from Wild Cherry, Eucalyptus and Gellan	7%
Invert Sugar	Glycerine.
Malt & Aromatics	q.s.
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BIOFOL 12 Brand of Vitamin B Complex with B₁₂ and Folic Acid

Balanced combination of BIOFOL 12 gives remarkable results in patients of all types of anæmia. The reason is that it contains the whole group of Vitamin B. From this simplified statement of fact certain recommendations are made as under:—

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Useful for pernicious anæmia and relapse except the "pernicious anæmia of pregnancy".

"Folic Acid"

Absolutely essential for the treatment of "pernicious anæmia of pregnancy". Normal maturation of red blood cells cannot occur in the absence of folic acid.

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Folic acid alone is usually adequate for the treatment of sprue and the sprue like anæmias, but in combination with Vitamin B₁₂ it has an added effect. Vitamin B₁₂ is completely effective for the treatment of pernicious anæmia both in relapse and in remission and all types of megaloblastic anæmias except "pernicious anæmia of pregnancy".

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The Liver Extract

It provides all the hæmatopoietic factors of the liver. Also the hæmatinic minerals and Vitamins in their natural state. The value of Neo-livacon in anæmia cannot therefore be underrated. Neo-livacon is administered intramuscularly.

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Depocilline (Procaine Penicillin G for Aqueous Injection)	300,000 unit vials
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- In a case of ulcer.

Composition:

Sulphathiazole	...	5%
Codliver Oil	...	10%
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Each 5 c.c. ampoule contains:—Saturat-
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Vit. B₁ (Thiamin Hydrochloride) 30 mgm.
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5. Infantile Liver etc.
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Dosages & Direction.

Adults:—3 c.c. to 5 c.c. intramuscularly twice a week or thrice if desired according to the severity of the cases.

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WHOOPOLIN

An Ideal COUGH SYRUP for the treatment of Whooping Cough and conditions such as Chronic bronchitis, respiratory catarrh, pharyngitis, asthma and other ailments of throat exciting cough.

COMPOSITION

Calcium Iodide	...	2 gr.
Sod. Phenobarbitone	...	1 gr.
Dionin	...	1 gr.
Menthol	...	1 gr.
Tint. Belladonna	...	24 m.
Vinum Ipecac	...	16 m.
Ext. Glycyrrhizae Lq.	...	1'06 dra.
Syrup Tolu	...	3'33 dra.
Adjuvants q.s. for one fl. ounce		

WHOOPOLIN by virtue of its ingredients acts as an ant-spasmodic and sedative expectorant highly recommended in Whooping Cough. It loosens and fluidifies the mucus from the bronchi and thus facilitates its removal which indirectly helps to control the cough due to constant irritation of the mucous.

The removal of mucus from the bronchi and the control of its spasm give better chance for repairing the inflamed mucous membrane.

Literature on application to Medical Profession

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Massive Iron therapy

Each fluid ounce contains:—

Ferri et ammon citrate	...	60 grs.
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Calcium glycerophosphate	...	4 "
Copper and Manganese	...	traces
Strychnine Hydrochloride	...	1/200 "
Vitamin B ₁	...	2,000 I.U.
Vitamin B ₂	...	3,200 "
Vitamin C	...	100 mg.

Indicated in all cases of secondary anæmia, anæmia during pregnancy, anæmia of children and nutrition.

Also MINRON with FOLIC ACID

8 mgs. per fl. oz. (for Pernicious Anæmia.)

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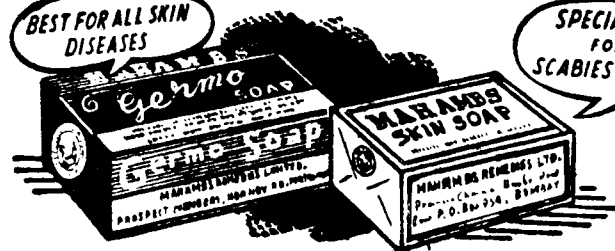
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Now with more improved formula

UNI-CALCIN

(For Intramuscular Injection only)

An advanced therapy for Tuberculosis and other conditions where Calcium, Choline, Liver Extract and Vitamins are indicated.

Each 5 c.c. amp. contains the following:

Calcium Gluconate	10%
Whole liver extract (with anti-anæmic principles) obtained from fresh young healthy sheep's liver equivalent to	150 gm.
Choline Chloride	1/6 gr.
Thiamine hydrochloride (Vitamin B ₁)	2.5 mgm.
Riboflavin (Vitamin B ₂)	0.30 mgm.
Ascorbic Acid (Vitamin C)	10 mgm.
Nicotinic Acid Amide	10 mgm.

The preparation has been preserved in a most suitable pH to ensure maximum activity and stability of all the above ingredients.

Available in 5 cc. and 3 cc. Sterile ampoules.

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"TYEVITE" Multi Vitamin Capsules.
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Fortified Cod Liver Oil Capsules, 5 m. each.

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Liver Extract with Vitamin 'A' & 'D' Capsules.

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Contains:—Asoka, Lodhra, Rajitabhasma, Alum and Silajit Etc.

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Contains:—Aswa Gandha, Sariba and Rajita-Bhasma etc.

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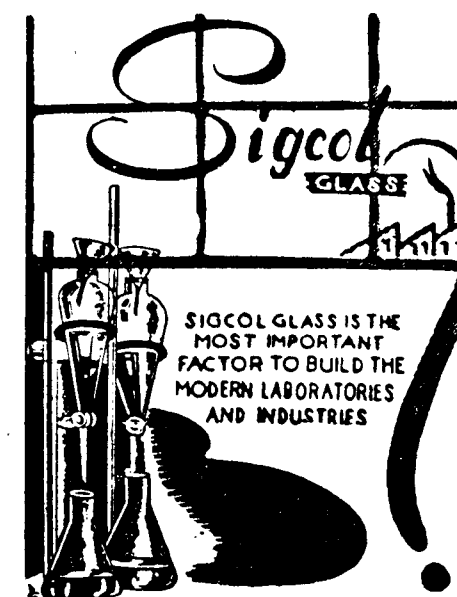
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" Aspirin 5x100 0-14; 1000 " 9-0
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Nicotannic Acid 0-5gm. 100 1-8 500. tin. 4-8
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Glass Rods 1-12; Cork Screw each 1-0
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" Adexolin Liq. 14 cc. 2-0; 100 caps bot. 6-0
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" " 50 mg. 10c.c. 4-8; 100 mg. ea. 7-8
" Fersolate 100 1-10; Codopyrin 10tab. 0-12
" Erbolin 10 tab. 1-6; 100 tabs. bot. 5-8
" Celin 6 x loc. 5-0; Berin 25 mg. 10cc. 2-10
" Ostomalt 1/2 lb 2-8; 1 lb. 3-14
" Celin 50 mg. 25 tabs. 1-10; 100 tabs. 3-12
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" " German 3-0; Down " 4-12
" All Glass " Japan 3-8; German " 4-0

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German 1-4 2-0 3-0 4-0 7-0 9-8 E
Italy 1-12 2-12 3-14 6-0 9-0 11-12
Japan 1-2 1-14 3-0 4-0 7-8 9-0 h
S.N. :- Re. 1-0 More
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7-10 12-4 14-0 16-8 25-8 32-0
Ideal (C.N.) 7-4 10-0 13-0 15-8 21-8 30-8
I.C.I. Pamaquin 0-2 grm. 300 tabs. bot. 1-0
" 0-1 grm. 500 1-2
" Paludrin 3 grm. 8 tabs. 0-7-6; 500 Tin. 27-4
" 2c.c. 5 amps. 3-4; 2c.c. 25 amps 11-4
Japan Clinical Thermometer Flat 1/2 Min. dz. 21-0
Lavandar Smelling Salt Eng. 13-8
Litmus Paper Book Assor. 1-0
Leukoplast Elastic 1x3 yds. each 0-8
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Lilly's Gentian Violet Jelly 4 oz. Tube. 1-0
" Sulphanilamide Cream 4 oz. 0-10
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M. & B. 693, 100 tabs. 9-0; 500 tabs. tin. 42-0
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" Sulphatriad 25 2-12; 100 tabs. 9-12
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P.D. Chloromycetin 12 Caps. bot. 29-12
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" " 10 gr. 2c.c. 100. B.D.H. box 33-0
" " 5 gr. 1c.c. 100. " 27-0
" " 5 gr. 1c.c. 6. " 1-14
Quinacrin USA 1000 9-8; 100 tabs. bot. 1-2
Roche Proctigmin 20 tabs 5-12; Thiacol 1oz. 3-14
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Scissors " 5 " 2-0; Scalpel " 5 " each 1-12
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" " Italy 1-4 2-14 3-14 6-8 9-0 11-8
" German 1-8 2-2 3-4 4-8 8-0 10-8
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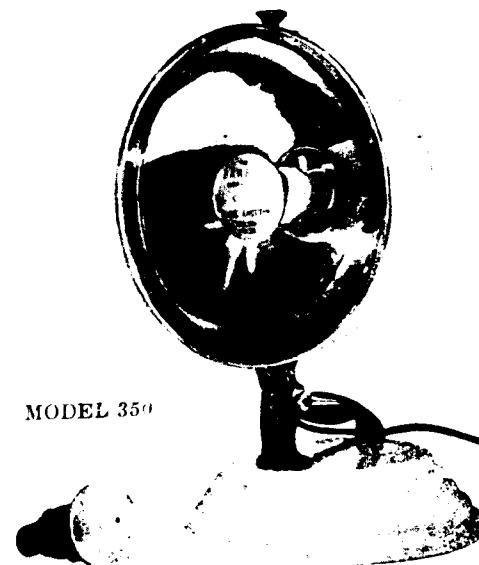
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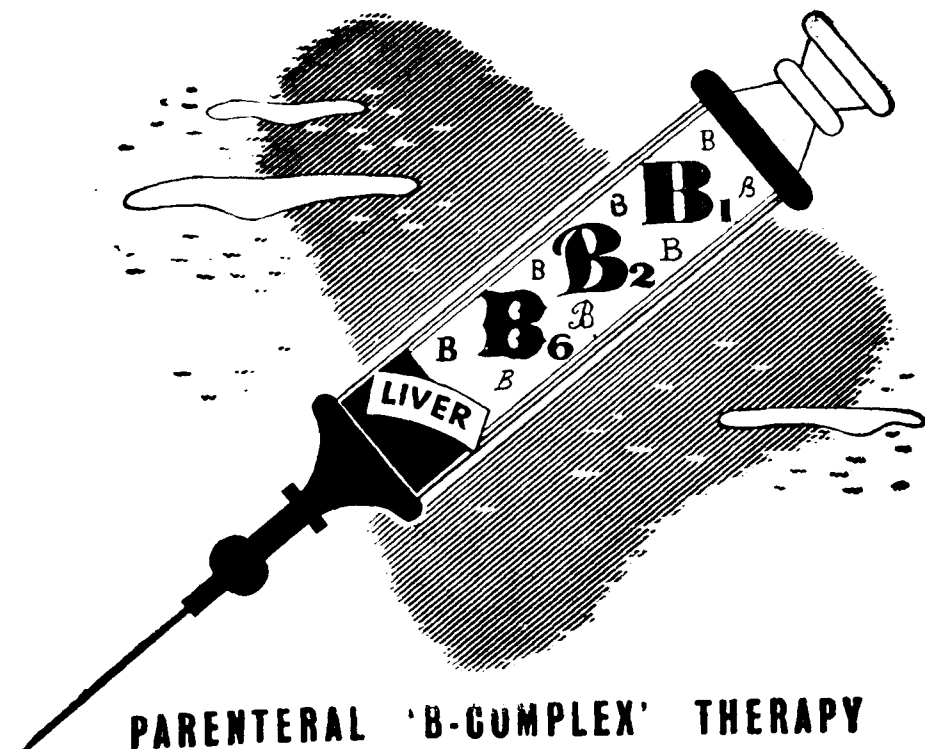
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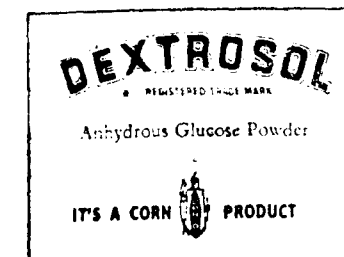
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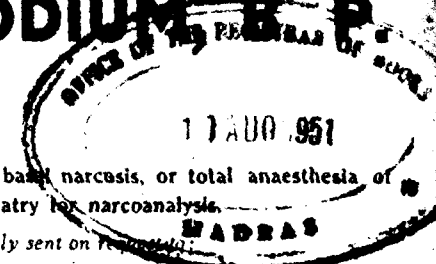
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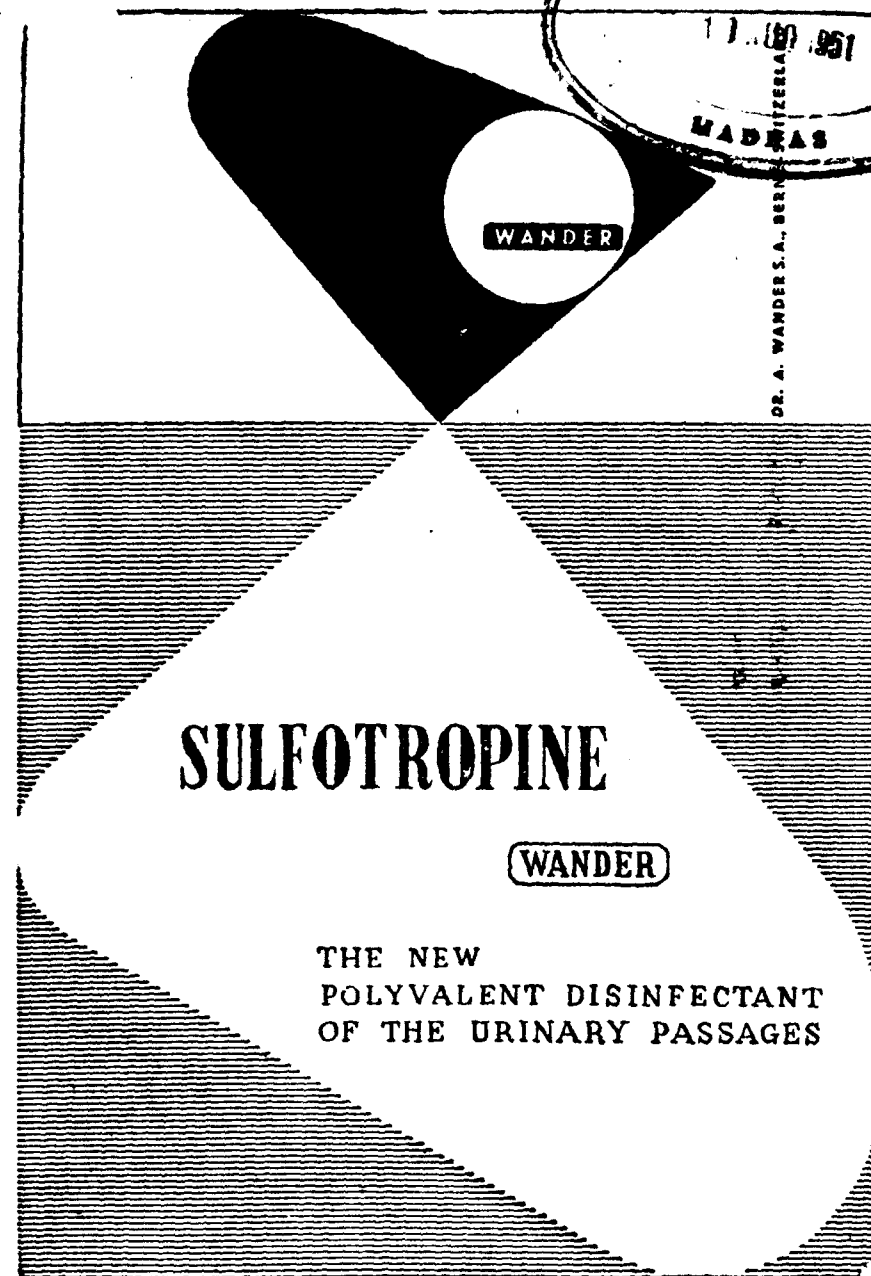
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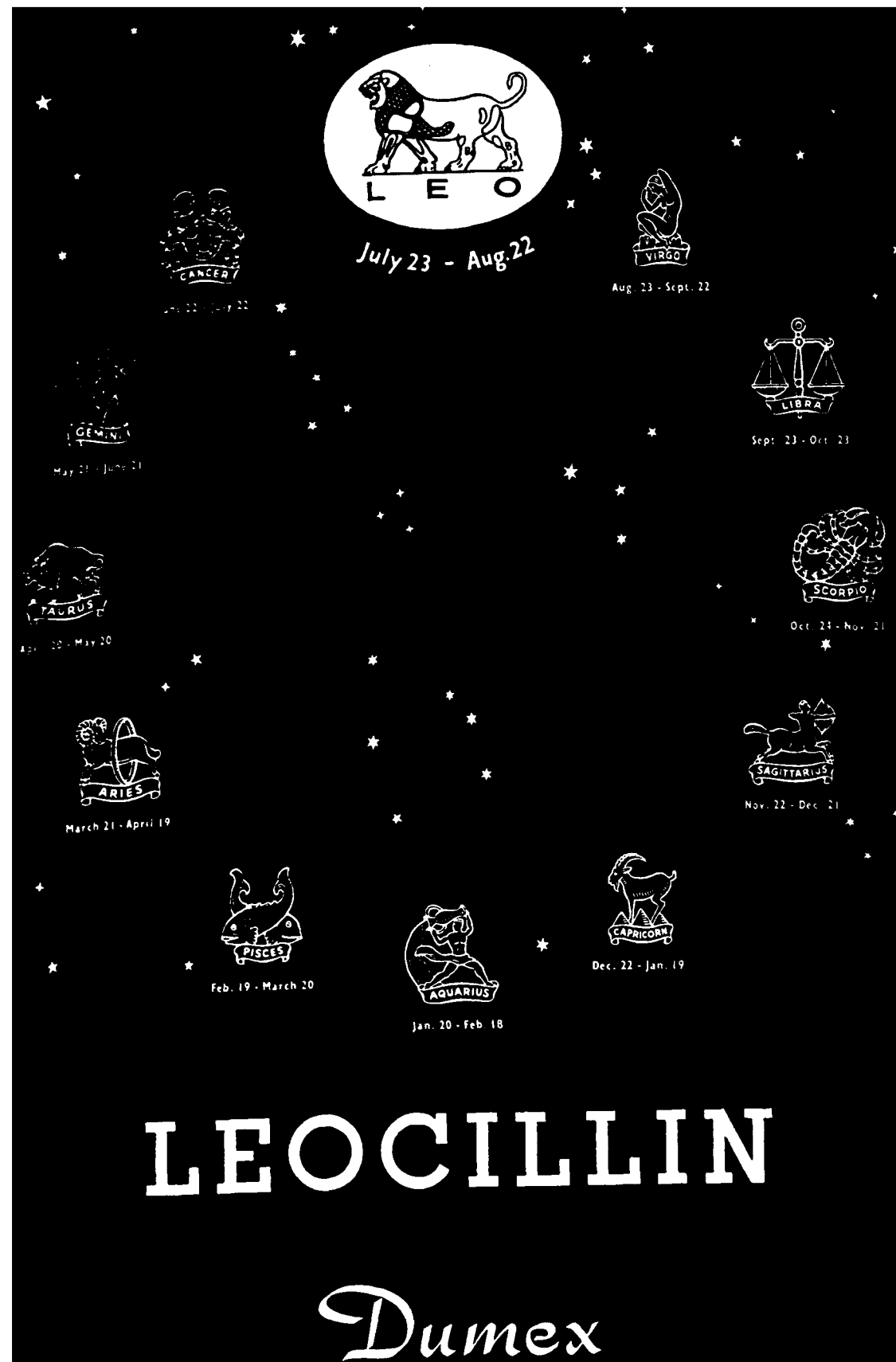
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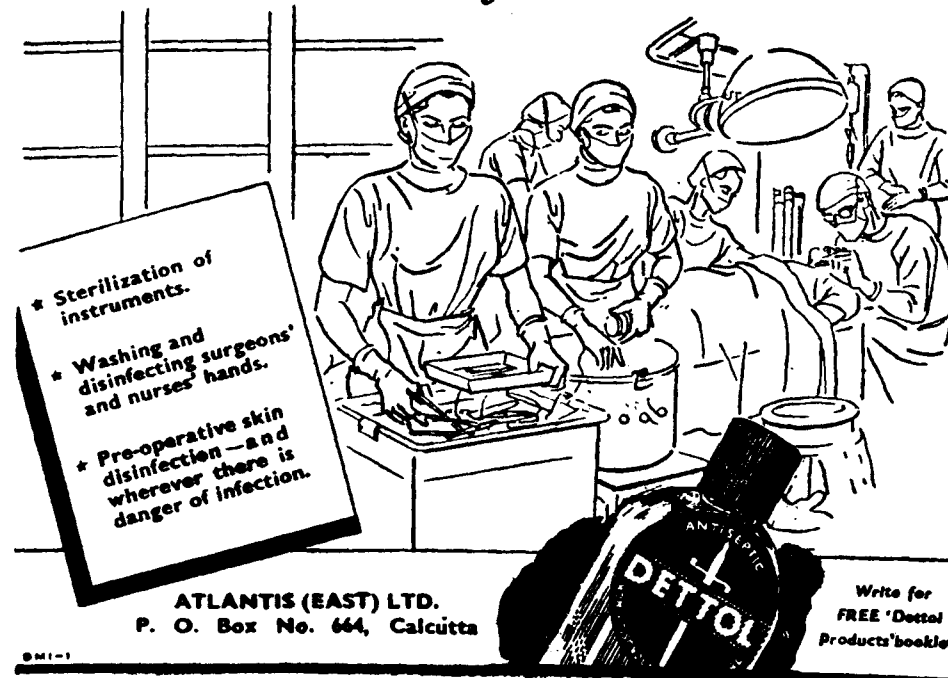
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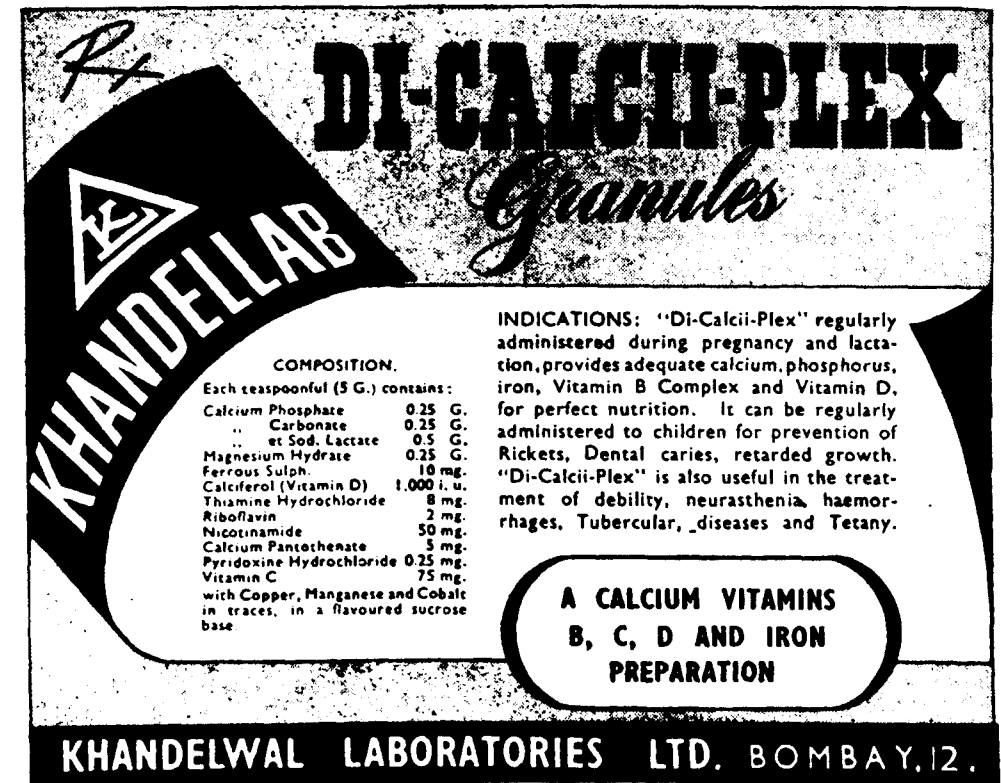
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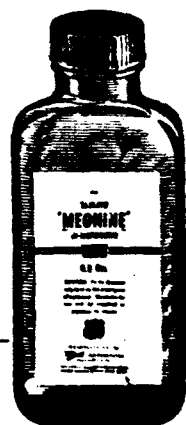
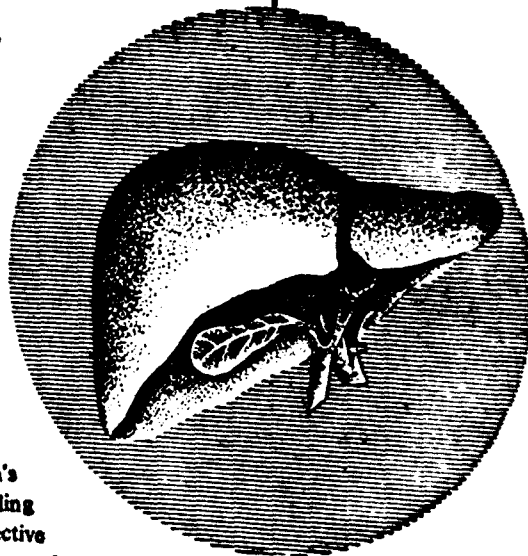
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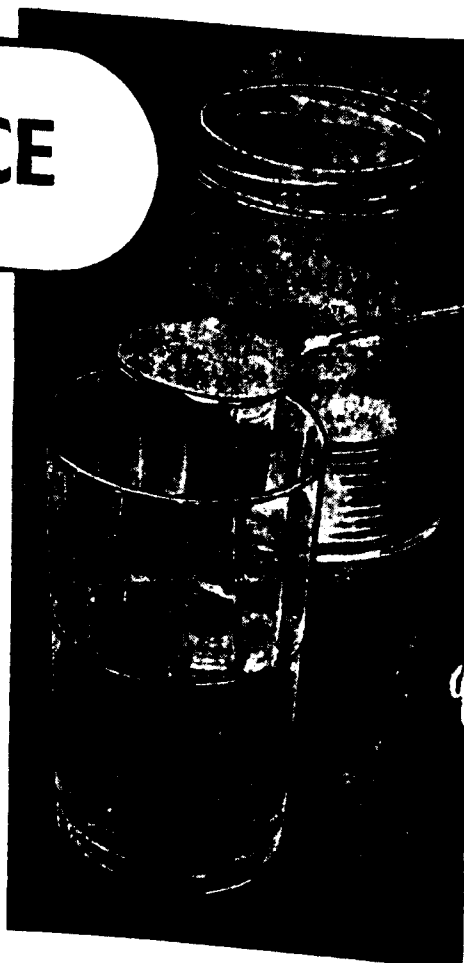
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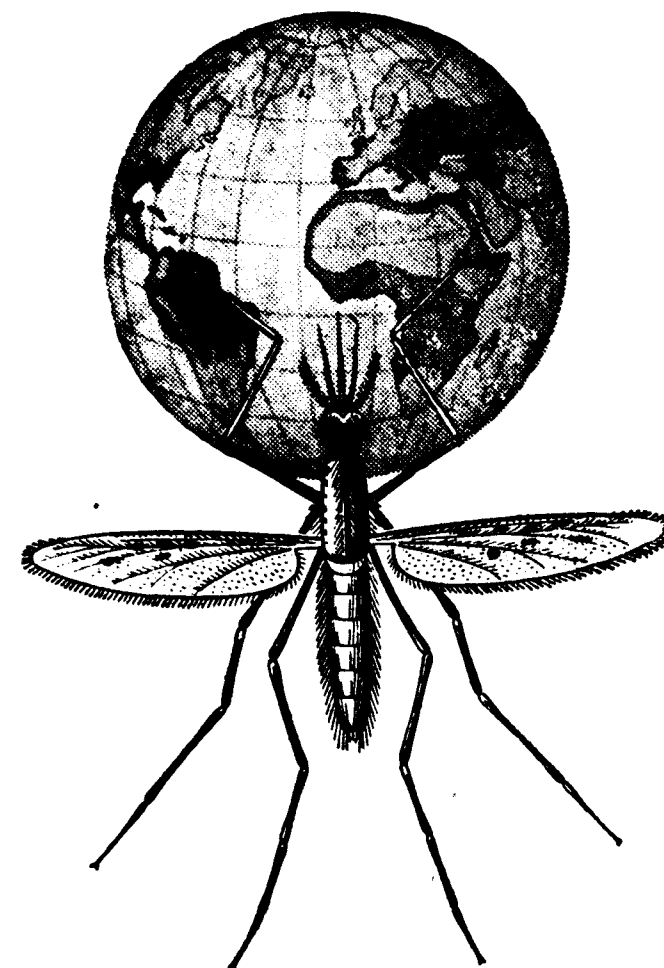
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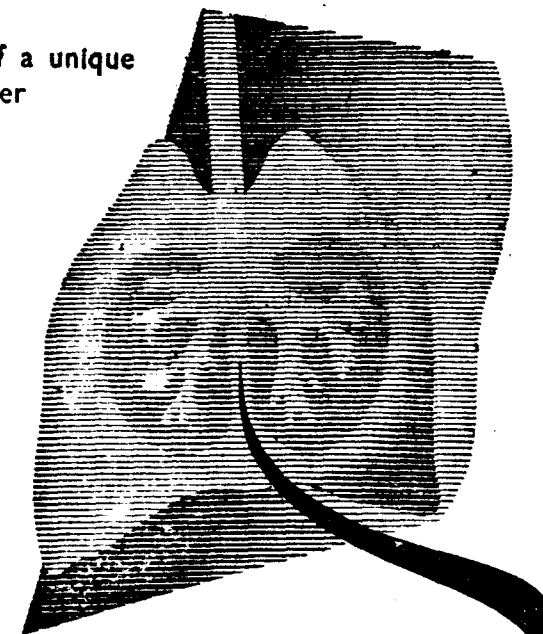
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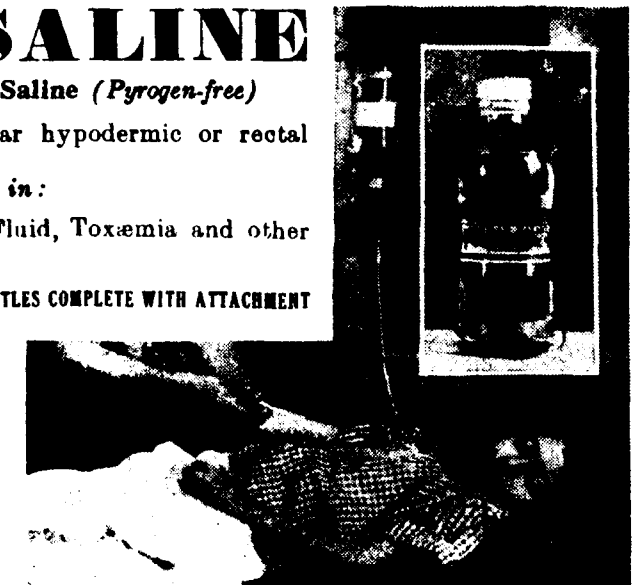
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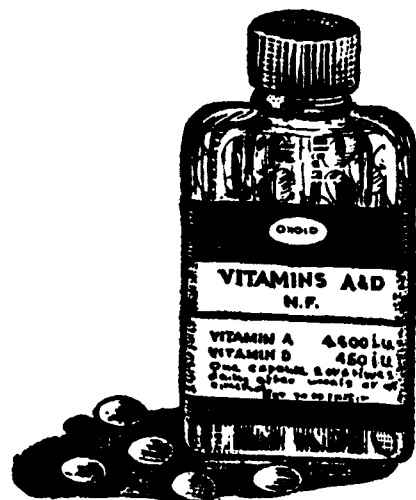
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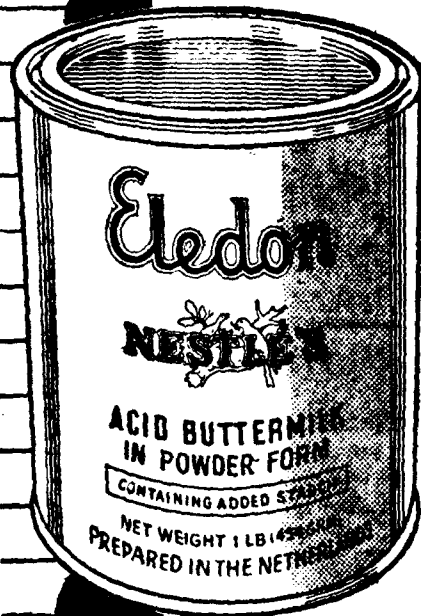
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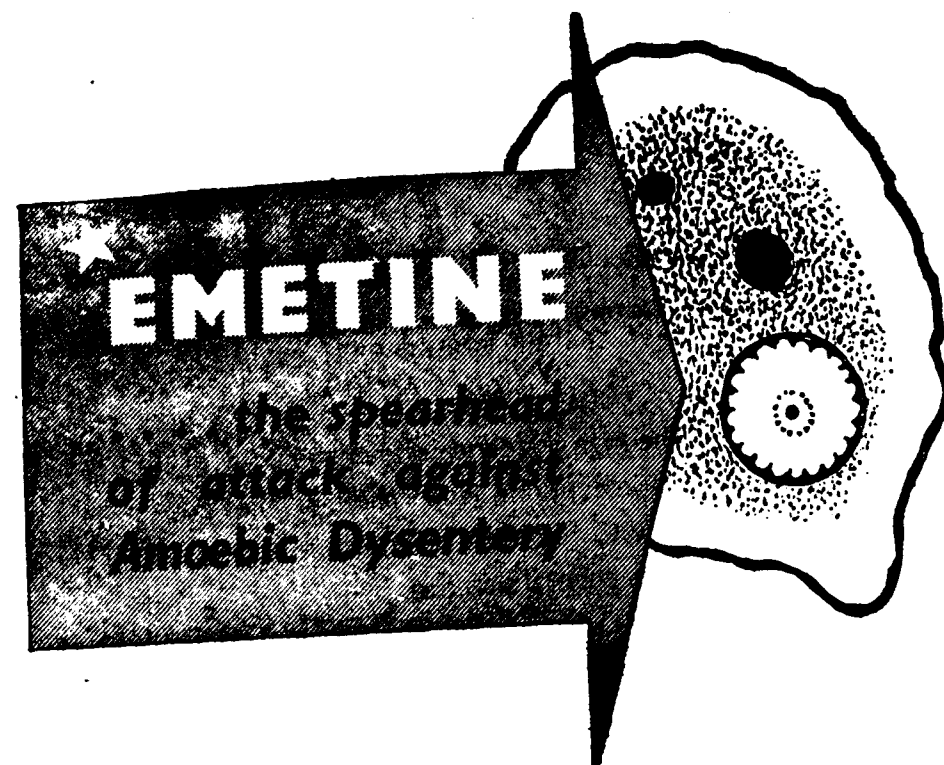
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ESSENCE OF PÆDIATRICS

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BEFORE I give the essence of pædiatrics, which I hope will be very useful to the General Practitioner, I wish to mention our great need at present. Our wants in this world are many but our dire needs are few. One of these needs in Madras is a good Children's Hospital—an hospital enough to cater to the needs of the unfortunate ill children. After visiting the various children's centres and hospitals in the United States of America and Canada, I feel that a Pædiatric Ward in the General Hospital is inadequate to serve the big population of children in Madras. We require not a ward or wards but hospitals—a few at least in the city with adequate and qualified staff. This is an ideal but at present it is difficult to achieve. The next best is to have adequate pædiatric blocks or wings attached to General Hospitals of the city, utilizing all their facilities like Radiology, Pathology, Surgery, E.N.T. etc. If this is so any problem regarding children can be tackled successfully. Great pains must be taken to prevent any cross infection in the general wards by segregating the patients in cubicles. Younger they are, the greater the care that should be taken, and in some cases individual isolation must be done. Surgery in pædiatrics is a specialized subject and our surgeons of the city can tackle them easily with a little practice. Cardiac surgery may be attempted more often by our surgeons with advantage and many cases of congenital lesions like patent ductus arteriosus and congenital anomalies of the great vessels can be tackled and thereby the child can be benefited and its life prolonged. The hospital can also give valuable advice to mothers regarding feeding problems.

The second important need is a Well-Baby Clinic where the normal children are examined every now and then and the mother advised regarding the normal food requirements and the normal development of the child. To these clinics, as differentiated from the hospitals, normal babies are brought in and with them the mothers also attend. A few lectures by competent people and nurses are given for the benefit of these mothers. Mothers can discuss their problems freely with the doctor-in-charge and take proper advice regarding the upbringing of their children. To give such an advice the doctor should know the proper development and growth of the normal child and the variations in health and disease and I think the following points would be profitable. They are taken from the growth and development chart of the Toronto (Canada) Baby with a few alterations according to our children's standards.

Growth and development.—Weight:—The birth weight of the child is 6½ pounds and it loses about 9 ounces during the first three days of its life but regains its birth weight rapidly within the first ten to fifteen days. The weight is doubled (13-14 pounds) in six months and trebled (20 pounds) in one year. In five years retards, ceases or there is a loss out of proportion to the severity of the illness. Birth weight may be above or below the average and may remain above or below the average throughout the first year.

Height:—The length of the child at birth is about 20 inches and there is a rapid gain during the first year of life, about 9 inches, and slower during the second year, about 3½ inches, and thereafter 2½ inches per year. Irregularities in height are mostly due to heredity and rickets. At birth the extremities as compared to the trunk are shorter (43%) but at five years the extremities are longer than the trunk (54% of the length of the body). Effect of malnutrition upon the length of the body is much less than on the weight.

Chest:—Circumference: Birth 13 inches, 6 months 16 inches, 1 year—1½ years 18", and in 5 years 21". At birth the transverse and anterior-posterior diameters are the same but as age advances the transverse diameter increases much more rapidly. The circumference of the chest is ½ an inch less than that of the head but at the 3rd year both are the same and after that age the circumference of the chest exceeds the head.

Head:—Birth 13", 6 months 16", 1 year 18", 3rd year 19", and in the 7th year the circumference is 20".

The sutures normally close by six months but abnormal wide separation is found in premature children and in those having congenital syphilis. In some there is early closure and ossification even before birth which give rise to microcephalics.

The fontanels close; anterior 14 to 22 months and posterior 2nd month. Anterior fontanelle is 1" in diameter at the end of the 1st year.

Shape of the head: (a) Compression from labour (disappears within 1 month); (b) brachycephalic; (c) dolichocephalic; (d) irregularities:—rickets, hydrocephalus, premature ossification and brain malformations.

Abdomen:—Circumference at umbilicus: throughout infancy same as the chest but less than the head. End of 2nd year: same as the chest and the head. After the 2nd year: chest increases much more rapidly.

Unusual enlargements:—(a) Chronic intestinal disorders; (b) tympanitis (rickets); (c) enlargement of abdominal organs: (i) acute; (ii) chronic (malaria, kala-azar, infantile biliary cirrhosis); and (d) new growths like Wilm's tumour.

Stomach:—Capacity: Birth 1·20 oz.; 2nd week 1·50 oz.; 4th week 2·00 oz.; 8th week 3·30 oz.; 12th week 4·50 oz.; 6th month 5·75 oz.; and 12th month 8·90 oz.

SPECIAL SENSES.—Sight:—Infants avoid light during the first few weeks after birth. Cornea slightly sensitive in the newborn. Eyes follow light by the 6th day, co-ordinate by the 3rd month and recognize objects by the 6th month.

Hearing:—Deaf the first 24 hours, becomes acute at the end of 5-7 days, tries to turn the head towards sound by 2-3 months and recognizes familiar voices by 3-4 months.

Touch:—Not highly developed except lips and tongue at birth. It is acute all over the body at the 3rd month and localization of sense impressions start by the 5th month. Temperature sense is developed early.

Taste:—Highly developed at birth.

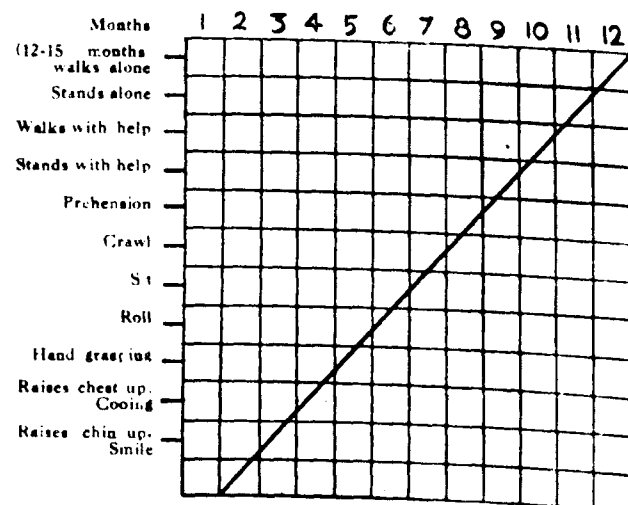
Smell:—Developed later than other senses.

Speech:—Time of development varies greatly. Girls talk from 2 to 4 months earlier than boys. Towards the end of the first year single words like 'papa' 'mama' etc. and after the 1st year sentences of 2 to 3 words are spoken and thereafter there is a rapid improvement. The order of development in the second year is as follows:—Names of persons and objects, verbs, adverbs, adjectives, conjunctions, prepositions and personal pronouns. Delay in speech development (if after two years) may be due to the defects in the central nervous system, peripheral nervous system, organs of phonation, or in the organs of articulation.

Muscle development (greatly varies):—Developmental chart (vide chart, page 496) first year (from Harvard Medical School).

Abnormal delay in appearance of functions is due to: (1) Malnutrition; (2) prolonged illness. (3) injuries to the nervous system; and (4) rickets.

Deformities of the bony system are due to: (a) Rickets (chiefly); (b) empyema; (c) emphysema; (d) cardiac diseases; (e) scoliosis;



A child should have at the end of the first year 6 teeth; 1½ years 12 teeth; 2 years 16 teeth; 2½ years 20 teeth.

Variations:—(a) A child may be born with teeth; (b) teeth may appear as early as the 4th month; (c) nursing children get teeth earlier than artificially fed children; (d) syphilitic children are prone to early dentition; (e) irregularities in the order of appearance of teeth are found in idiotic children; (f) delayed dentition occurs: (i) healthy children (10 months); (ii) rickets; (iii) cretinism; and (iv) malnutrition.

Permanent teeth:—1st molar 6th year; incisors 7-8 years; bicusps 9-10 years; canines 12-14 years; 2nd molars 12-15 years; and 3rd molars 17-25 years.

The problems are many for the mothers but the most important one is the feeding problem. Such a problem can be tackled by the doctor-in-charge of a Well-Baby clinic. In case of breast-fed babies, the problems are very few, for the breast milk contains all the essentials. The only addition to the breast feeds would be vitamins C in the form of orange juice and vitamin D in the form of cod-liver-oil. The trouble comes only when the child is on artificial milk feeds. The mothers do not know what, when and how to give the artificial feeds. Overfeeding in this country is a rarity due mostly to poverty but of society but also in the well-to-do people due to ignorance and wrong advice. The artificial feeds are calculated according to the expected weight of the child.

Five fundamental principles are to be kept in mind in infant feeding:—

(1) Energy requirement; (2) protein requirement; (3) inorganic salts; (4) vitamin requirement; and (5) fluid requirement.

Energy required by the child is 50 calories per pound of body weight if the child is below 6 months and 45 calories per pound if

(f) Pott's disease; and (g) chondrodys-trophies.

TEETH:—Deciduous or milk teeth 20 in number. 2 lower incisors 6-9 months; 4 upper incisors 8-12 months; 2 lower lateral incisors 12-15 months; 4 anterior molars 12-15 months; 4 canines 18-24 months; and 4 posterior molars 24-30 months.

aged above 6 months, per day. This caloric requirement is supplied by milk with the addition of carbohydrates in the form of sugar. One ounce of sugar can safely be given to a child below 6 months or 15 pounds in weight and 1½ ounces to the child above that age or weight. One ounce of sugar yields 120 calories and one ounce of milk 20 calories.

Protein requirements are very well covered in 1½ ounces of milk per pound of expected body weight supplied to the child. A normal child gets more than 1½ ounces of milk per pound body weight if correctly calculated and fed, and so the protein need of the child is very well covered.

Most of the inorganic salts which are essential to the human body are found in cow's milk except Iodine and Iron. In areas containing water with deficient iodine content, iodized salts must be added to the feeds. Often infants too long on milk alone (breast or bottle) get milk anemia and so iron must be given now and then in the form of ferrous salts.

Majority of the vitamins are found in milk with the exception of vitamins C and D. Half an ounce of orange juice and a teaspoonful of cod liver oil daily would easily supplement the vitamin deficiency.

Fluid requirement of the body is great in a child when compared to that of an adult. The child requires 3 ounces of fluids per pound of body weight per day. If the child is above 10 pounds the maximum fluid requirement is 40 ounces a day.

To sum up, a 10 pound baby's diet with milk can be calculated as follows:—

Energy required 50 calories pound or 50 x 10 = 500 calories.

Carbohydrate required: 1 ounce yields 120 calories.

The remaining caloric needs are made up by milk to be given (one ounce yields 20 calories) 380 calories or 19 ounces of milk.

Fluid required is 3 ounces per pound of body weight and so the fluid required is 30 ounces.

So the milk ratio must be: Milk 19 ounces; water 11 ounces; sugar 1 ounce. The total quantity should be divided into six feeds and given once in 3 hours.

An ounce of orange juice and a teaspoonful of cod liver oil is all that is needed in addition.

The common practice of giving gripe water as a daily routine and frequent purgatives is not only not necessary but harmful. There are very many feeding problems but space does not permit their elucidation. All the problems must be very familiar to the clinician in charge of a Well-Baby Clinic.

In addition, the Well-Baby Clinic should deal with minor psychological problems such as bed wetting, thumb sucking, temper-trantrums, habit spasms and masturbation. These clinics should

carry out prophylactic inoculations against diphtheria, whooping cough and tetanus in the form of triple vaccine.

The most important therapy in paediatric practice is the "fluid therapy". The fluid requirement of the child, as we have seen just now, is very much more than that of the adult and the children are apt to lose this fluid very easily by vomiting and diarrhoea. They not only become dehydrated quickly but go in for acidosis and later coma. I have given below a few of the important fluids used in paediatrics in a chart form:

Parenteral fluid therapy

Fluids	Conditions requiring fluid therapy	Amount and routes
2 parts of 5% Glucose and one part of Normal Saline.	Dehydration, acidosis, shock, pyloric stenosis.	Subcutaneous 10 c.c. per pound of body weight. Intravenous 2 oz. per pound per day.
Lactate solution	Acidosis.	Same as above.
<i>Darrow's solution</i> — Pot. Chloride 2 g Sod. Chloride 3 g Molar Sod. Lactate 40 c.c. Water 710 c.c.	In severe cases of acidosis designed for intracellular repair for replacing potassium loss.	I.V. 10-30 c.c. per pounds of body weight for 3 days. S.C. Oral.
<i>Proteins</i> — Nutramigen. Amegen. (Mead Johnson)	Protein deficiency Anasarca	Oral. I.V. 1-5 10% soln 1-2 g per kilo weight.
Blood and plasma.	Hæmorrhage Nutritional oedema.	I.V. 20 c.c. per pound of body weight.

Polyethylene tubing can be conveniently used for I.V. continuous fluid transfusion. They are flexible and the movement of the limbs do not disturb the tubing.

During my stay in Canada, I was very much impressed by the camp life for the chronically ill children. It is a camp situated a few miles from the busy city where these children spend a month each year. In that camp the children are taught, fed and looked after very carefully. For example, a diabetic child is taught to weigh the foodstuff according to its needs, to take insulin itself and to feel that he is not the only one who is the sufferer from diabetes when he sees his brethren with the same disease. The patients suffering from chronic cardiac lesions, bronchiectasis and other chronic diseases attend these camps. Convalescent camps on these lines for children with ailments which require prolonged care, will go a long way to rehabilitate these children as well as relieve the congestion in the overcrowded hospitals in the city, making room for acute cases.

The last but not the least of all the needs is a Paediatric Association in Madras and a Paediatric Journal.

EVALUATION OF SOME IDEAS ABOUT AILMENTS AND TREATMENTS IN CHILDHOOD

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IDEAS about ailments and their treatments are undergoing radical changes with the advance in knowledge.

Erroneous ideas about ailments in children are rampant all over; the illiterates still associate the occurrence of some diseases with the wrath of deities, while educated men get bewildered when they hear the scientist and compare these views with those that are fixed in their minds for years.

The good old granny still forms the first line of defence to any upset in the child. Her long experience about ailments in children and their household remedies handed down to her from generation to generation is not a negligible proposition.

We find that the scientist of yesterday was erring in the understanding of certain diseases and the scientist of tomorrow is similarly bound to discover that we also made mistakes.

Some practitioners and the intelligentsia carry erroneous ideas about ailments in children and it is the object to take into account some of these ideas and compare them with the findings of the writer.

The principles of infant and child-feeding are grasped by few, in fact every mother should be conversant with them. One feels surprised when an educated mother says that the cause of the diarrhoea or vomiting or dyspepsia in her child is because her milk has gone bad and does not agree with her child; on occasions it is observed that a medical practitioner has given her this idea. At times her diet is blamed for the trouble in her breast-fed infant. Some mothers confidently state that the child gets upsets when she eats a certain article of diet. I have made experiments by asking them to eat the alleged offending article of diet to their hearts' content and proved to them that their fears were groundless.

Breasts are perhaps one of the best filters Nature has provided; the cause of the complaint in the child is found to be somewhere else; and woe befalls the small infant, if it is advised to be weaned.

Few natural developments in the human body have come to be so much blamed as teething in childhood. In the case of a number of ailments, particularly those referable to the gastro-intestinal tract and the nervous system, the erupting tooth is pointed out to be the culprit, not only by the laity but also by many a practitioner. Even the authorities are ambiguous, whether or not dentition causes

any ailments in children and express views which err on the safe side. Some tooth is always in the process of erupting from about nine months to two years. Why should then a child fall ill when a certain tooth is coming out and not when the other was showing out. I have practically always found a cause for an ailment somewhere else when teething was blamed, and consider that teething does not cause any ailment in children. It is interesting to note that no one points out to the tooth when ailments occur during the second dentition.

Similarly worms have come to be more blamed than they deserve. Troubles like diarrhoea, vomiting, dyspepsia, irritability, convulsions, teeth-grinding and a host of others are said to be due to worms. It is true that many children, particularly the run-down and dirty, harbour round worms in their intestines; but when they are few, they are harmless; and it is a usual finding that after the bowels are freed of them by an anthelmintic the trouble complained of continues, and it is observed that the roots of the trouble were somewhere else.

This is not so in the case of the thread-worms, which generally infest in large numbers and cause much harm to the child by their nefarious activities. Many helminths are capable of much mischief but they are not so common and some have territorial importance. It is important to grasp in this connection that it is not generally the worms that cause dyspepsia and wasting to begin with, but a marasmic dyspeptic child forms a good soil for the lodgement and propagation of the worms, and the vicious circle continues.

Far too many diarrhoeas and vomiting are treated by drugs alone. Drugs hold a second place in their treatment; stoppage of all food and the treatment of dehydration which accompanies it, is of paramount importance. The mortality from diarrhoeas and vomiting will be greatly reduced if efficient treatment is forestalled for dehydration that ensues; treatment which follows is bound to be less successful.

It is not only in diarrhoeas and vomiting that dehydration occurs; the rapid breathing which takes place in infections of lung tissue, causes marked dehydration; fluid is lost to a very great extent in the breath. In acute illnesses with high temperatures, in convulsions and persistent crying, dehydration ensues. This factor is far too important in hot countries and in hot weather; and the smaller the infant the more frequently and seriously he is affected. The adult tissues get fibrous with advancing age, but the tissues of the child are far too cellular, requiring fluid for their efficient functioning and the infant like a seedling will not stand deprivation of fluid for any length of time. The giving of water or glucose-water alone will not suffice to combat dehydration, the required electrolyte has got to be supplied in sufficient quantities.

Convulsions in childhood particularly amongst infants is another ailment where there is much misunderstanding. Tetany is responsible for a vast number of convulsions in infants. On occasions an infection, or a fall, or some such exciting factor has pulled the trigger and let loose the convulsions, but the stage was already set, and it would have been found that the infant did not have sufficient Calcium concentration in his blood.

Worms, teething, phymosis are amongst the popular causes which are blamed for starting convulsions, but they are hardly ever the cause.

The child is quite happy with his few round worms, teething go their way quite innocent, and phymosis, unless of such a degree to cause back pressure and toxæmia (which is rarely met with in general practice), is hardly ever the cause.

It would be fortunate for many infants, if the phimosed prepuce which they carry would not have lent itself to such an easy attack by an enthusiastic surgeon. Misfortune has befallen an infant if circumcision is performed with the idea of curing his fits; after the operation they are let loose with a vengeance, and at times misfortunes do not come singly, for hæmorrhage and sepsis occur at the site.

Morphia and hypnotics pushed to the limit of just not abolishing the sucking reflex and administration of sufficient quantities of Calcium after inducing the acidemia is the proper treatment. Giving of Calcium Lactate powders alone or injections of Calcium is of no avail.

The subject of enlargement of liver in childhood has caught popular fancy. The laity has learnt something about the dreadful incurable disease called cirrhosis of liver in children. They consider that the disease has set in, whenever they learn that the liver of the child has enlarged. Advantage is taken of this terror for the disease by unscrupulous vendors of patent medicines to reap a rich harvest.

It is a very difficult problem when to call that the enlarged liver has taken up the cirrhotic process. To come across a moderately enlarged liver is a common finding; it is due to a vast majority of cases to causes other than cirrhosis. The anæmias, congenital syphilis, heart disease and some other rare diseases cause the liver to enlarge. But then there is a case off and on where the hardness of the liver, taken in consideration with other signs and symptoms and the general condition of the child, leaves little doubt. But then there are some border line cases where time will have to pass before one can give an opinion. At times a practitioner makes a mistaken diagnosis and is responsible for much misery.

Even some of the uneducated have become conversant with the name rickets; they think it is a bad disease which occurs in

children, causes them to waste and kills them. This knowledge they have many times derived from medical men who have not correctly understood the disease. The fancy of the medical student is caught by pictures of the spectacular appearance this disease produces and they get branded in their memory.

The wasted marasmic child is many times diagnosed as a case of rickets; but wasting and rickets do not go together. Rickets is a disease of growth and when wasting begins the rickety processes abate and the case becomes one of infantile atrophy.

One rarely comes across in India a rickety child who shows the bending of his skeleton to the extent of the published pictures of the disease in its severity; here, in India, the Sun is merciful, but the rickety deformity of the chest resulting in falling of the chest-wall and in consequence causing the abdomen to protrude is a very common sight indeed. Particularly hit by this misfortune are children of the poor and the middle classes who are fed entirely on a carbohydrate diet after they are weaned; milk is not available to them and no fats or vitamin D go in their diet; they suffer from carbohydrate dyspepsia, and this gives rise to fermentation and protrusion of the abdomen. The child now looks like a barrel carried on two slender sticks, the wasted legs. Had not these unfortunate urchins been playing in the compassionate rays of the Sun, they would have hardly been able to stand and walk.

It is not generally appreciated to the extent it deserves that the bending of the limbs in rickets is comparatively less harmful than the collapse of the chest-wall and pelvis. The former starts and helps keeping up infection in the lungs due to permanent partial compression of lung tissue and hindered respiratory movements and defective ventilation.

Rickets is not a disease which kills, it is one which softens, softens not only the bones but the muscles, ligaments and practically the entire organism; and death, if it results, is due to the effects of this softening.

The Vitamin Age is on us, the amount of literature turned out and the amount of advertisements piled on us have smothered us. When it becomes possible for one to come out of this big confusion and give the subject a calm and unbiassed consideration, one feels that the exuberance of the scientist coupled with the self interest of the manufacturers has done much ado about something. Not that avitaminosis does not exist or the vitamins have no place in treatment; admittedly they have unquestionable value and one does come across an occasional case of severe avitaminosis, particularly in the hospital class of patients or see them under famine conditions; but an average child suffers from a moderate degree of avitaminosis when he does so. Anæmic, run-down children with wasted limbs and a bloated abdomen waddling down a lane is a

common sight in an Indian town; these are not generally suffering from avitaminosis of much severity but from malnutrition and carbohydrate dyspepsia. What they need is food sufficient in quality and quantity. Milk, sufficient quantities of proteins and fats derived from animal origin and an iron mixture are what they require, and not heroic treatment by the highly priced vitamin preparations, Liver Extracts and Folic Acid.

It is interesting to note that we do not come across cases of phthisis in children as it occurs in the adults; the characteristic of the disease in the adult is its chronic progressive nature; the affected lung tissue goes through the process of caseation and cavitation; no such thing occurs in the child. Does the young lung tissue possess certain degree of immunity to the germ; or does the germ readily filter out of the lung tissue into the lymphatic system and the blood?

We frequently see cases of tubercular meningitis in children; it appears that the tubercle bacillus has a predilection for the meninges of a child but appears to prefer the lung tissue of the adult.

It is a moot point why children with their indiscriminate habits of eating should not fall an easy prey to the typhoid bacillus.

The child, the younger he is, enjoys a certain degree of immunity from the ravages of this disease; and when it does occur, it shows the mild form and a negligible mortality rate and mostly the infecting organism is found to belong to the paratyphoid group.

Quite a big controversy has raged about the value of enucleation of tonsils. It is agreed on all hands that tonsils which are definitely septic should come out. It is observed that the health of the child improves, he grows rapidly and a number of his complaints are cured after removal of his septic tonsils; but it is observed that far too many tonsils are removed; some take a speculative chance and take tonsils out to cure a complaint, and later come to the conclusion that the tonsils were not offending and would have stayed where they were without causing mischief.

Some of the procedures carried out on children are done in an objectionable way. Of these syringing the ear for otorrhœa and giving of glycerine per rectum for relieving constipation may be mentioned.

Syringing the ear for otorrhœa is not only worthless but may be harmful; cleaning the external auditory canal with cotton wool pencils and insupplation of idoboric powder is the best one can do. Similarly giving of undiluted glycerine with the hard big plastic cannulae of a glycerine syringe to a small child though successful to bring out the results, is a painful procedure and may injure the anus or set up proctitis. The correct way to do it is to dilute a small quantity of glycerine with warm water in a 20 cc. syringe and

give it by means of a rubber catheter attached to the nozzle of the syringe.

Some of the drugs used for children have the quality of being harmless, but of little or no value; while others cause definite harm. Of the former mention may be made of lime and dill waters and of the latter Sodi-Citrus, Alkaline waters, castor oil and spiritous drugs, are some that are worth considering.

Sodi-Citrus and the Alkaline waters are on many occasions given to children who are anæmic and wasted for the relief of their vomiting, diarrhoea and dyspepsia from which they usually suffer. The remedy does more harm than good. The weak and anæmic children suffer from lack of sufficient acid in their stomachs, valuable for gastric digestion and their trouble is traceable to this lack; and administration of these alkaline preparations neutralizes whatever little acid there was and does exactly the opposite of what is required to be done and causes worsening of their complaint.

Regular administration of castor oil for relieving chronic constipation is a mistake committed often by mothers and even by some doctors. The remedy is worse than the disease; though successful immediately, it later causes progressive inveterate constipation resulting in damage to the bowel mucus membrane due to chronic irritation and inflammation by the action of the ricinoleates in the oil.

Similarly infants are observed to be given preparations containing alcohol. Many patent preparations, mixtures from dispensaries made up of wine, tinctures, spirits and Asavas and Arishtas contain alcohol. This goes to the child at times in good quantities and for some length of time. It sets up chronic irritation of the delicate mucus lining of the bowels and gives rise to stimulation and later to depression of the child.

Small bottles of the concentrated vitamin A & D preparations on the market adorn the shelf of many a home. It has of late become a fashion to prescribe these drop preparations for a number of ailments and as a tonic to improve wasted children. They possess the advantage of ease of administration and have a place in the treatment of some ailments in children. But indiscriminate use is made of them, and in many cases they have not served the purpose for which they were intended.

Massaging a child with cod liver oil is very popular; here the act of massaging is of great value and the kind of oil used is of small significance; massaging with cocoanut oil is equally good, if cod liver oil is administered internally, and has the advantages of avoiding the foul smell of cod liver oil.

Advertisements of tonics and drugs for treatment of many illnesses abound in the lay press and on walls of cities and even in villages. Many of them are worthless and a few harmful.

Advantage is taken of by vendors of these preparations of the ignorance of the population to fill in their coffers; it is high time Government stepped in and put a stop to this exploitation of the gullibles.

But that means hoping for the Moon under the present circumstances. The struggle for existence is getting keener, the manufacturers of these patent preparations are systematically training the public to drug themselves, and with vast resources at their command and no code of ethics to follow, it will be very difficult for practitioners to compete with them, and the day is not distant when the doctor will be driven to the wall and be one of the screws of this vast machinery. The short-sighted practitioner helps in the disintegration of himself and his brothers by falling a prey to the request of the patients to prescribe a patent. It is time that the teachers of medicine point out the danger to the budding doctor.

I have given consideration to a few ideas prevalent in Western India about ailments and treatments in children and have evaluated them in the light of my experience of children for two decades. I have not concentrated on an occasional case which may tell a different tale, but on the vast majority of Indian children. It is possible that some of the views I have expressed may be erroneous and it is not unlikely that I may modify some later with further experience in this field.

Toxoid Therapy for Diphtheria

The use of diphtheria toxoid instead of or in combination with anti-toxin is definitely a new therapeutic procedure. This method is based on the following idea: The body cells may accept either toxin or toxoid. Toxin is dangerous; toxoid is not. If it would be possible to bring the toxoid to the body cells before the cells are reached by the toxin, the cells might be blocked against the toxin and thus be protected. To achieve this blockade the toxoid was given intravenously daily for ten consecutive days.

In Cremer's district of Western Germany diphtheria for some time has been developed from a children's disease into a disease more frequently seen in adults. During the spring of 1946, for every 50 cases in persons under 17 years of age, 360 cases in persons over 17 years of age were reported. Myocarditis is the most frequent complication of diphtheria in persons over 17 years of age. Therefore, continuous electrocardiogram control is required, even starting before toxoid therapy is initiated. Cremer has treated 95 persons with the new toxoid therapy. Of these, 60 remained free of myocardial damage and 35 showed some signs of damage in the electrocardiogram. None of the 95 toxoid-treated patients died, while a mortality of 4 to 5 per cent would have been expected without the use of toxoid (with antitoxin only).—(J. Cremer, *Arch. f. Kinderh.*, 134: 106, 1947).—*American Journal of Diseases of Children*.

CLINICAL IMPORTANCE OF CERTAIN PECULIARITIES OF THE ANATOMY OF THE CHILD

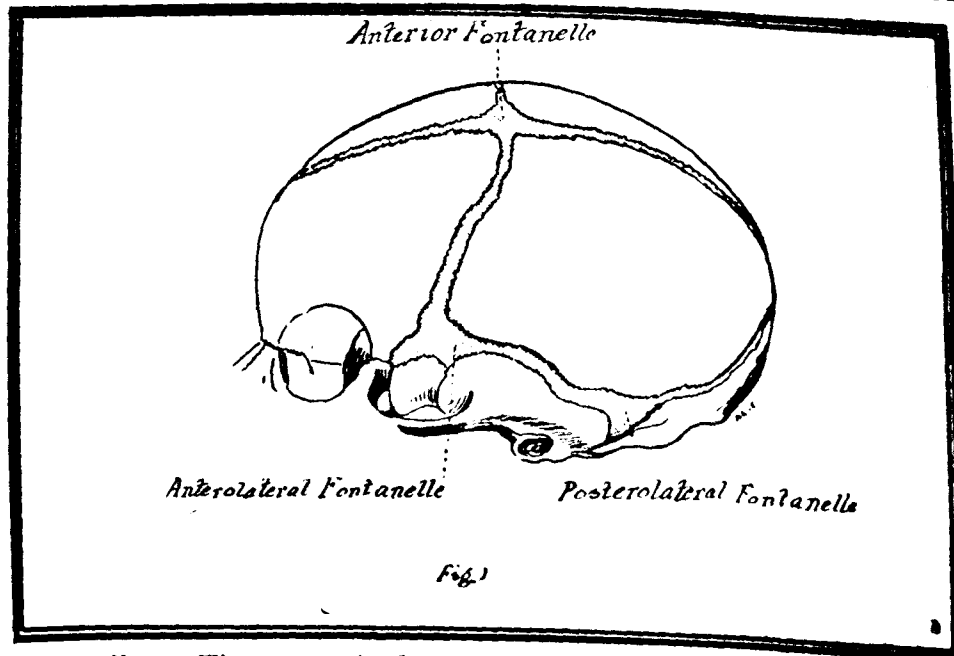
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THIS article is intended to provide the general practitioner with consolidated information about certain peculiarities of the anatomy of the child, that may be of great clinical importance and utility to him in his daily routine.

I. The skull.—It is only partially ossified at birth, the gaps being filled with a membranous structure. These gaps are called



fontanelles. There are six fontanelles at birth, all being in relation to angles of parietal bones. Two are median and four are lateral. The median fontanelles are posterior and anterior. The anterior one is the most important from the clinical point of view. It is situated at the place where the two parietals and the frontal bones come close together (*Fig. 1*). It is rhomboid in shape and measures about $1\frac{1}{2}$ " x $1\frac{1}{2}$ ". It persists for two years after birth and is a non-rigid area of the skull. This area can be of assistance to a general practitioner as follows:—

(a) For venipuncture and venicolsis for administration of blood and other fluids in a child. Through this area, a big venous channel (superior sagittal sinus) can be approached without much difficulty.

The superior sagittal sinus lies at a depth of $1/8$ th to $3/16$ th inch from the surface, is exactly in the midline and can be approached easily. A small area centred over the fontanelle is shaved. The baby wrapped in a blanket with his arms by his side, is placed on his back. The attendant grips both sides of the head with her hands and steadies



the body with her elbows. The operator can either sit facing the fontanelle or stand at the side of the infant. The shaved area of the skin is sterilized. With the left hand, the margins of the fontanelle, which is of the shape of a lozenge, are palpated. A puncture is made, $1/4$ th inch anterior to the posterior corner of the fontanelle, strictly in the middle line and pointing towards the occipital protuberance (*Fig. 2*). Two definite layers have to be penetrated: first, the skin and the aponeurosis; and, second, the outer wall of the venous sinus. When the blood has been obtained or transfused as the case may be, the infant's head is elevated and the puncture is sealed with Collodion.

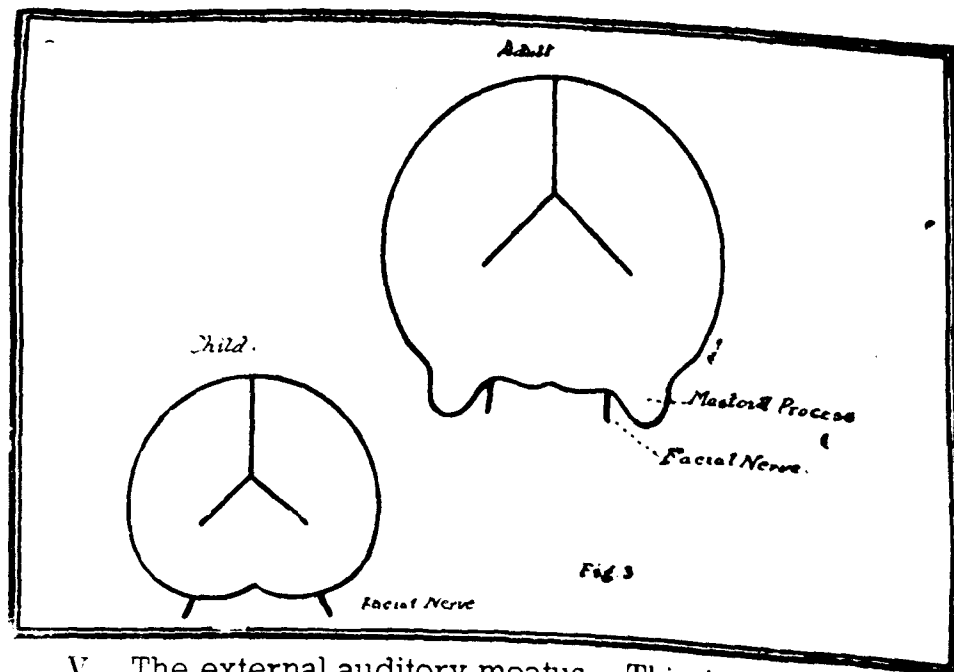
(b) To find out the state of hydration of a baby. Abnormal depression of the membrane indicates an insufficiency of body fluids. The degree of tenseness of the membrane gives an index of the intra-cranial pressure.

(c) For diagnostic puncture of the lateral ventricle.

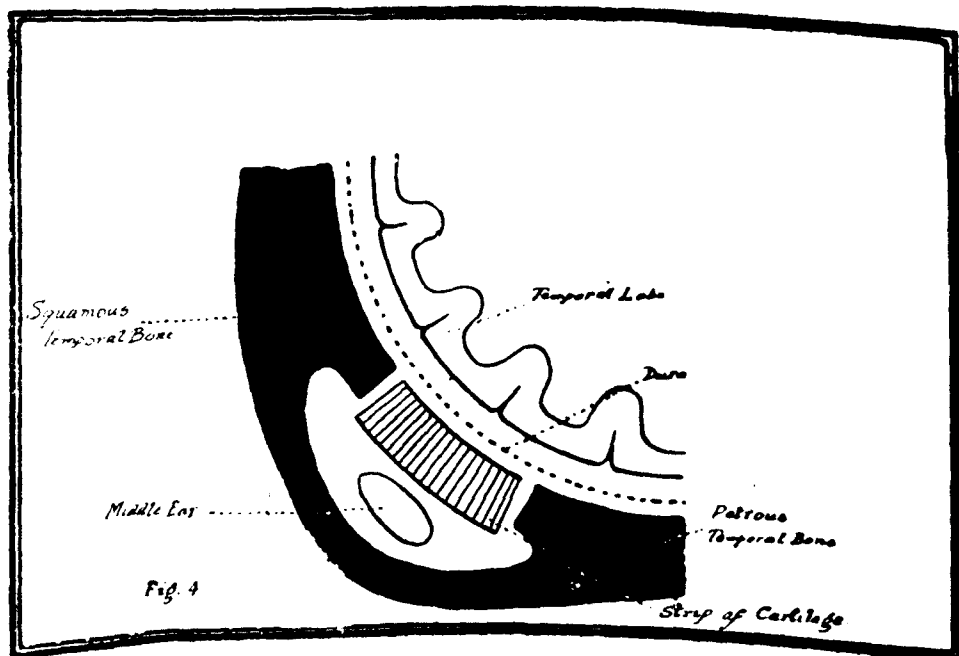
II. The mastoid process.—This does not begin to develop until the end of the 2nd year and thus the facial nerve is a subcutaneous structure (*Fig. 3, vide page 508*) and is in danger of being cut by an incision behind the ear which extends too far down.

III. The petrous temporal bone.—In the infant there is a strip of cartilage uniting the squamous and petrous parts of the temporal bone. This cartilagenous strip is very thin and lies under the dura and the temporal lobe of the brain. Infections of the middle ear spread readily through this cartilage to cause meningitis or abscess (*Fig. 4, vide page 508*). Thus infections of the middle ear should be treated very early in children if these complications are to be avoided.

IV. The auditory tube.—This is relatively wide at birth and the infection of middle ear and mastoiditis are common. Therefore the infections of the tonsils and adenoids should be treated at an early date.



V. The external auditory meatus.—This is relatively small and straight and thus the tympanic membrane is very much nearer the surface and stands in danger of being injured if the speculum is pushed in carelessly.



VI. Frontal sinus.—This does not exist at birth. It begins to develop as an outgrowth from the nose during the first year. It is rarely evident before the 7th or 8th year. It reaches full development between the 15th and 20th years.

If this fact is recognised, one can exclude the frontal sinus disease in children of less than 7-8 years of age.

VII. The respiration.—This, in the first two years of life, is almost entirely abdominal (diaphragmatic), due to the circular shape of the thorax and horizontal position of the ribs. It changes to thoracic as the ribs assume oblique position during growth. After abdominal operations in children, as there exists then an abdominal wound which is painful on respiratory movements, the child restricts these movements as much as possible, thus interfering with the excursions of the diaphragm. The result is that the lungs are improperly ventilated and secretions tend to accumulate in them which may become infected and cause pneumonia.

Thus any child with abdominal operation should be made to breathe deeply and encouraged to cough by giving regular Carbon dioxide inhalations.

VIII. The liver.—This is relatively very large at birth and occupies much of the abdominal cavity, and is felt easily per abdomen in a normal child. This fact should always be remembered if erroneous diagnosis of enlarged liver is to be avoided.

IX. Perirenal fat.—There is very little perirenal fat in a child and the kidney is intimately related to the peritoneum. The peritoneum is therefore often torn in injuries to the kidney, and intra-peritoneal hæmorrhage giving rise to signs of free fluid in the abdomen, is common.

Furthermore, perinephric abscesses are very common in children due to absence of this perinephric fat and easy passage of organisms from hepatic and splenic flexures of the colon which lie in intimate contact with the kidneys on the right and left side respectively. Perinephric abscess must therefore be excluded in cases of pyrexia in children where the cause is not obvious.

X. The omentum.—Localisation of intraperitoneal inflammation is poor in children due to poorly developed omentum, and children therefore should be operated early for conditions like acute appendicitis.

XI. The urinary bladder.—The fact that the bladder is an abdominal organ is taken advantage of in diseases of urinary bladder in children. In cases of acute retention it may be aspirated per abdomen, without any fear of peritonitis.

XII. The large intestine.—In children appendices epiploicæ are not present and the surgeon therefore finds it difficult to identify the large intestine in abdominal operations. We are not certain about the exact age of their appearance. However, work is being done to determine the same.

THE CHILD AS A SURGICAL SUBJECT

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THE child is not a miniature adult and the new born is not a miniature child. Many experiences in both Medicine and Surgery prove the value of this saying. By applying simply the Laws of Surgery in children soon we would meet with failure after failure. The child is a growing individual, is obeying special, very characteristic physiological and patho-physiological rules. The response to any pathological impulse will be given according to its own laws, not according to the laws which are governing the adult organism. The normal anatomy of a child differs widely from the anatomy of an adult organism. The pathological changes are mostly to a certain extent different and characteristic too.

Without any doubt children can support great and greatest interventions by observing some—mostly very simple—rules of paediatric surgery. This statement of mine is proved by hundreds and thousands of successful brain, heart, thoracic and big abdominal operations in children.

There is no doubt about it, that modern medicine has grown too vast for one human brain. But it is equally true that the "University" principle cannot be neglected altogether. Progress in details are made by workers, specialized in one very limited field of science, but the solutions of big problems are waiting for scientists, who have acquired sufficient knowledge in many different fields of science.

In consequence we need specialists in many limited fields within surgery, nevertheless it must be emphasized, that surgery is a clinical entity and a man who is worth this distinction must be conversant with the whole subject to a certain extent.

In every big centre in the West there are surgeons with special liking for paediatric work. Such men are gradually specialized in it, giving up the surgery of adults. Yet many emergencies must be dealt with by a general surgeon and to a certain limit—in remote places—by general practitioners. But it is clear, that any general practitioner must be conversant with the special indications and aspects in paediatric surgery.

To start with, there is the age, which must be taken into consideration in dealing with a special case in paediatric surgery.

For the delivery the child is provided with a liberal amount of antibodies from the maternal organism. This provision will last for 24–48 hours, henceforth all the life-threatening congenital abnormalities must be operated during the first or second day of life. If for some reason or other that is not feasible, the operation—if not an emergency—must be postponed to a later date, when the child is

regaining his original weight. Still better it is to wait patiently until the increase is steady and the body weight is at least 10 pounds.

The ano-rectal atresia is likely to reach the surgeon on a very early date. I am not speaking of the imperforate anus, in which the closing membrane can be split by any practitioner, but about the more severe degrees of that kind of malformation. In 24 hours sufficient gas is swallowed by the child to reach the lowest part of the intestine. Then the hour of operation must be fixed, immediately after an X-ray of the child is taken in head down position, showing clearly the distance between the anal surface and the intestine. It is a rule that, when the distance is wider than 2 inches, colostomy must be done. We ought to postpone the very intricate operation necessary to bring down to the proper place the intestine, if feasible, to a later date, mostly around the second year, when the child will be sufficiently strong to support such an operation and the tissues will be sufficiently differentiated to help the surgeon to reconstitute the normal position.

To open the passage is an emergency, to postpone the operation will multiply the danger: the organism of the child will be no more protected by the maternal anti-bodies, the toxicosis developing from the intestinal obstruction will also weaken the resistance of the child.

Yet it would be an error to think, that the operation, from below or even a colostomy, as a last resource, is an easy one. The tissues of the newborn are not so differentiated as in an adult, moreover they are friable. Sutures can cut through, frustrating all our surgical work. The region, when we are operating from below, is a very vascular one and the child is very badly supporting even a small amount of blood loss.

Equally it would be a great error to postpone the operation, because of the expected technical difficulties. The newborn at least is a healthy individual, which condition is many times more precious for us as the small difference in an easier technique, because of the little bit more differentiated tissues.

If the atresia is complicated with fistula, the child with a fistula leading into the bladder or into the ureter must be operated without delay. The operation of other fistulous cases, if the safety valve, that is the fistula, happens to be sufficiently large, can be delayed until the child is strong enough to support the detailed plastic operation.

It is quite obvious that amniotic hernias, myeloceles (if feasible and sensible to operate) must be operated immediately after birth.

The congenital pyloric stenosis, if congenital at all, and the duodenal obstruction in the newborn must be clearly differentiated, because the decisive time factor can only so play the important part in our consideration. The congenital pyloric stenosis will cause

symptoms 8-14 days after birth, the duodenal obstruction 24-48 hours after it. The latter must be operated immediately, if we want to be successful. The pyloric stenosis might be treated for a very short time conservatively, but the best results have been recorded from clinics in which early operation is accepted as a routine. Dessicated, cachectic babies would not support the operation at all. All over the world the Ramstedt operation is accepted. By performing this operation, we ought to know that every single muscle fibre of the hypertrophic muscle mass must be severed.

Only recently are recorded successful cases about babies suffering from congenital obstruction of the extra-hepatic bile ducts. Such kind of operations are technically extremely difficult. It is an interesting fact to know that some babies, who have not been operated, can survive with complete obstruction one year or even somewhat longer.

The cleft lip in a healthy newborn is to be operated in the first or second day. Alimentary and respiratory troubles can cause in such a baby, if left unoperated, serious complications, even fatal ones. If the cleft lip is connected with the cleft palate only, the closure of the cleft lip must be done in the newborn. The closure of the cleft palate ought to be postponed so far as the 18th-20th month of life. The best technical solution in a child who is already speaking, would only very slightly ameliorate the speech of the child. The result in any cleft palate operation is not dependent on the closure of the gap. The closure must be performed in such a way, that the physiological function of the soft palate shall be restituted to normal. Equally important is the speech-training after operation. It is a lost case if the mother happens to suffer from cleft palate too. This speech-training, which is absolutely the domain of the respective mothers, is a very hard problem over here.

Speaking about the time factor we ought to consider the congenital hernias. It is very rare to be compelled to operate on a simple congenital hernia at an early time in life. It would not be wise to do so. First of all many of the congenital inguinal hernias will disappear later in life with or without any conservative treatment. If because of the tendency to incarcerate, or because of rapid enlargement, we would consider it wiser to operate, we can do so safely after the 6th month on a healthy baby. In weak babies it is better to postpone the operation until the baby is getting mixed food, that is around the 10th or 12th month. It is a common error over here, that babies are far too long breast-fed. As regards technique, hernioplasty is generally contra-indicated, what is necessary is to remove simply the sac.

It would be a big error to rush into any kind of hernia operation, except the strangulated ones, without controlling first the respiratory or alimentary troubles, common causes of the rapid enlargement or threatening strangulation.

The congenital umbilical hernia has 3 characteristic features. It is conically shaped, small and the content is freely movable. Thus there is no danger of strangulation. It is very likely to heal spontaneously in the first 2 years of life. Strapping by elasto-plast is fostering the healing process. If up to the age of 4-5 closing is not achieved, operation is indicated.

Strictly speaking, most of the so-called congenital umbilical hernias are not at all congenital. The umbilicus is only gradually closing after birth. If in the first one or two months, cough, constipation or diarrhoea supervenes, hernia might develop.

The undescended testis seems to be a very interesting problem, no agreement is reached yet concerning the best method of treatment. In the first year of life a certain number of undescended testis will reach the scrotum, that will complete the descent. It is true that many undescended testis are simply retractile testis, in which case the strong cremasteric muscle will pull up the testis into the superficial inguinal pouch. Such a retractile testis will sooner or later reach the scrotum and remain there. By evaluating the results of conservative treatments it is very important to think about that eventuality which is not infrequent at all.

The undescended testis is more liable to malignant degeneration.

Gonadotropic hormones are claimed to have a certain action to foster the descent by prolonged use in small children.

Any operative method is able to bring down and to fix in the scrotum the undescended testis, nevertheless in the majority of cases no further development can be observed and spermatogenesis will be certainly missed.

It is very interesting to note that if operation has been done on both sides, one testicle is likely to develop normally and even spermatogenesis can be proved.

By taking into consideration that in small children no malignant degeneration is likely to occur, it is a convenient solution to wait for the operation until the age of six if, with or without conservative treatment, the testis remains still undescended.

The hypospadiasis and the less frequent epispadiasis must not be corrected urgently. To such a plastic operation we need a liberal amount of skin. We will have that at our disposal if the child is somewhat older. I like to perform such an operation between 4 and 6 years of age, that is before the child goes to school.

The extroversion of the bladder can be cured seemingly definitely by transplantation of the ureters into the recto-sigmoid and excision of the extroverted bladder. Many cases operated 20 years ago, or even more, are still alive and healthy. The immediate danger of such an operation is insignificant by using the modern Sulpha therapy and dividing the operation into 3 stages. Nevertheless over here I would not rush with such a kind of operation. My

experience can be only a very limited one in this country, but it seems to me that adults are supporting very easily the transplantation of the ureters, but the children are getting through the operation without difficulties, even ascending infection is not developing at all yet, they are slowly losing their weight, their appetite disappears completely, they are getting less and less interested in their surroundings and will die in some months' time or so and we will be unable to detect any marked pathological condition with our present equipment. It was not possible to prove that some toxins are absorbed from the child's recto-sigmoid, which is not in inverse proportion to the age of the child, hence we might delay the operation up to the age of 10. According to my experience it is not likely that the kidneys are getting infected in a young child if no manipulation is attempted to stop the flow of urine. To the technical side of the operation it is necessary to know, that the ureters ought to be liberated only to such an extent, that no tension shall be present when the transplantation is carried out. It is very important to save as much from their blood supply as possible, that is, not to clean them from the surrounding fatty tissue. The transplantation itself must be so simple as possible.

Avoiding operation in the early adult life, ascending infection or malignant tumour formation will lead to fatal consequences.

The congenital hydrocele must not be operated. One or more aspirations will cure the condition. Use of sclerosing fluids is not necessary. Trans-illumination before aspiration because of complicating hernias and anti-position of the testis is necessary.

It is understood that any form of intestinal obstruction can be found in childhood, yet there is a special form, which must be specially mentioned, the intussusception.

The patient is mostly a strong male baby around the 8th month of age. The trouble starts suddenly abdominal colics with intervals of relief. Called soon after the onset it might be life-saving to the child to do a rectal examination. Blood-stained slime will cover our gloved finger. In such an early state conservative treatment will be efficient in about 90% of cases. The treatment is very simple, water enema with a pressure head of 60 cm. The result must be verified by barium enema.

In later cases, or if conservative treatment fails, operation must be done. In cases operated in time gentle pressure on the intussusciens will prove efficient. Pulling on the intussusceptum is strictly forbidden. If the first gentle attempt fails, the intestine is returned into the abdominal cavity and packed in compresses, soaked in warm saline. After 10 minutes or so, a new attempt is made, if unsuccessful resection must be done. To force the reduction, to repeat it innumerable times, will certainly lead to very high fatality rate, caused by irreversible shock.

The congenital dislocation of the hip is almost always not at all congenital. The disposition is congenital, but it is only very seldom detected. This disposition is caused by the hypoplasia of the joint, the treatment—retention or reduction and retention—must last 1–2 years. In the 2 first years of life the prognosis is excellent, up to the 6th year the prognosis is good, from this period onwards the usual treatment is no more feasible and some kind of operation must be performed.

It is a common error to stop the conservative treatment too early, that is before acetabulum shows a normal configuration.

The second most frequent congenital malformation from orthopaedic side is the talipes. This is a real orthopaedic emergency. Two faults are rather common in the treatment. To reduce with undue force, without proper knowledge of the true nature of the malformation, and, secondly, to stop the treatment in 6–12 weeks, when the configuration seems to be normal. The treatment, perhaps only supervision, can only be stopped, when the muscle power of the supinator muscles is in balance with that of the pronators, usually when the child is walking.

The infantile paralysis offers a big lot of very valuable work to the surgeon. In dealing with such cases some rules must be strictly observed.

For surgical purpose 4 states can be differentiated, the pre-paralytic state, the paralytic state, the state of reparation and the end state. If the surgeon is called in time he cannot simply wait until in one or one and half years the end state is reached. He ought to fight against the 2 big dangers: the over extension of the paralysed muscles and the contracture of the healthy antagonist. Reaching the end state he must correct first the contractures already present in spite of his care, after that 1 or 2 years must be left, to give time to the muscles to recover so far as it goes, liberated from over extension. Only after this time period the different, more or less elaborate, operations can be performed for restitution of the lost muscle power.

The surgeon must not be keen to solve the whole problem in one stage. It is better to divide the necessary operation in so many stages as possible. First in such a manner the correction is less load for the child, secondly if one operation fails, not too much is lost, it will be easy to correct it within the next stage.

The chapter of the pyogenic infection is one of the most important in paediatric surgery. A certain resistance against pyogenic infections is only slowly developing, due to repeated insignificant or more or less severe infections. In children, living in poor surroundings, that is more evident than in children of better class people. Excepting children in very low condition, the elastic and unimpaired circulation, the healthy kidneys, liver and other vital organs are

outweighing the mentioned handicap to a certain degree. The answer of the organism to the chemotherapeutics and antibiotics is more marked as in adult life. The Sulpha drugs are well tolerated, the dose according to the body weight can be 3 times higher in small children as in adults. We have been very conservative ever since in regard to children suffering from acute empyema. In the era of chemotherapeutics and antibiotics this conservatism has even more right. Aspiration and intrapleural injection of the drug will avoid opening of unlocalized empyemata with almost always fatal result. The danger is to push too far our aspiration treatment. In that case chronic empyema may develop. In a case, which is not yielding to aspiration, a closed drainage in due time will be mostly sufficient to cure our little patient.

In the pre-Penicillin era it was obvious, that the acute haematogenous osteomyelitis was an incurable disease. Irrelevant whether we did follow an extreme active, a moderate, or an extreme conservative surgical treatment, recurrences occurred even after 20 years of perfect health. At the time being, if the case is seen shortly after onset, even the subperiosteal abscess formation can be avoided. If an abscess has been already formed aspiration and subperiosteal injection of Penicillin will mostly achieve complete cure. If not, we will simply incise the practically sterilized abscess.

It must be remembered, however, that up to the age of 2 the infecting organism is mostly the streptococcus. In such a young child the inflammation might spread through the epiphyseal cartilage and reach the joint. It is equally important to know, that so far as our present knowledge goes, some kind of bony destruction cannot be avoided even with the earliest Penicillin treatment. Therefore immobilization of the limb is still essential.

Whether or not the early Penicillin treatment is able to secure definite cure, without the danger of late recurrence, cannot be answered at present.

Pneumococcal peritonitis, chiefly the primary form, is the disease of female children in the age period between 2 and 10. The onset is acute, temperature and leukocyte counts are high. In the cases, the pelvic region, later on the peri-umbilical region will be the most tender spot. Cyanosis, at least some bluish tinge, is present on the lips and on the top of the nose. Herpes of the lips or nostrils is very characteristic too. Nevertheless, from time to time, we will meet cases in which it would not be possible to exclude a severe form of appendicitis. In my opinion, in such a case, the simple exploration in local anaesthesia from a small grid iron incision is less dangerous as to try to aspirate some fluid from the abdomen when there is not yet a localized fluid collection.

In obvious or verified cases Penicillin and Sulpha drugs will control the infection if the treatment did not start in a dying overtoxicated child.

From the big mass of common pyogenic infections I would only mention 2 peculiarities in children. In a child, after an exhausting infectious disease, any kind of common pyogenic infection is very likely to be generalized, but in paediatric surgery it is no hopeless septic case. Sometimes we might think, because of our modern treatment, that even a dying child can be saved. I ought to mention, that girls around and during the puberty are very sensitive to pyogenic infections and their natural resistance seems to be very low.

In India, in many places, the goitre is endemic, consequently it seems to me very important to consider that problem from the point of view of the paediatric surgeon.

The demand for thyroxin in the growing organism is great. In many a child, around the puberty, the thyroid gland can only meet the demand by hypertrophy. Such a juvenile diffuse goitre must not be treated at all. It will in most of the cases disappear around the age of 20. Nodular goitre or primary or secondary hyperthyrosis can be encountered in children. Hence, theoretically, indication for an operation could be justified. Yet it is wise to postpone the operation up to the age, when the organism is fully developed and to operate earlier only because of vital indication. Such a vital indication is an incarcerated retrosternally situated big nodule or a fulminant hyperthyrosis.

There are 2 conditions, which only I mention, because they are too frequently forgotten, that rarely they can occur in childhood. Appendicitis, because of anatomical reasons, is very rare under the age of 2. Still there is a possibility for it. It is practically impossible to find typical tenderness or rigidity in a crying child. It is a luck, if the doctor happens to find the child sleeping, still we cannot count on that. To examine the child in a prolonged lukewarm bath might help. In difficult cases even a light general anaesthesia is permitted, to continue with it during operation if the diagnosis is affirmed, or if appendicitis still cannot be excluded. It is better to take out 9 healthy appendices from not otherwise seriously ill children, then to risk a perforation in one single case. In older children appendicitis is quite frequent. We must remember that it is a lymphoid organ, that the child has a low acidity, and in consequence quite often appendicitis follows some kind of tonsillitis. Measles, scarlatina, typhoid in the early stage can mimic appendicitis. In such a case the operation is not only unnecessary but is definitely harmful for the child.

The low acidity of their stomach protect the children from peptic ulceration, and in consequence even in adolescence peptic ulcers are exceedingly rare. Nevertheless, peptic ulcer might occur in rare cases even under the age of 10. Interestingly, peptic ulcer in children is taking rather a serious course. Can be, because it is not detected in time, can be because it develops only in children with a marked disposition for that disease. Severe bleeding, pyloric stenosis

is not uncommon in such a case. The treatment should follow general surgical lines. The children so treated are developing normally. The dreaded peritonitis type of anæmia after partial gastrectomy has been never proved in our very extended material, including our operated children.

The extra-pulmonary form of tuberculosis is very frequent in childhood. Bone and joint tuberculosis is most frequent in the first 5 years of life. Tuberculous lymphadenitis is frequent chiefly on the neck and mesentery. To avoid errors we must remember that in young adolescents Perthes' disease can cause considerable difficulty in making differential diagnosis between it and tuberculous coxitis. Equally important to know is that mesenterial lymphadenitis can have its cause in pyogenic infection.

In adult life the enteral form of tuberculosis is almost always associated with pulmonary tuberculosis. In children it can be a solitary clinical manifestation.

Late tuberculization associated with heavy infection can lead to easy generalization and fatal outcome.

Generally speaking, any tuberculous infection in small children, causing first a localised pathological change, is very prone to generalize, due to the imperfect protection which is only gradually and slowly developing. Therefore, the severity of any tuberculous infection is in inverse proportion to the age of the child. Any infectious disease is likely to flare up a slumbering tuberculous infection in childhood.

The high protecting power of vaccination has lately been proved by the immense material gained by compulsory vaccination in Russia. About Streptomycin no definite opinion can be given at present in surgical cases.

Generally speaking, the grade of malignancy of a malignant tumour in childhood is just as well in inverse proportion to the age of the child. Taking into account that in most of the cases we are facing very advanced stages, because the possibility of malignant tumours in childhood is not sufficiently born in the mind of the general public, it is not advisable to perform any drastic, mutilating operation. It would not secure the child from recurrences. The pre- and post-operative X-ray treatment is a very delicate matter, because of the very sensitive skin of the child, which can be very easily damaged by X-rays.

Burns are, in my opinion, more frequent over here as in the Western countries. Children can easily lose a higher proportion of their body weight in fluids, as adults. Therefore burns are more dangerous in childhood as in adult life. Plasma in the needed amount can scarcely be afforded for most of our patients. To cover the epithelial defect as early as possible must be our primary effort. We must remember that grafts from any donor can take temporarily. So it would be possible to overbridge the critical period and

proceed with autografts when the child is sufficiently recovered. Furthermore, we ought to remember that early grafting will prevent infection. In late cases we must not wait until the whole surface is ready for grafts, but we might proceed in stages. Amnion might prevent the excessive fluid loss, besides it might even take and be transformed entirely or partly into smooth skin. Definitely it fosters the epithelization. To wait for scar formation is a big error not counting the danger of contractures and the high costs. Keloid formation after extensive scar formation is very common over here and keloids are potentially malignant.

Due to special anatomical and physiological causes, fractures are usually very well healing in childhood. Even marked angulations are completely corrected by the growing bones in some years' time. One factor must be remembered, that is not to interfere with the blood supply of the limb. If the displacement of the fracture is preventing the free blood supply, immediate and efficient treatment must be sought to liberate the vessels. In childhood we must be very careful in applying plaster cases. The child is prone to develop very quickly extensive œdema, thus interfering with the necessary blood supply. It must be a rule not to apply plaster cases at least in children, without having steady control over the patient. Oedema formation, anæmia, cyanosis, loss of function, continuous pain, coldness or even only tingling will indicate to cut immediately the whole plaster case to reconstitute the impaired circulation, lest the big danger of Volkmann's ischemic gangrene threatens. It is a tendency to treat rather the skiagram and to neglect the aim to reconstitute the best possible function. It is true that, in most of the cases, the perfect alignment will secure the best possible function, but not always. To preserve the function is our primary care and even we might sacrifice the anatomical alignment, knowing that later on this defect will be corrected without our preoccupation. Therefore most of the very elaborate methods of fracture treatment can be safely discarded in childhood.

I would like to mention 2 practical rules which proved very valuable in dealing with fractures in children. High temperature after a plaster case is applied is heralding skin necrosis, hence the case must be immediately split or removed, if no other cause of the high temperature is to be found. The skin of the children, as I have mentioned already, is much more sensitive to X-ray damage as in later life. Too many screenings, too many skiagrams can easily cause X-ray burns.

Now speaking about intrathoracic operations, our routine has been to operate the children in local anæsthesia, if needed, combined with a very superficial general anæsthesia, if and when it was needed. In expert hands—because of the miniature anatomical proportion of the child—low spinal anæsthesia is a very safe procedure in children; on the contrary, there is a widespread opinion that spinal anæsthesia

cannot be used in childhood. The occasionally dropping blood pressure is in no time corrected by the very elastic circulation of the child.

The success of our local anæsthesia will largely depend on the friendly relation of the child to the team, mainly to the anæsthetist, who is there to control the child during operation. If for some reason or other general anæsthesia is preferred the smooth introduction of the anæsthesia is again in direct proportion to the friendly relation, and the friendly behaviour of the anæsthetist to the child. Too brisk introduction with very marked excitement will herald serious trouble during operation. The very sensitive nervous system gets overexcited during the introduction period and will be more apt to a neurogenic type of shock.

Coming to the general surgical technique, I may state that it is essentially the same as for the operations in adult life. Nevertheless, one point must be stressed. Dealing with adults many errors, even faults, can be committed in the majority of cases without any harm to the patient in question. In pædiatric surgery, alike in brain surgery, errors or faults are very badly tolerated, if at all.

In the pre-operative care the correct feeding of small children is immensely important. It is fairly simple to feed a healthy child, it will be a very complicated job to select for the child the proper food before operation in the days of serious surgical disease. We will appreciate very much the experienced help of the pædiatrician. Fasting and purging have long ago become outdated even in surgery for adults. They might interfere with the so important protein and electrolyte balance.

It is very convenient for operation in babies to use a flat metal container with a concave cover. In the cold season the container can be filled with hot water. Of course we must be careful to protect the baby from direct contact with the container. To this container the baby is securely bandaged and the whole container can be moved for the convenience of the surgeon.

In the hot season it is very difficult to prevent extensive fluid loss by perspiration. The solution for this all important question is an air-conditioned theatre. In any serious case, dealing with small children, we might introduce a small sized catheter through the nose into the œsophagus to secure sufficient fluid intake even during operation. The catheter will be securely fixed to the face of the child and it will be of great help in the early post-operative time. The babies are seemingly not at all disturbed by the presence of the catheter. Even if blood is available, in most cases it is difficult to make transfusion into a small child. The best way is sometimes the vein which runs in the mid of the front. I would warn against making transfusion into the sinus. Without any danger sufficient blood can be transfused into the tibia. I would not advise to use in children the sternum for this purpose. Even in adults this type

of fluid intake is losing day by day its once big popularity. To prevent the baby and ourselves from all this trouble it is imperative to avoid any blood loss during operation. In my opinion the greatest single danger of any kind of operation over here is the blood loss. Not counting the anæmic patients, many of our surgical subjects, seemingly in fit condition, are tolerating very badly blood loss, chiefly during and after operation. We are until now unable to find out before operation which patient will tolerate a moderate blood loss and which patient would not. Children in inverse proportion to their age are even more sensitive to blood loss as adults.

To prevent drying out and cooling down of tissues and organs, not to pull and push and press tissues and organs briskly, are general surgical rules. These very rules are vitally important in children. Observing them vigorously will enable us to perform great and greatest operations even in small children.

It is very important to place our sutures without any tension and very carefully, because in the very friable tissues of children the sutures might cut through.

Collodium provides a very good and cheap air- and water-tight cover for completely closed wounds. In pædiatric surgery its advantage is enlightening.

In the post-operative treatment of serious operations the mentioned feeding through a small sized catheter, introduced through the nose, will give excellent results in small children. In such a manner it is fairly easy to maintain the so necessary protein and electrolyte balance.

In small children Anodynes will be hardly necessary. The child, provided the bedding, dressing and perhaps splints are in order, would not show any sign of pain or inconvenience.

To make a long story short, pædiatric surgery must be performed in a most delicate manner. It is never a fault in surgery to be careful and delicate in technique. In children this is simply imperative. It will be a great help for us to be provided with the necessary fine instruments, nevertheless many of the greatest operations can be performed in children with our usual equipment.

In a short article, like the present one, I could only mention some of the typical examples to show the big and important differences between the general and pædiatric surgery. If I could impress upon some of my readers to get themselves interested in this important and gratifying field, I would be sufficiently rewarded.

ANÆSTHESIA IN CHILDREN

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ANÆSTHESIA in children is not an easy problem. It taxes even the ability of the best anæsthetist during a major surgical operation. Accidents on the operation table and post-operative complications are not uncommon in these cases. So it requires considerable skill, experience and judgement on the part of the anæsthetist while anæsthetising children, and he must possess a thorough knowledge of the physio-pathology of the various conditions, for which the operation is required. Besides looking to the safety and comfort of the patient, he must look to the convenience of the surgeon during an operation and help him in the post-operative treatment of the little patient. So his primary object, while tackling these problems, should be to ensure adequate pre-operative preparation of the patient, to make a proper choice of anæsthesia, and, lastly, to see that the patient recovers, smoothly and uneventfully in the ward, after the operation. The first two aspects of the problem only will be dealt with here, as the post-operative measures adopted in children as well as in adults remain practically the same.

A. Pre-operative preparation of the patient.—Soon after admission into the surgical wards, the patient undergoes a thorough clinical examination and a few routine laboratory investigations. A special note is made about the cardio-vascular and respiratory systems. In older children, as in adults, certain cardiac efficiency tests are made to assess the degree of operative risks. They include pulse rate, blood pressure, 'Moot's formula', oculo-cardiac index, myocardial index and 'Crampton-value.'

Associated conditions, such as anæmia, cachexia, dehydration, avitaminosis, inter-current infections, endocrine disorders like diabetes, thyrotoxicosis, toxæmic conditions etc., need proper treatment prior to the operation.

Now coming to the psychological aspects in anæsthesia, the anæsthetist has to win the confidence of the little patient and the anxious-looking parents and relatives. To achieve this object, he must be familiar with them a few days before the operation, with an occasional charming smile and reassuring words. Children, except infants and very young ones, remember about past events in life quite well. The psychic trauma that may be inflicted by the ordeals of anæsthesia and operation may be too great to affect the future mental outlook of the child, who remains very apprehensive and excitable temperamentally. These may get aggravated during anæsthesia, especially when the parents are found panicky or distressed with the thought of the operation. In such cases, during anæsthesia, the metabolic rate is increased and endocrine secretions

are augmented with a stormy induction, unsatisfactory maintenance and severe post-operative shock. So he must tackle these problems smoothly, by suggestions and cheering words, failing which by adequate sedation of the patient during the pre-operative period.

In emergency operations, however, a detailed pre-operative preparation is not possible.

Starvation of the patient prior to the operation is to be deprecated as it induces post-operative ketosis due to glycogen depletion from the liver which gets easily susceptible to the toxic action of anæsthetic agents under such a condition. The child should be given plenty of glucose drinks in the form of barley, sugar, fruit juice for two or three days before operation. The last drink should be given three hours before the administration of anæsthesia. No milk should be given in the last feed as the clots formed in the stomach may remain and vomited out during induction of anæsthesia. Babies should have their last milk feed 3-4 hours before operation. Where possible, intravenous injection of glucose must be given before starting the anæsthesia. Drastic purgings cause exhaustion to the patients and may be avoided. Clothing should be warm but light and the child should be protected against cold and chill.

Next comes the pre-anæsthetic medication of the patient which is very essential for a smooth and satisfactory anæsthesia. Its choice depends on factors such as age, the physical and mental condition of the patient and the nature of the anæsthetic agents to be administered.

Pre-medication should be given in adequate doses by proper technique and specified route and under the personal supervision of the anæsthetist. Instances are not rare when Morphine has been injected in place of Atropine with fatal results, capsules or tablets of Barbiturates given orally have been spat out without the notice of anybody and rectally administered drugs have been ejected out due to faulty technique. Loaded stomach and bowels may retard their absorption. Some children may resent the rectal introduction of a rubber catheter and get so restless and non-co-operative during the administration of the drug that it gets expelled, unless the buttock is strapped. Post-operative excitement may follow in some cases, but, on the other hand, a severe respiratory and circulatory depression may occur due to their cumulative action in cases of injudicious repetition.

Drugs used for sedating children belong mostly to the group of long acting Barbiturates and those that are commonly used are: Nembutal, Soneryl, Dial and Seconal. But for basal narcosis, Paraldehyde, Avertin and smaller doses of Thiopentone are the drugs of choice. Morphine, Omnopon and Scopolamine, although used in smaller doses in older children, should be avoided as far as possible, especially when toxic volatile general anæsthetic drugs are used. In infants and young children, there is no justification whatsoever for

their use. As to their dosage, mode of administration, indications and contra-indications, a detailed description of these is not possible here. But the following two drugs need some special mention as they are commonly used in children:—

(a) Nembutal, for sedation, may be given either orally in capsule or elixir forms or rectally as suppositories. Rowbotham recommends 0.6 grain per stone body weight, for oral administration given about an hour before operation. When administered rectally, the dosage is practically the same but is given three hours before operation.

(b) Paraldehyde is administered per rectum in doses of 3i per stone body weight mixed with equal amount of olive oil. The catheter, three-quarters of an hour before operation. A preliminary bowel wash is necessary. It is quite safe as a basal narcotic in children.

Last but not the least comes Atropine in the domain of pre-medication. It is used for all cases of general anaesthesia, as it stimulates respiration, checks excessive salivation and mucus secretion and prevents or minimises the incidence of laryngeal spasm and primary cardiac failure due to sudden vagal stimulation under light chloroform anaesthesia. It must be given in adequate doses, three-quarters of an hour before operation. Children tolerate Belladonna group of drugs well and toxic manifestations are seldom seen, unless there is associated pyrexia, dehydration, toxæmias, or acute sepsis, in which cases, its dosage is either reduced or Scopolamine is used in smaller doses in lieu of it.

B. Choice of anaesthesia.—No hard and fast rules can be laid down in this respect. Often it becomes a matter of personal likes and dislikes of the surgeon or the anaesthetist, but it is essential always to consider the age, the general condition of the patient, the degree of operative risks, the length and nature of operation and the various associated pathological conditions present.

Before selecting a drug or a method for a particular operation due considerations should be made of the following facts.—

In children, the metabolic process is high and hence their oxygen requirement is greater. In other words, they tolerate anoxia badly inasmuch as post-operative complications such as surgical shock, ketosis and some cerebral dysfunctions may occur. Thus one may realise the importance of maintaining a clear air-way besides the supply of liberal amount of oxygen during anaesthesia.

Secondly, judgment of the proper plane of anaesthesia is important. A light anaesthesia may invite troubles like laryngeal spasm, primary cardiac failure and poor muscular relaxation; whereas, a deep anaesthesia may produce surgical shock, ketosis and pulmonary complications during the post-operative period.

Thirdly, the anaesthetist must be well-equipped with adequate resuscitative measures to combat the various accidents and complications that may occur during anaesthesia, such as, cardiac failure, respiratory failure, convulsions and surgical shock.

Lastly, he must make a due note of the relative merits and demerits of the different anaesthetic agents and techniques, while selecting them from the children's point of view. A brief account of these is given below:—

Di-ethyl ether is the drug of choice, because of its potency, wide margin of safety, the simplicity of its equipments and its effectiveness in high oxygen concentration; besides, there are no undesirable cardiac effects nor any damage to the vital organs, unless the patient is anoxæmic. Its chief disadvantages are marked excitement period, excessive salivation and mucus secretion, frequent post-operative emesis and chest complications and occasional convulsions.

Di-vinyl ether is excellent for short operations, the induction being rapid and smooth with a quick recovery. But it is not suitable for maintenance due to its toxicity resembling that of chloroform. At times, it is used as a supplement to Nitrous Oxide-oxygen anaesthesia for relaxation for a short period.

Ethyl Chloride too produces a smooth and rapid induction with early recovery and is used either for operations of short duration or for induction only in those of long duration due to its high toxicity. If given in strong concentration it may cause spasm of the masseter muscles and vocal chords, depression of the vasomotor centre as well as cardiac irritability and hence it has got a narrow margin of safety. To obviate these troubles, a mixture of oxygen and Carbon dioxide must be used in Ethyl Chloride anaesthesia in children.

Chloroform, being a protoplasmic poison, exerts a cardio-toxic effect, besides causing liver and kidney damage if used for a long time. There is no justification for its use in modern anaesthesia except when there is a fire-hazard and non-inflammable agents like Nitrous Oxide and Thiopentone are not at hand. C_2E_3 mixture should also be discarded on similar grounds. Like Ethyl Chloride and Cyclopropane, chloroform and C_2E_3 mixture may cause sudden heart-failure.

Trichlor-ethylene is a safe and non-toxic agent, used both for induction and maintenance, though the anaesthesia is not quite satisfactory. But it is a good supplement to gas-oxygen sequence. Occasionally, tachypnœa and tremors are noticed during its administration.

Nitrous Oxide alone or Nitrous Oxide-air analgesia should not be used in children, as they tolerate asphyxia badly. Sub-oxygenation produced in such cases may cause excessive muscular rigidity,

and bleeding from venous congestion and post-operative complications already mentioned before. Due to the same reason Nitrous Oxide and oxygen anæsthesia is to be used for induction or for operations of short duration only. But in major operations, this should be supplemented with Trilene or Ether when muscular relaxation is required. Moreover, by suitable sedation, basal narcosis, local or regional analgesia or even by a trace of Trilene or Ether, this gas can be administered with a higher percentage of oxygen, which eliminates the question of anoxæmia.

Cyclopropane is as potent as chloroform. It is a strong respiratory depressant, produces ventricular extra systoles and increases blood loss from excessive capillary oozing with severe shock during or after the operation. Even in thoracic operations in children, ether remains the drug of choice over Cyclopropane. As regards the various techniques followed in anæsthetising children, the following need some mention :

Open and semi-open drop methods are commonly used for induction as well as for maintenance of anæsthesia in young children, because of their simple outfit and easy control with adequate oxygenation from the air. Their chief disadvantages are, marked excitement period and occasional apnoea from apnoea.

Closed and semi-closed methods are not quite suitable for infants and small children as their tidal air volume is small and sometimes becomes too weak to operate the expiratory valve, as a result of which excessive re-breathing, with accumulation of carbon dioxide and the anæsthetic gases, may occur which will produce anoxæmia, shock and even respiratory depression. The use of a smaller re-breathing bag and periodic release of the gases from it into the external air is a judicious procedure in such cases. Rapid induction or even the use of too strong ether vapour, by these methods, may cause severe shock from deep anæsthesia. So, to obviate this trouble, the use of a continuous flow gas-oxygen-ether apparatus with Carbon dioxide absorption outfit and an adjustable ether drip-feed arrangement, as designed by Nosworthy and Hewer, is preferred in children.

Carbon dioxide absorption technique, though safe and is indicated in certain operations, is not much used in children as accumulation of a certain amount of the gas always occurs, due to too much dead space, and respiratory embarrassment may be seen because of the complicated nature of the anæsthetic apparatus.

Rectal administration of ether is seldom used, since the advent of intra-tracheal anæsthesia. But recently rectal Thiopentone has been used in children in 5 to 10% solution, with a dosage of 0.02 gm. per pound body weight. In such cases, adequate pre-operative preparations as for general anæsthesia should be made. It is suitable for endoscopies, minor operations, and examination of the patient under general anæsthesia, when so required.

Endotracheal anæsthesia ensures a smooth and unobstructed respiration, but it should be used with caution and gentleness. In children, the epiglottis is soft, delicate, flexible, and may get impacted into the 'rima glottidis', especially when there is laryngeal spasm. If there is superadded congestion of the upper respiratory passage, it may be easily traumatised during intubation. Hence its injudicious use may invite post-operative complications like oedema of the glottis and infection of the air passages. This anæsthesia is to be avoided in infants as the lumen of the catheter, that can pass into their tiny trachea, may not ensure a smooth and free respiration. Ayre's modified technique in endotracheal anæsthesia for children is quite suitable as it produces no embarrassment of respiration and a uniform anæsthesia.

Endonasal and endopharyngeal methods, though used occasionally, are unsatisfactory procedures.

Intravenous anæsthesia with short acting Barbiturates like Cyclonal, Thiopentone or Kemithal Sodium is seldom used in children below ten years of age. When administered to older children it is used in a weaker concentration, injected slowly and cautiously into a prominent vein. Maintenance of a clear airway and oxygen supply in a liberal amount are of utmost importance. Respiratory depression, when it occurs, may be profound, and prompt resuscitative measures must be taken to save the patient from impending death. This anæsthesia is required when fire-hazard is present but Nitrous Oxide is not available and Chloroform is to be avoided.

Local and regional analgesia are not satisfactory in children, due to their excitable and apprehensive frame of mind. If used, they must be supplemented with basal narcosis or a light general anæsthesia with gas-oxygen and Trilene. Babies and infants, however, tolerate local anæsthesia well. Spinal anæsthesia, though advocated by some people, is rarely used in children due to its attendant risks.

Muscle relaxants, such as Curare, Myanesin, Flaxedil, C_{10} (Decamethonium Iodide), though they possess no analgesic properties, are sometimes used in children as an aid to anæsthesia. But they must be used with the utmost caution as their margin of safety is small and respiratory depression is profound which may affect the heart ultimately. Except in thoracic surgery, where controlled respiration may be required, the use of Curare and its allied drugs is not indicated in children. Griffith rightly observes, "Curare should not be made the excuse for a poor anæsthetic sloppily administered".

In view of all these above facts, the following conclusions are drawn as to the proper choice of anæsthesia in various surgical operations under different circumstances, a few instances of which are given below :—

1. Gas-oxygen-trilene-ether sequence, is the most suitable form of anæsthesia, almost in all major operations.

2. When intra-tracheal intubation is indicated, Ayre's modified technique is to be followed.

3. When the general condition of the patient is good and a gas machine is not available, Ethyl-Chloride-ether for induction and ether with oxygen for maintenance is the next choice.

4. The rest are to be judiciously avoided and their use is to be considered only under exceptional circumstances.

5. When the general condition of the patient is bad or toxic features are present, toxic volatile drugs must not be used. In such cases, premedication with rectal Paraldehyde and local infiltration analgesia with 0.5% Novocaine is indicated. If necessary, this may be supplemented with a little gas-oxygen-trilene. Adequate warmth, fluid transfusions and oxygen administration are essential to combat shock in these cases.

6. The same principles hold good for severely anæmic, cachectic and dehydrated cases. Ether may be used with high oxygen concentration.

7. Orthopædic cases require good relaxation for proper manipulation of the bones and joints. Ethyl Chloride-ether or gas-oxygen-ether is ideal.

8. In intracranial operations, if the patient is comatose, local infiltration or field block is enough; if patient is conscious, preliminary basal narcosis, Ethyl Chloride-ether for induction, and intra-tracheal gas-oxygen-ether for maintenance. If diathermy is to be used, eliminate ether entirely from the circuit. In older children, supplement gas-oxygen with intravenous Thiopentone or Kemithal. Sodium administered intermittently at the intervals of 15 to 20 minutes in small amounts.

9. In nasal, oro-pharyngeal and laryngeal operations, intra-tracheal gas-oxygen-ether is required.

10. In endoscopies and removal of foreign bodies from the air passages and the œsophagus the same sequence is used, but if fire-hazard is present, ether is replaced either by a little chloroform or intravenous barbiturates. Tracheotomy instruments must be kept ready in such cases.

11. In Ludwig's angina and other inflammatory or neoplastic conditions in the neck, asphyxia may cause laryngeal spasm. So Cyclopropane or C_2E_3 mixture is to be used in place of Nitrous Oxide or Ether with adequate oxygenation. Intubate, where possible. If the patient's condition does not permit the use of the above agents, local infiltration and a little Trilene is to be used. Keep instruments for tracheotomy in readiness.

12. Similarly, in children with obesity, short neck or high palatal arch, mechanical obstruction of respiration is common. Ethyl Chloride-ether sequence with oxygen and Carbon dioxide is used in these cases. Gas-oxygen induction is contra-indicated here.

13. In various intrathoracic operations, including those for correction of congenital anomalies in the heart, œsophagus and diaphragm, intratracheal ether with oxygen is the anæsthesia of choice. When the chest cavity is opened, controlled respiration is started by Carbon dioxide absorption or minute doses of Curare. Cyclopropane may be used in places of ether in such cases, but sparingly. Frequent suction of the tracheo-bronchial tree helps in preventing contamination of the healthy lung with foul materials from the diseased sides. In infants and small children controlled respiration is not much required; rather it is a hazardous procedure to suspend the natural respiration in them, in as much as the depth of anæsthesia and the degree of surgical shock cannot be assessed correctly. Warmth, and transfusions of blood, plasma or glucose saline are necessary.

14. In intra-abdominal operations, intratracheal gas-oxygen-ether is ideal; packing of the throat prevents aspiration of the vomitus into the lungs. In acute abdominal conditions, such as congenital pyloric stenosis, intussusception, intestinal obstruction, appendicitis and general peritonitis, operative risk is high due to the low condition of the patient and the associated toxæmia. In such cases, gas-oxygen-trilene-ether (in minute quantity), supplemented with local infiltration or pararectal block with 0.5% Novocaine is quite suitable. In jaundice and other cases of liver derangement, ether is avoided and rectal Paraldehyde for premedication with gas-oxygen and local analgesia are required.

15. Infants and new-borns need only a light general narcosis, even with the limbs moving and being restrained by the nurse, in most of their operations. While a sensitive structure is operated or when adequate muscular relaxation is required, local infiltration with 0.5% Novocaine serves the purpose well.

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Adoption Problems

Adoption should never be undertaken without medical advice. Only a doctor can judge the risks of illness in a child who is for adoption. Mental deficiency and mental illness, epilepsy and psychopathy should be considered in the first place, as possible inheritable qualities. The majority of undesirable adoption cases concern mentally deficient children. All children intended for adoption should undergo thorough physical and mental examinations. The physician should be enabled to repeat his control examinations from time to time. The natural and the prospective parents should also undergo somatic and mental examinations. Adoption by a single woman should not be fostered without urgent reasons. The natural parents should give up all contact with the child they have given away for adoption.—Torsten Thysell, *Ann. Paediat.*, 173: 267, (Oct.) 1949.—*American Journal of Diseases of Children*.

NECESSITY OF X-RAYS IN THE DIAGNOSIS OF DISEASES OF CHILDREN

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IN children, in view of the difficulty of obtaining a correct history of disease and an accurate knowledge of its signs and symptoms, X-ray examinations can often give a very valuable help in arriving at correct diagnosis. The object of this article is to describe in brief those diseases of children in which X-rays are of diagnostic help.

Bones and joints.—Acute osteomyelitis:—In children the disease is usually hæmatogenous, with or without history of trauma. In early diagnosis of this disease comparative X-ray photos of very good quality are essential, as no gross changes are visible for about a fortnight after the onset of the disease. The earliest change is an ill-defined area of bone absorption, single or multiple, which must be carefully looked for. Later, a fine opaque line of new subperiosteal bone formation gives a clue. Later the areas of rarefaction coalesce and the fine line of the subperiosteal new bone becomes thicker and irregular. The extent of these changes is inversely proportional to the virulence of the infection. If it is very virulent, there may be no radiological evidence, the whole layer of periosteum being stripped off, and the whole shaft may necrose without the formation of the involucrum.

Chronic osteomyelitis:—The chief feature of chronic osteomyelitis is the predominance of bone production over bone destruction. The bone undergoes much sclerosis and thickening and, within the enclosed area of rarefaction, the dense shadow of a sequestrum may be seen.

A Brodie's abscess is characterized by a cyst-like area of rarefaction surrounded by a zone of sclerosis. It is differentiated from a bone cyst by the presence of sclerosis surrounding the area of rarefaction and its margin is not so well defined.

In tubercular osteomyelitis, common sites are spongy bones of vertebrae, small bones of hand and feet and the ends of long bones. The disease is usually hæmatogenous. A trauma may localize the lesion or there may be multiple bone lesions.

Comparative views are again essential for early diagnosis. In a joint the earliest change may be an effusion causing widening in the joint space. In spine, diminished intervertebral space may be the earliest evidence.

Tubercular lesions are marked by the predominance of osteoporosis. When there is caries, the destruction is of molecular type and no large areas of rarefaction should be expected. There may be just a blurring of the normal trabecular pattern giving a ground glass appearance. If the destruction is massive, larger areas of

rarefaction may be seen. The articular surfaces of the bones become irregular and lose their smooth contour. In tubercular dactylitis, there is a cyst-like area of rarefaction, with a certain amount of expansion, simulating an osteoclastoma.

In syphilis, osteosclerosis dominates over osteoporosis. The lesions are usually multiple. In the congenital type, diaphyseal ends show osteochondritis. The density of the regions is diminished and the zone of temporary calcification is broader. The metaphysis may show fragmentation or disintegration. Syphilitic periostitis and osteo-periostitis cause much thickening and sclerosis of the bones. Irregular areas of rarefaction may be present within the thickened bones. In skull this gives a moth-eaten appearance. In syphilitic epiphysitis, the epiphyseal line is widened. A line of periosteal reaction may be present and occasionally the epiphyses are detached.

Osteodystrophies.—Osteogenesis imperfecta:—The cortex of the bones is very thin and the cancellous pattern hardly visible. The bones are bowed and mis-shaped, may show multiple fractures with callous formations round the fractures, but the fracture line remains visible. The shaft of the bones may show atrophy.

Achondroplasia:—The bones are broad at the ends and their shafts are short, giving the so-called collar-stud appearance. The epiphyseal centres appear prematurely.

In osteo-chondro-dystrophia foetalis of the hyperplastic type, the epiphyses are broad and fungus shaped. Ossification is delayed and the diaphyses remain short. In the other variety, there is marked deficiency in the length of bones. The bones are bent and buttressed.

Morquio's disease is a variety of foetal chondro-dystrophy. The lower diaphyseal ends of radius and ulna are rotated towards each other. Head of femur is absent, while the inner condyle is large and the outer underdeveloped.

In hereditary chondrodysplasia, multiple bony outgrowths are present in the region of epiphysis of long bones.

Rickets:—(Infantile)—There is a widening of the metaphysis and the diaphyseal ends have an irregularly serrated and cupped appearance. The cancellous structure is more open and the cortex has a streaky appearance. The bones are bent depending upon the pressure to which they are subjected and the cortex is thickened on the concavity of the bends. In syphilis, on the other hand, the thickening is all over and not confined to the concave sides, rather it is more prominent on the convexities. The flat bones show lime absorption giving moth-eaten appearance. But in the process of healing, they may become very dense and form in the skull rachitic bosses. The sternal ends of ribs are expanded and cupped.

Late rickets:—The changes resemble those found in infantile rickets. In renal rickets also there is defective mineralization of the bones as a result of an altered Calcium Phosphorus ratio. Appearance varies with the stage of the disease. The ends of bones present an appearance similar to those in rickets, but the distribution is less uniform. The skull shows a finely grained osteoporotic mottling. Later it presents a woolly appearance and thickening of the vault.

Scurvy:—The lesions are multiple, characterized by periarticular swellings. The metaphyses are widened and the diaphyseal ends show a dense opaque line called Trummer Zone. Behind this the bone presents a more or less normal appearance which contrasts with rickets. The diagnostic feature of the disease is subperiosteal hæmorrhages, which strip the periosteum away from the bone and may cause separation of epiphyses. Organisation of subperiosteal new bone at the margin of the blood-clot causes extensive shadows round the bone stimulating a new growth.

There are several other comparatively rare diseases of bones which show characteristic X-ray appearance.

Diseases of the chest.—Heart:—In the infant, the heart is larger in size in relation to the thorax than in the adult. This is further exaggerated in pictures taken at short distance, which sometimes becomes necessary in children, to shorten the time of exposure to a minimum. Utmost care, therefore, should be exerted before interpreting enlargement of the heart by radiogram.

In mitral disease, early cases may show no change in the appearance of the heart. The following alterations from normal are characteristic:

(1) An isolated or disproportionate enlargement of the left auricle in the right oblique view producing increased cardiac depth and "Wedging" of a barium swallow and a curve backwards of the œsophagus.

(2) Straightening and lengthening of the left border of the heart in the anterior view, due to enlargement of the pulmonary artery and conus and possibly of the left auricular appendage, and less regularly.

(3) Buttressing (extension upwards and outwards) of the right auricular curve.

(4) Increases of the hilar shadow.

In aortic regurgitation X-ray changes with well developed lesions are confined to the left ventricle and to the aorta. As a result of left ventricular hypertrophy, the left border moves farther out, or the lower and apical portions become more rounded; both these features may be present in anterior view. In the left oblique position the left ventricular arc is more pronounced and rounded than normal. The ascending aorta may be more prominent.

In congenital malformations of the heart, radiography is particularly useful and may reveal unusual prominence of one of the chambers of the heart, dilatation of the pulmonary artery, an abnormal position of the aorta or evidence of coarctation. Perhaps the most promising of all methods now being employed in the diagnosis of congenital heart disease is the radiographic demonstration of the heart and great vessels by intravenous injection of opaque substances (Uroselectan and similar compounds). The main technical difficulty in children lies in the injection of the fluid sufficiently rapid and in timing the exposure. In Fallot's tetralogy, the opaque medium, which normally shows up first the pulmonary vessels, appears immediately in the aorta owing to the latter being placed astride the interventricular septum and receiving the blood directly from the right ventricle. A right aortic arch is also found in certain types of dextrocardia. This condition can only be diagnosed with any certainty, by X-rays, which shows absence of aortic knob on the left side, projection of the aorta to the right and indentation and displacement of the œsophagus to the left during a barium swallow.

In aortic stenosis radiography reveals a large heart and a small or absent aortic knuckle.

In patent ductus arteriosus, dilatation of the pulmonary artery is the main feature (Caput of Zimm), and in severe cases the dilatation can be seen extending to the branches. Vigorous pulsation of the aorta and pulmonary artery can sometimes be made out, the latter showing "a hilar dance" (Assmann's sign).

In defects of the auricular septum, radiography reveals enlargement of the heart to the left and usually a globular outline, but sometimes a "Coeur en Sabot". The pulmonary artery is very prominent and may almost appear aneurismal, while the aortic knob is small or absent. In the right oblique view the enlarged pulmonary artery and its division will produce a definite impression on a barium filled œsophagus. Some enlargement of the left auricle may also be obvious if mitral stenosis is a complication.

In pulmonary stenosis, X-rays give a characteristic picture with the aorta projecting abnormally to the right and a concavity in the region normally occupied by the pulmonary arc. There may be a bulge on the left border below this due to enlarged conus. The apex is blunt and resembles the silhouette of a wooden shoe (Coeur en Sabot). With a right sided aortic arch, the aortic knuckle will be absent and a barium filled œsophagus will be found lying on the left of the arch and its relationship to the aorta in the oblique position will be altered.

In Eisenmenger's complex, which is a rare condition, skiagram shows pulmonary arc as prominent, heart is globular in shape or the apex may be blunt and raised. The hilar shadows are increased and show vigorous pulsation, "Hilar dance."

In tricuspid stenosis, an X-ray picture will demonstrate a globular shaped heart and convexities corresponding to an enlarged right auricle and left ventricle.

Bronchiectasis:—This may be congenital or acquired. The most characteristic is the cystic type, in which several large thin-walled rounded cavity-like shadows are seen, or there may be a honeycombed appearance of the lung. The acquired type may be cylindrical or saccular. For accurate investigation bronchography after Lipoidol is necessary. The whole bronchial tree is clearly visualized. In plain picture, it is often difficult to differentiate between bronchiectasis and tubercular infiltration in unusual position. Also both may go together. Collapse may be present in either. Examination of the sputum and bronchography can only differentiate.

Radiography of chest has revealed that the so-called cystic lung is a much commoner disease than was suspected.

Atelectasis:—If a large bronchus is obstructed, the result may be a massive collapse. Smaller bronchii involve small portions of the lung and the radiological appearance depends upon the amount of lung tissue involved. The collapsed portion of the lung becomes void of air and therefore opaque, but the definition of the opaque shadow depends upon whether or not it is overlapped by air-filled lung. Hence skiagrams in suitable diameters are necessary.

The affected portion of the lung collapses and exerts a negative pressure on the surrounding structures. The diaphragm goes high, heart, trachea and mediastinum are retracted towards the affected side, the intercostal spaces are contracted and very soon there is compensatory emphysema of the unaffected lung. If a foreign body is the cause of the collapse, it may be seen if it is radio-opaque.

Pneumonia does not usually require radiological diagnosis. Unsuspected consolidation of the middle lobe may be revealed by a skiagram. At least two views should be taken and the differentiation is necessary between consolidation and effusion. Unresolved pneumonia gives atypical opacities.

Bronchopneumonia causes mottled opacities in the lung, difficult to differentiate by radiography alone.

Lung abscess:—Before cavitation occurs, the appearance is like that of consolidation due to any other cause. After cavitation occurs, a cavity more or less rounded and containing a fluid level is seen. It is surrounded by a zone of consolidation. The cavity and fluid level are visible in skiagrams taken in vertical position only. Skiagrams taken in lying position would obscure both the fluid level and cavity and is diagnostically useless.

Pyæmic abscesses may be multiple and small.

Pneumonitis gives the appearance of a lung-abscess which has not broken down and is atypical.

Amongst the shadows which may resemble abscess cavity radiologically, are: (1) Tuberculous cavities; (2) solitary congenital cyst with fluid level; (3) a single bronchiectatic cavity; (4) an empyema which has burst into the lung; and (5) an emphysematous bulla.

Abscess cavity shows a much more extensive zone of surrounding consolidation, but later only the fibrotic wall may remain. Differential diagnosis must finally depend upon the clinical history, sputum examination, etc., etc.

Tuberculosis:—Appearance of tuberculous lesions of lung in childhood depends upon the pathological process involved:—

A pneumonic process gives the shadow of consolidation difficult to differentiate from other consolidations, infiltration gives clusters of pin head opacities which should be differentiated from bronchovascular shadows seen end on. Cavitation shows cavity shadows with or without fibrosed walls according to their chronicity, fibrosis gives linear opaque shadows, and calcified lesions as comparatively dense opacities.

Without entering into the various forms of tuberculous lesions in childhood it may be pointed out that routine examination has revealed that tuberculosis in children is far more common than is suspected. On the other hand, the necessity of very good picture in inspiration cannot be overemphasised. We have seen many errors of interpretation, entirely as a result of bad X-ray pictures.

Further, there is considerable difference in the breadth of mediastinum and cardiac shadows in inspiration and expiration, these tending to be considerably broader if the skiagram is taken in expiration. After prolonged expiration such as occurs at the end of a cry or a whoop, the lung fields appear almost opaque and the heart shadow much enlarged, tending to serious misinterpretation such as enlarged heart, enlarged thymus, and lung infiltration. Hence the skiagram of a child's chest must be of a very good quality to permit of a correct interpretation.

A common form of tubercular lymphadenitis in children is the affection of the paratracheal gland which manifests itself as a broadened right paratracheal shadow in the superior mediastinum. The hilar glands also are often swollen and sometimes assume a very large size. After healing, the glands are seen as calcified shadows usually round about the hila.

In *eosinophilia* the bronchial tree presents a finely mottled appearance. The pin-head opacities are smaller in size than that of tubercular infiltration. They tend to be generalised, but may be very difficult to differentiate from tubercular infiltration. Differential white blood cell count gives the clue.

In *pleurisy* the earliest sign is limitation of movement of the diaphragm of the affected side and the costo-phrenic angle is comparatively shallow. As the fluid increases in quantity, an advancing

triangular opacity is seen with its apex in the costo-phrenic angle and its base looking upwards and medialwards. Further accumulation of fluid displaces surrounding parts, pushing the diaphragm downwards, mediastinum towards the opposite side and the intercostal spaces become wider, but if the heart mediastinum is already anchored by pleural adhesion there may be no apparent displacement to the opposite side. Radiologically, it is not possible to differentiate between simple effusion, pus or blood. When effusion is present, there is usually some difference in the density and level of the opacity in skiagrams taken in erect and supine positions. If the effusion is encysted, this change does not take place and the opacity bulges towards the less resisting-sides. Thus, if the effusion is encysted along the chest wall, the opacity gives a convex shadow towards the lung. A lamellar type of pleurisy gives a generalised haziness over the whole lung field and an opaque line of thickened pleura may be traced along the chest wall, rising from costo-phrenic angle, upwards towards the apex.

Diaphragmatic pleurisy occurs between the pleurae covering the base of the lung and the dome of the diaphragm. It is easily recognized in the left side by the contrasting translucent shadow of gas in fundus of the stomach, but, on the right side, due to the opaque shadow of liver below, it is very difficult to differentiate between this and a high diaphragm or an upward enlargement of liver. As a sequela of diaphragmatic pleurisy, adhesions are left between the diaphragm and the under surface of the lung seen as tenting of the diaphragmatic shadow. Inter-lobar pleurisy may completely escape detection by physical examination. In X-ray photos taken in lateral projection, their appearance is typical, being a triangular or spindle-shaped opacity located in an inter-lobar fissure. Mediastinal pleurisy occurs between the apposing surfaces of the mediastinum and the lung. It gives triangular opacities lying about mediastinal border differentiated from those caused by local collapse by the nature of the associated displacement phenomena.

If empyema bursts into a bronchus, a fluid level topped by an air-shadow is seen.

Pneumothorax, spontaneous or artificial, presents a typical appearance. The collapsed lung is seen as an opacity gathered round the hilum of the lung, surrounded by the clear translucent homogenous shadow of the air in the pleural space. The displacement of surrounding parts is proportional to the amount of air present which, if excessive, as in a valvular type of spontaneous pneumothorax, pushes the mediastinum into the opposite chest and thus causes severe distress. The portion of the lung which is adherent to chest-wall does not collapse and tags of adhesion may be clearly demonstrated. When there is effusion or blood present, a horizontal fluid level is formed. Complicated by adhesions, multiple fluid levels are seen.

Mediastinum:—An enlarged thymus is seen as a rectangular shadow in the superior mediastinum. Carefully taken pictures may show pressure on trachea. Enlargement of paratracheal glands is by far the commonest cause of a pronounced shadow of the right mediastinal border. Mediastinal tumours give a rounded enlargement of the mediastinal shadow.

Digestive system.—*Achalasia* in children is easily overlooked and diagnosis requires an X-ray examination after a barium swallow.

In diaphragmatic hernia, it is necessary to differentiate it from eventration of diaphragm. It may be possible to demonstrate by barium, that it is the fundus of the stomach which has herniated through an opening in a normally situated diaphragm, that it is not the diaphragm that is high itself, and there may be so-called paradoxical movement of the fundus of the stomach during breathing.

Pyloric stenosis is shown by the retention of the barium meal.

Congenital defects or constriction at the duodeno-jejunal junction may result from pressure of superior mesenteric artery and early examination with an opaque meal and X-ray will show the food passing into the duodenum and becoming arrested.

The passage of radio-opaque swallowed foreign bodies can be easily followed by repeated X-ray examination. It is surprising to note the efficient and tactful manner in which the gastro-intestinal tract can dispose them off per via naturalis. Non-opaque foreign bodies, if sufficiently large, can be demonstrated by barium meal as negative shadows.

Ascaris lumbricoides may be seen as filling defects in the barium meal or after evacuation of the barium meal by the retention of barium in their elementary canal.

Intussusception is best investigated by barium enema, the flow of which is arrested at the advancing end of the invaginated gut and it may be possible to see a collar of barium interposed between it and the surrounding gut.

Acute appendicitis is a surgical emergency and not a province of the radiologist, but if the appendix is not immediately removed and is allowed to drift into subacute or chronic form, it often becomes necessary to investigate by X-rays. Barium is administered and necessary to investigate repeatedly examined at frequent intervals to see the ilio-caecal region repeatedly examined at frequent intervals to see if any barium enters the appendix. During the course of a barium meal, a normal healthy appendix fills and empties several times with barium. Hence no conclusion can be drawn by nonvisualization of the appendix at a single examination. Screening and establishment of a definite tenderness in relation to the appendix with local rigidity or mass formation warrants a diagnosis of an appendicular lesion. Blood examination and other physical signs are also very important. It may also be possible to show an abnormally situated appendix or caecum. A retro-caecal appendix is better seen after the barium has cleared away from the caecum.

SMALLPOX VACCINATION IN GENERAL MEDICAL PRACTICE

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Smallpox vaccination, as is well-known, is the introduction of vaccinia virus into the deeper layers of epidermis (where multiplication takes place most easily), for the purpose of inducing immunity to smallpox by the production of an artificial disease called vaccinia (from Latin Vacca = a cow). In smallpox, the virus of cow-pox is deposited in the epidermis where it survives, multiplies and produces the local lesion and some general effects designated as vaccinia. After vaccination, the individual is found immune to smallpox because the virus of cow-pox has induced the production of anti-bodies which destroy and protect against the virus of smallpox.

II. Age for vaccination.—This is an important consideration.

1. *Primary vaccination* :—(a) An infant may be vaccinated even soon after birth but it is wise and customary not to undertake routine vaccination of infants during the first few weeks after birth. It should be done before the age of six months so as to avoid the constitutional disturbances during the period of teething and artificial feeding. General discomforts from first vaccination are usually milder in infants than in older children and adults and complications do not arise. The optimum age for first vaccination is therefore about four months. Summer months should be avoided, if possible. The first or primary vaccination confers immunity for from five to ten years.

(b) Primary vaccination in school children, adolescents and adults should not be undertaken except in those exposed to smallpox infection.

2. *Revaccination* :—The necessity for routine revaccination varies with circumstances, thus :—

(a) For children vaccinated in infancy, revaccination should be repeated about every 5 or 7 years thereafter.

(b) In the presence of a danger of exposure to smallpox, vaccination should be done regardless of any prior vaccination.

(c) Doctors, nurses, sanitary inspectors and others who are likely to deal with cases of smallpox should be protected by regular revaccinations every year.

III. Site for vaccination.—1. *Site of election* is the site originally selected by Jenner, which is the skin of the left arm in the region of the depression formed by the insertion of the deltoid muscle. The skin on the anterior surface of the forearm two inches

below the bend of the elbow, avoiding the area overlying prominent veins, may be selected as an alternative site for vaccination.

2. *Preparation of the site for vaccination* :—The skin should be cleaned by gently rubbing the selected site with sterile pledget of cotton moistened with Acetone and allowed to dry for a few seconds. The application of a highly volatile agent such as Acetone or ether is said to facilitate the penetration of the vaccine into the skin as well as has an antiseptic action on the skin. Acetone is preferred because it is cheaper than either ether or alcohol. Non-volatile antiseptics should not be used. Ordinary washing with soap and water followed by rubbing with sterile gauze soaked in three cleanings of sterile water, is also satisfactory.

IV. Vaccine material.—1. *Calf-propagated glycerinated lymph* :—This is the material widely used. The lymph should be used up within one week of the date of its manufacture which is the date of its issue from the Vaccine Institute. If, however, the lymph is obtained in ice from the Vaccine Institute, and continuously stored at refrigerator temperature it can be used up within a fortnight of its issue from the Vaccine Institute.

2. Vaccines obtained from virus cultivated in the tissues of minced chick embryo.

3. Vaccines obtained from virus cultivated on chorioallantoic membrane of developing chick embryo.

These vaccines are free from bacterial contamination and therefore being thus without the potential dangers of calf vaccine, should prove excellent vaccine but it has not yet found favour because of the limited evidence in respect of its antigenic value, duration of immunity resulting from it, its keeping properties etc., in comparison with calf lymph vaccine which has stood the test of time.

V. Methods of vaccination.—1. *Cutaneous methods* :—(a) *Cross-hatching* is an objectionable method which is prohibited by law in many countries. It should not be practised.

(b) *Linear scratch* is a convenient and satisfactory method. Skin should be prepared as described above and one small droplet of lymph should be placed upon the prepared site with a sterile needle and then a scratch one-eighth inch long made starting in the droplet. The excess vaccine may be wiped off with sterile gauze and the sleeve pulled down.

(c) *Multiple pressure method* :—This is the method which has been extremely satisfactory and is particularly recommended for adoption.

3rd. *Technique* :—A small drop of vaccine lymph covering an area of $\frac{1}{8}$ inch in diameter is placed on the skin at the prepared site. A long, straight, preferably flat-sided needle, sharp and twitchings, held parallel or tangential to the arm with the forefinger of weight, finger above and the thumb below. The needle point

is next pressed firmly and rapidly into the drop about 30 times as a routine within 5 to 10 seconds. The rapid up and down motion of the needle should be perpendicular to the skin and the needle and not in the direction of the long axis of the needle. The needle point is not driven into the skin but at each pressure the elasticity of the skin pulls a little of the epidermis over the point of the needle so that the virus-bearing lymph is carried into the deeper epidermal layers. Under no circumstances must the calf lymph virus be placed subcutaneously. If the skin has not been rubbed unduly in cleaning and if pressure is entirely perpendicular to the needle, there should be no bleeding and within a few hours there will be no evidence of trauma. The excess vaccine lymph should be wiped off the arm with sterile cotton wool as soon as the pressures have been completed and the remainder should be allowed to dry.

2. *Intracutaneous method*:—For intracutaneous method the vaccine must be diluted to a fairly great extent. Results obtained by this method, using calf lymph vaccine, are in no way really superior to those obtained by the ordinary cutaneous methods. This method is therefore not in routine use. Force (1927) suggested that this method be used in cases in which the cutaneous method has failed to give either a "take" or the vaccinoid reaction of immunity. The method is also recommended for the chick embryo vaccine, the advantage claimed being that there is no external lesion and no subsequent scar formation. It is open to question whether the complete elimination of scar is desirable.

3. *Number of insertions*:—It is now definitely established that the degree of immunity is not dependant upon the number or area of the scars; large scars are often due to secondary infections. Trial should therefore be made of vaccination and revaccination in one insertion and to use no method of insertion larger than $\frac{1}{8}$ th inch in any direction. A single vesicle is sufficient to protect. The important factor is the time elapsed between vaccination and exposure to smallpox rather than the size and number of vesicles.

In vaccination by the multiple pressure technique:—(1) A single insertion using "30 pressures" is enough both for primary and revaccinations.

(2) Multiple insertions using two or even three separate areas of insertion in one arm not less than one inch apart with "30 pressures" in each insertion, both for primary and revaccinations, are advised under the following conditions:—

(a) In case the subject is not likely to return for re-origination in the event of failure.

(b) In case of exposure to smallpox.

(c) In the presence of an epidemic or undue prevalence of smallpox.

(d) In case of failure of previous vaccination.

(e) In case there is any doubt as to the full potency of the vaccine because of possible adverse conditions of transport or storage.

(f) For such persons as desire to obtain the maximum protection against smallpox obtainable at one operation.

VI. *Dressings*.—The best dressing is the unbroken skin; dressings are therefore not only unnecessary as long as the vesicles or pustules remain unbroken, but harmful if permitted to remain on the arm. The area should rather be exposed to the air to exclude the possibility of the growth of anaerobic bacilli. If, however, the vesicle or pustule breaks, or the "take" shows signs of secondary infection, the wound should be treated surgically as any superficial infected wound.

The vaccinated site should not be exposed to direct sunlight until dry. Bathing is perfectly safe throughout the period of vesiculation and pustulation if care is taken to ensure that the vaccinated area is not wetted until the formation of a firm scab.

VII. *Inspection of vaccination*.—1. Primary vaccination should be inspected between the 7th and 10th day after vaccination.

2. *Revaccination*:—Ideally a daily inspection until a maximum reaction is observed. Generally, two inspections are done (a) one on the third day, and (b) the second on the sixth or seventh day.

VIII. *Types of reactions following vaccination*.—1. *In primary vaccination*:—"Primary take"—Here a papule appears on the 3rd to the 5th day and the characteristic vesicle, round, umbilicate and multilocular, reaches its greatest development on the 8th or 10th day or later, and a reddened inflamed area known as the "areola" appears round the vesicle about the 7th day. Pustule appearing about the 10th day or later reaches full development by about the 12th day after which it rapidly dries, the areola fades and a scab or crust forms which should not be removed. It drops off spontaneously about the 20th day or later. It should be noted that the formation of a fair sized areola is an important event, indicating that the attainment of the maximum immunity against smallpox will not be handicapped.

2. *In revaccinations*:—(a) *Primary reaction* i.e. a course resembling a "primary take".

(b) *Vaccinoid or accelerated reaction*:—The papule appears on the 3rd or 4th day with vesicle formation by the 5th day. Pustules begin to be formed. The height of reaction occurs on the 6th or 7th day of time, which it subsides rapidly.

Reaction of immunity or immediate reaction:—A papule appears within 48 hours and subsides without forming a vesicle. The weight of the arm increases.

British Ministry of Health Memorandum on smallpox vaccination (1948) observes that "it is unwarranted to regard this reaction as a reaction of immunity because the lymph used may have been weakened and was unable to produce the vaccinoid or vaccinal reaction; it is also possible that such a reaction may have been due to the sensitivity of the individual to protein or other substances in the lymph and that it was not a response to the virus of vaccinia. Therefore this type of reaction should be recorded merely as 'maximum local reaction (non vesicular) on 2nd/3rd day' and if there is any doubt concerning the potency of the lymph used, one further attempt at revaccination should be made with a fresh lymph."

(d) If none of the above reactions occur, or if there is a delayed formation of a small papule after the 3rd day without further development, it is a negative reaction and the person should be revaccinated.

IX. Interpretation of results of vaccination.—1. *Primary reaction* is seen in those whose immunity from previous vaccinia or from smallpox has completely disappeared.

2. *Vaccinoid or accelerated reaction* indicates partial immunity from a previous attack of smallpox or a previous vaccination.

3. *Reaction of immunity or immediate reaction* is generally held to occur in persons possessing a high degree of immunity (*Cf. para VIII (2) (c)*).

4. There is a common belief that failure of repeated attempts at vaccination indicates immunity. This belief is erroneous and may result in real harm. Vaccination may fail for many reasons. Cases are on record where persons were unsuccessfully vaccinated three, four or more times before a reaction was obtained. Smallpox itself does not always protect against smallpox. Louis XV of France died of a second attack. Jenner mentions a case who had smallpox five times.

5. Belief is also commonly held that if a revaccination takes, the subject was therefore again susceptible to smallpox. While this is generally true, it is also worth remembering in this connection and not necessarily to smallpox, for vaccination gives stronger protection against smallpox than against cowpox.

X. Recording of results of vaccination.—1. *Primary vaccination*:—(a) When there is marked vesicle formation reaching maximum size after the 7th day, the result should be recorded "typical primary vaccinia".

(b) Where the vesicle formation is absent, a second should be made; if a similar result is obtained, it should be recorded as insusceptible to vaccination (I.T.V.). This insusceptibility should be recorded.

is not for an indefinite period. Such persons should be revaccinated whenever occasion demands.

2. *Revaccination*:—If there is no local reaction even after the second inspection, a second attempt should be made; if no reaction even then, a third attempt should be made. If no reaction after the third attempt, the result should be recorded as "No local reaction to revaccination (repeated)".

XI. Potency test of the vaccine lymph.—A useful field test for potency is that the vaccine should give more than 50% of vaccinoid reaction in a group of people vaccinated more than ten years previously or who have had smallpox over ten years previously.

XII. Complications of vaccination.—1. *Generalised vaccinia*.—Is liable in persons with chronic dermatosis. It is important to remember that the case fatality in generalised vaccinia is about the same as that for malignant smallpox (Ross 1940).

2. *Septic complications* of the vaccinated area may arise if aseptic precautions at the time of vaccination and after care of the wound are neglected.

3. *Post-vaccinal tetanus* is fortunately a rare complication which is due to the neglect of the wound and not to the vaccine lymph. Lymph prepared according to modern methods conforming to the safety tests prescribed by law is safe.

Since, however, occasional instances of post-vaccinal tetanus have been reported, it has been suggested that every effort should be made to immunize infants and children against tetanus preceding vaccination. Alum precipitated tetanus toxoid can be given at intervals of 3 to 4 weeks without interfering with the development of adequate immunity.

4. *Post-vaccinal encephalitis*:—The incubation period is ten to twelve days after vaccination. It usually follows primary vaccination and not revaccination. The condition rarely occurs in infants under one year of age but the bulk of the cases occurs in children over two years of age. Prevention lies in primary vaccination in the first year of life.

XIII. Control indications.—Vaccination is contraindicated only under the following conditions:

(1) In persons with fever and skin diseases such as eczema, unless exposed to infection.

(2) If there is whooping cough in other members of the family.

(3) In case the patient is anticipating an elective operation.

Other preventive inoculations such as T.A.B., anti-typhus, should be avoided at the time of vaccination.

These forceps injuries are, thus, the product of the labile and variable passenger in a fixed unyielding passage. The pelvic factor also plays an equally important role in this complex. The pelvic immobility is more noticed in its joints as the age advances.

Superficial injuries on the scalp and the face do not result into any pathological changes. Sometimes very few might get infected and result in necrosis and scarring. Fractures and bony injuries lead to intracranial damage which is of great pathological interest. The cushion of the cerebrospinal fluid permits wide mobility of the cranial contents but the injury ensues when the application of the forceps suddenly overtakes the contents. The resulting lesion is a contusion, concussion, edema or vascular rupture.

The septa of the duramater are regarded as ligaments of the bones of the vault. They restrain excessive alteration of the shape of the head during labour. The injuries to the tentorium result from lateral pressure by forceps application, whereby the antero-posterior diameter of the head tends to a compensatory elongation. The longitudinal fibres of the falx cerebri swing across the tentorium on each side, and this point of junction is the weak point of the system. The triangular area in the junction of the falx cerebri and tentorium is damaged in over 92% of deaths from cerebral hæmorrhage. The compression of the occipitofrontal diameter tends to elevate the calvarium with direct strain upon the falx and tentorium. This happens when the forceps is applied anteroposteriorly. The blood vessels which tear and are the usual sources of intracranial hæmorrhages are the veins of Galen and its tributaries.

Tears of the falx and the tentorium are almost immediately followed by subdural and ventricular hæmorrhage. This damage is found in 40% to 50% of all cases of intra- and post-natal deaths. Sometimes the pressure of forceps might bring only congestion and rise of intracranial pressure, leading to the interference of the blood supply of the respiratory and other centres in the brain stem, producing a state of intra-uterine and post-natal asphyxia of the foetus.

The care of the child should start from giving injection of Vitamin K 10 mgms. to the mother during labour to raise the prothrombin level in the blood of the child.

While extracting the child with forceps continuous pressure should never be applied but the blades should be released and unlocked at intervals. Axis traction is practically never used even in mid- and high forceps. The handle of the blade should be covered by sterile towel and traction applied by Pajot's method. The bladder and the bowel should be evacuated.

After extracting the child with forceps, when the head is crowned, injection of Lobeline (mild) or Coramine should be given as a routine, in the scalp or caput to avoid anæmia and asphyxia of the brain and further maleffects. The blades should, then,

be removed in the reverse order of their application to avoid injury to the child and the mother. The delivery may be completed by the upward pressure of the fingers of the right hand or with the palm of the right hand enveloped by a sterile towel, exerted between the anal orifice and the tip of the coccyx. The head may, then, be allowed gently to extend at the end of the pain. The edges of the vulva are slipped over the face and the chin during the interval. Once the face is out, delivery should be allowed to progress by natural forces only.

When the child is delivered and if it is in a healthy condition the pulmonary respiration is established almost immediately and after a few ineffectual gasps the child cries lustily. The child should be handled as little as possible, and violent attempts to stimulate respiration must always be avoided. Oxygen should be given until respiration becomes normal and infant comes in good colour. It is best administered by a small No. 4 catheter in the nose or in the mouth.

The obstetrician should then look for any injuries to the scalp, the face or the bones and examine the child carefully. The usual bath should not be given, but the child should be kept as quiet as possible and after oiling all over with warm olive oil should be wrapped in cotton wool or warm blanket and should be carefully protected by hot water bottles or bags. The room should be quiet, properly ventilated and the cradle should be shielded by screen to prevent draughts. Injection of Gardenal Sodium $\frac{1}{4}$ c.c. or $\frac{3}{4}$ of a grain and aqueous vitamin K¹⁰ mgms. i.e. Synkavit 1 c.c. should be given to all the children after forceps delivery as a routine, to prevent the damage caused by small intracranial injury which often occurs in forceps application. Bromide mixture should be given for the first 2 days as a routine. For the first 24 hours it is best to give no food whatsoever to the child. Even fluid is not to be allowed. The child should be left undisturbed as far as possible. Three feeds at 8 hourly interval may be given during the next 24 hours and subsequently regular feeding may be commenced.

The oxygen should be continued for a longer time. The respiration and the colour should be carefully watched, and when it is maintained for a sufficiently long time then only it should be stopped. The rate of flow should be about 1 bubble per second through water. The oxygen from the cylinder should pass through a Woulfe's bottle standing in warm water so that it will reach the infant moist and warm.

All unnecessary handling should be avoided. The infant must be carefully weighed every day, 4 hourly temperature chart should be kept in order to know and promptly deal with the fluctuations of temperature. In the first few days the nurse-in-charge should be instructed to watch for weakness in sucking power, drowsiness, twitchings, cyanosis, temperature, yawning or marked diminution of weight. These children should be kept in the Nursing Home

for observation until one fortnight. I had one child under my observation who showed twitching and cyanosis on the 11th day and could be promptly diagnosed and treated successfully.

Bony injuries are rather uncommon. The posterior half of the parietal bone, or rarely the posterior part of the frontal bone, may show depression or the depressed fracture of the bone. The forceps blades play a contributory part in forming these depressions, when the head is pulled down in contracted or flat pelvis against the sacral promontory. No treatment is required because the bone gradually rises into its proper position by itself or a little lateral pressure is enough to set it in correct position.

Very rarely fractures of skull bones have been noted after difficult forceps delivery. These are the flat bones and because of incomplete ossification fracture takes place in the radial line of ossification. They rarely show displacement. Whenever an actual break in continuity occurs cerebral injury is from hæmorrhage. Oedema or direct pressure is almost inevitable whether or not it produces recognisable symptoms. Consequently, the treatment would be the same as for intracranial injuries. Some cases of the fracture of the occipital bones have been reported, wherein weak union between the squamous and the lateral portions permits the separation under the stress of difficult labour. The injury can be largely prevented by careful cephalic application of forceps and by the avoidance of undue pressure of the occiput against the symphysis pubis. Intracranial injuries play an important role.

Extensive hæmorrhage:—Extensive subdural or intraventricular hæmorrhage usually causes stillbirth. A few of these infants do survive for a short time. They are born in a state of white asphyxia from which resuscitation is usually difficult and they usually show subsequent unmistakable symptoms. They show frequent attacks of cyanosis and the respiration is irregular and shallow. Rigidity of the limbs, localised twitchings of face and eye or generalised convulsions might also be observed. The sucking reflex is absent. The child might be in coma or on the other hand might be restless and crying. The lives of these children are very precarious and they seldom survive more than a few hours or days. No treatment is likely to be effective. Lumbar puncture seldom produces any appreciable effect and can do no more than prolong life for a little while.

Slight hæmorrhage:—These cases can mostly be saved. They show very few symptoms and therefore need constant observation. For days together the child might remain normal and after a few days might show occasional twitchings or attacks of cyanosis. Weakness in sucking power, drowsiness or even yawning might indicate the lesion. Lumbar puncture and careful examination of infants with suspicious symptoms would probably bring to light more cases of slight hæmorrhage.

Maintenance of perfect quietness is necessary so that thrombosis might take place to best advantage. The external application of heat is necessary to sustain the body temperature. The infant should be handled as a case of a head injury, should be kept in upright posture, and 10 mgms. of Vitamin K should be given and repeated, if necessary. Lumbar puncture should be done repeatedly with a view to freeing the subarachnoid spaces and preventing them from becoming matted. Cerebral oedema and congestion might be relieved by giving 2 to 3 ounces of 10% saline solution by the rectum. The twitchings may be controlled by the use of Chloral Hydrate in doses of half grain or Dormel liquid in doses of 5 to 10 drops 4 hourly by mouth. Oxygen should be given continuously and Gardenal Sodium may be repeated if necessary.

After studying all these injuries we can judge that almost all these children can be saved and morbidities minimised if proper care is taken. All minor injuries get completely recovered, and even intracranial injuries are frequently followed by permanent recovery. In cortical contusions in which the lesion consists of essential hyperæmia, oedema or a series of punctate hæmorrhages, recovery is more prompt and definite.

Involvement of the brainstem directly or secondarily always renders the prognosis grave. Convulsions which give way to paralysis often signify irreparable tissue damage, but recovery is not unknown. The occasional case may also succumb to secondary changes involved through local infection or constitutional disease.

It is uncertain but some cases have been reported with permanent aftereffects, the chief of which are the spastic paralysis of limbs, monoplegias, hemiplegias or unequal spastic diplegia. The mental development of such children may also be affected.

In conclusion it can now be said that forceps application should be carried out after allowing sufficient time for the head to mould and descend into the pelvis. X-ray pelvimetry should be taken to help to measure the pelvic diameters in difficult cases. Persistent occipito-posterior position should not be mistaken or overlooked. Feeling the ear or the nape of the neck is a good guide to diagnose it. The dilatation of the cervix should be complete between pains before forceps is applied. If foetal distress is evident before full dilatation, it is always possible to complete the dilatation manually and then the forceps can be applied. Episiotomy is an absolute indication in primipara and in multipara with persistent occipito-posterior position, mento-posterior position, and for the aftercoming head in breach presentations. Mid- and high-forceps should always be handled by trained and experienced obstetrician. The low forceps should be clearly and strictly defined as the application of forceps when the head is visible, the skull and not the caput is on the perineal floor and the sagittal suture is in the antero-posterior diameter of the pelvis.

BIRTH INJURIES

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THE subject of birth injuries has been selected for discussion because most of these mishaps can be very well treated by general practitioners. The injuries may be trivial, moderate, or it may be even so grave, as to produce a stillbirth or fatality after birth.

These injuries are classified into three heads:—

- I. Injuries of external parts.
- II. Injuries to nerves.
- III. Injuries to bones.

I. Injuries of external parts.—1. *Caput-succidaneum*:—It is physiological and is nothing but an œdematous swelling which forms normally in the soft tissues over the presenting parts of the child's head and it is of no pathological importance. Occasionally a cephal hæmatoma is concealed underneath. No treatment is necessary. It disappears within two or three days—hardly a week.

2. *Cephal hæmatoma*:—While *caput-succidaneum* is superficial, cephal hæmatoma is deep, underneath the periosteum, and so the physical signs are different which makes its diagnosis easy. Cephal hæmatoma is an extravasation of blood underneath the periosteum limited to the area bounded by the neighbouring sutures and is due to the pressure on the skull and scalp at birth. It may develop after spontaneous delivery but usually it occurs during forceps delivery or in extraction of the breech especially when there is some disproportion. The most common situation is one or both parietal bones as they are common presenting parts. However it can occur on occipital or one of the frontal bones. As against *caput-succidaneum*, which is always present at birth, cephal hæmatoma may not be present at birth but develops a few hours or even one or two days after delivery. It is chiefly of interest because it tends to persist in some cases for as much as two or three months and causes anxiety to an anxious mother who has probably a first child after great longings. While *caput* is not well circumscribed, may be present over more than one cranial bone, and pits on pressure, cephal hæmatoma is sharply limited by sutures to a particular bone, not pitting on pressure, and is elastic.

Treatment of cephal hæmatoma:—Cold compresses and a firm pad application is all that is necessary in early cases. Later no dressing is needed. It should not be incised or aspirated for the danger of infection. No permanent defect results and the swelling gradually disappears. The treatment really is of the anxious mother and not of the child.

3. *Hæmatoma of the sternomastoid*:—This occurs in the process of delivery of the shoulders and is probably due to the rupture of some muscle fibres and vessels due to overstretching. A blade of forceps may deeply crush the muscle and lead to myositis. It appears a few days after birth, as a lump about the middle or the

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BIRTH INJURIES—RASIK M. KAMDAR

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lower third of the sternomastoid, and even torticollis may be seen. Child cries on handling.

The treatment is simple. The child should be placed to lie on the affected side, to produce counter stretching. Complete recovery occurs as a rule.

4. *Rare external injuries*:—Some of these are bruises and lacerations, injuries to eyeball, injuries to the throat and soft palate. They are due to faulty application of forceps and faulty manipulations with fingers.

II. Injury to nerves.—1. *Erb's palsy*:—This is due to injury of the brachial plexus and is due to excessive traction on the brachial plexus during the delivery of the shoulders. The injury is to the 5th and 6th cervical roots. The action of the 5th and 6th cervical nerves is abduction of the shoulder flexion of the elbow and supination of the forearm. These actions are naturally paralysed and so the opposite muscles get an upperhand. Therefore the arm is abducted, the elbow is extended and the forearm is pronated. As a result of this the limb assumes a characteristic position which is known as the position of 'Policeman's Tip.' Sensations remain normal but muscles atrophy quickly. The prognosis is favourable in a majority of cases because this is due to bruising and compression by the exudate as a result of overstretching.

TREATMENT.—The treatment is evident. The paralysed muscles should not be overstretched by the non-paralysed muscles because otherwise when these muscles regenerate they will not be able to act properly because of overstretching. Therefore the limb should be put in a position of rest i.e. the arm is put in abduction at right angle from the trunk, the elbow in flexion, the forearm in supination and the wrist in dorsi-flexion. Usually 'Fairbank's' splint answers well the purpose.

PROGNOSIS.—All the slight injury cases recover in the course of a few weeks. However about 15% do not recover and need an open operation of suturing the nerve. This operation is not very easy. It is difficult to identify the cut ends. The results are not very satisfactory.

One of the rare paralysis of brachial plexus is *Klumpke's paralysis* in which the 8th cervical and 1st dorsal roots are injured. The treatment is on the same principles.

2. *Facial nerve palsy*:—This is about the most common nerve injury. It is due to false application of the forceps during delivery. In most of the cases recovery is seen within a week. No treatment is necessary. Very rarely the facial palsy is due to intracranial injury in which the facial nerve is involved. In this case the paralysis may be more permanent.

3. *Radial nerve palsy*:—This occurs because of the special lie of the nerve for compression, as it has a long course and due to its close relation with the bone humerus. The deformity of wrist-drop

is wellknown. It is peculiar that there is only motor paralysis although the nerve is a mixed one. The sensory and the vasomotor fibres escape compression effect. The nerve is injured sometimes during fracture of humerus. Keeping the arm in 'cock-up' splint is the treatment. The results are satisfactory.

III. Injury to bones.—The injuries in order of frequency are :—(1) The fracture of the shaft of the humerus.

(2) The fracture of the shaft of one or both clavicles.

(3) The fracture of the shaft of the femur.

(4) Depressed fracture of the skull.

(5) Displacement of the epiphyses of the humerus or femur.

(6) Fracture of the lower jaw.

The fractures are seldom of the greenstick type. They are usually complete, and there is often considerable displacement. Large masses of callus develop, and after one or two weeks a lump is formed, which suggests injury to the bone. Prognosis in these fractures is excellent, because non-union is practically unknown. Union is rapid. Even if bone unites with angulation, gradual moulding occurs in the first few years of life, and normal alignment is restored. However, shortening may persist into adult life. With proper care during delivery, none of these fractures should really occur, as they are due to faulty technique.

1. *Fracture of the shaft of the humerus* :—This is due to wrong attempts to deliver the extended arms in breech presentation or to deliver impacted shoulder in vertex presentation. The common site is the middle third of the bone. The fracture is transverse or spiral. Over-riding is rare. The deformity is of outward angulation, as the powerful deltoid muscle abducts the proximal fragment. Radial nerve palsy may be produced. Callus formation is considerable. The diagnosis of fracture is easy. The arm lies hanging by the side, and there is inability to move the arm due to tenderness and pain. If, in doubt, radiography will prove the diagnosis.

TREATMENT.—This is simple. The arm is strapped to the chest over a pad of wool, which is thick enough to maintain moderate abduction of the limb. The hand and fingers are left free. Even if the fracture unites with some angulation, there is no cause for worry, because the angulation will be corrected by gradual moulding within the first two or three years.

2. *Fracture of the shaft of the clavicle* :—This occurs in the middle third of the shaft and in majority of cases it is due to direct digital pressure on the bone during delivery of the after-coming head. Occasionally it occurs indirectly from traction on the arm or the head. The outer fragment is displaced downwards and inwards, while the inner fragment is displaced upwards, by the pull of the sternomastoid muscle. The injury often becomes evident only by a lump due to callus formation two or three weeks later. A pad of gauze in the axilla tries to put the outer displaced fragment in a line

with the inner fragment. The arm is kept in a sling for two weeks. The results are quite good.

3. *Fracture of the shaft of the femur* :—This is produced by traction on the leg in breech delivery, but is usually due to efforts to deliver a breech with extended legs, by groin traction, or by bringing down legs first. Injury may also arise during extraction of the child by caesarean section. The fracture is in the upper shaft of the femur. The proximal fragment is strongly flexed by the psoas muscle and so it usually lies at right angle to the distal fragment. The attitude of the child with this fracture is one of general and strong flexion because of the tonic contraction of the psoas muscle.

TREATMENT.—Fixed skin traction is applied to both the limbs flexed at the hip and extended at the knee. I usually do fixed skin traction with the overhanging transverse bar in the middle of the frame of the child's cot. The traction applied is just sufficient to keep the buttocks slightly raised from the bed. By this treatment the distal fragment comes in apposition with the proximal flexed fragment. Nursing is easy, and no difficulty from pressure sores occurs. This is kept for four weeks. Result is excellent.

4. *Depressed fracture of the skull* :—This is due to pressure of the child's head on the bones of the pelvic inlet, particularly the promontory of the sacrum especially in contracted pelvis. It is a rare injury because of the pliability of the skull and wide open sutures in the infant. Depressed area of the bone often undergoes spontaneous elevation. If it fails to do so, operation is indicated. Operation is usually easy. Through a small hole at the bottom of the depression, the bone is brought into position by means of a hook.

5. *Epiphyseal displacement* :—Birth injuries may cause displacement of the epiphysis at the lower end of the femur, the lower end of the humerus or the upper end of the humerus. These injuries are rare. They are treated by ordinary manipulation and immobilisation for three weeks. Even if the displacement remains imperfectly corrected, the regenerative powers of the infant are such that an apparently normal bone is reconstructed and no deformity remains.

6. *Injury to the lower jaw* :—This injury is very rare and the treatment is on ordinary lines.

Sometimes multiple fractures are seen in an infant. In this case congenital fragility of bones e.g., osteogenesis imperfecta should be suspected.

The reader must have noticed from the above discussion, that the birth fractures unite very quickly. But there is one exception and that is the fracture of the tibia near the junction of the middle and the lower third of its shaft. This fracture is rare but is very difficult to unite because of the feeble blood supply and the difficulty of immobilisation in infants. Slow union or even non-union occurs, giving rise to pseudo arthrosis. There are various views as to the causation of pseudo arthrosis of tibia but the one mentioned above is probably widely accepted. The treatment is open operation and internal immobilisation by double onlay grafts.

IMPORTANT POINTS ON FEEDING

R. L. TANDON, M.B., B.S.,
Paediatrician, Dr. Tandon's Children Hospital, Hauz Qazi & Kingsway, Delhi.

MAJORITY of the patients who come to the hospital suffer from ailments which are directly or indirectly connected with the error of feeding. The important points regarding feeding are the following:—

1. Put the child on breast from the 1st day, no matter the milk comes or not, for a couple of days.
2. Give milk every three hours starting at 7 a.m. and ending at 10 p.m. No milk is to be given at night between 10 p.m. to 7 a.m. even if the infant cries. Give sips of warm water after each feed and at night if the infant wakes and cries.
3. Some mothers give their own milk off and on, in addition to artificial milk on the plea that the child feels hungry on breast. This mixture of milks is more injurious than putting the child on any one of them and so should not in any case be allowed.
4. Feed the child from both the breasts at each feeding from 5 to 10 minutes at a time. Give a little warm water after each feed.
5. Let the child be fed on breast for one year, the maximum.
6. Some mothers feed their babies on breast for more than one year and I have come across cases where feeding is continued for 3 to 5 years or longer, specially in rural areas, by uneducated persons and also by some persons on the plea that they can avoid pregnancy. This spoils the health of the child and mother and the notion of avoiding pregnancy is wrong. So breast feeding should be stopped by ten months to one year.
7. Most of the mothers, due to health or other causes, think that suckling is impossible and start straightway artificial feeding which should be discarded as it is injurious to child as well as to mother.
8. Failure to gain weight is the only justification for weaning in early days of the baby.
9. After 10 months to one year reduce the milk and replace some feedings by vegetable soup till the end of one year when the child is put on artificial milk.
10. After one year give only milk in the morning, midday and night diluting the milk to 1:3 to start with, adding little glucose. Give in between, vegetable soups and fruits.
11. Give only buffalo's milk for two years at least. No cow's milk is to be given to any child up to the age of 3 years to avoid bovine tuberculosis, or if buffalo's milk is not available put the child on Glaxo, Oster milk, Similac, Varamel, white house vaporated milk.
12. Don't give any medicine as tonics to the children. It is useless and even harmful to give vitamin A and D to infants so long as they are taking milk in any form, because this overloads the cells of liver causing various types of dyspepsia to the limits of producing cirrhosis of liver. Moreover, these things make the child flabby, not healthy. The infants require other things which are not available in milk diet like Vitamin B complex, Liver Extract. So these things may be introduced to a small extent.

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SCREAMING IN INFANTS

M. B. PRABHU, M.D., M.B.C.P.,
Madras.

Definition.—A scream is defined as a sharp shrill cry of fear or pain (Webster).

It will be noticed that screaming is different from crying. A scream starts suddenly; the voice is high-pitched and usually creates an impression that there may be something seriously wrong which requires urgent attention. A scream is far more un-nerving to hear than a cry.

Since the subject of this article is an infant, that is, a child up to two years of age, it will be evident that it cannot tell you what is amiss. Very often the physical signs are so few, sometimes so slight, occasionally almost absent, that it causes the attending physician a sense of embarrassment when he is face to face with a case that requires immediate handling but which gives so few clues for a rational management of the case.

We can take here some of the causes which are not usually considered pathological. Screaming in a healthy infant may be as a result of fright, taking place more readily in a child of nervous temperament. This cannot be considered strictly pathological. However, the object causing fright should be removed. It may be a sudden loud noise or some object the child is not familiar with.

Increasingly often it is a sign that the child is clamouring for attention or that it is frustrated in what it desires. Here the screaming is a sign of naughtiness and is more common in the petted and pampered child. Though screaming as such, does not need to be taken notice of, nevertheless it should be interpreted as a sign of emotional instability. The child likes to dominate the household by its cries and it insists on what it wants whether it is beneficial to it or not. Firm handling of the child, no notice being taken of its screams, and attempts to divert the child's attention to things that are pleasant, will bring about an improvement in the child's behaviour. If this behaviour pattern is not corrected in time, feeding difficulties will arise which, in their turn, may lead to ill-health and disease.

In a large number of cases the cause lies in the abdomen; usually it is some disorder of digestion associated with a certain degree of flatulence. The pain is of a colicky nature and is due to spasmodic contraction of the bowels. An enquiry into feeds is essential. In the majority of cases the child is on artificial feeds. Sometimes the artificial food adopted is one of good reputation—nay, wide reputation. This need not necessarily mean that it cannot cause indigestion in the child in question. The child usually lies with its legs drawn up. When you gently palpate the abdomen there is no increase of pain and on percussion there is tympany. The motion, on inspection, shows evidence of milk curds. A glycerine

enema and warm fomentations applied to the abdomen are helpful. The drug of choice in my experience, has been Liquid Paraffin 8 to 10 minims in a little warm water, as a suspension—not an emulsion—administered once in two hours or earlier has given greatest relief. In many cases simple carminative suffices, but in the cases referred to here, the parents had already tried the common carminative patent remedies and because these had failed the child was brought to the consultant. After the screams are relieved a detailed examination should follow. It should include a complete examination of the urine and motion to get a complete picture of the case with a view to ward off similar attacks of screaming in the future.

Another frequent cause is ear ache. This usually follows naso-pharyngeal catarrh and the usual history is that the baby had slight fever, cold, running from the nose; the child looked slightly ill: home remedies may or may not have been administered as the ailment appeared trivial. Then all of a sudden—usually at night—the child begins to scream. In a few cases the mother has noticed that when the ear was pressed in the course of handling the child, it had cried. I have an impression that this kind of intermittent ear ache is more common in mild types of naso-pharyngeal catarrh than when the child is severely ill with pneumonia. Ear ache should be suspected in each case, warm ear drops should be instilled in each ear and a sedative mixture given internally for the cold, the causative factor.

Some other causes:—Localized areas of acute inflammation, as a commencing abscess, cause fever and pain and when the part is handled carelessly the child simply screams. It is surprising how a mother of several children will bring an infant with a large abscess on the buttocks or back of the shoulders, handling the baby in such a clumsy manner that the abscess gets pressed upon and the child screams. It does not occur to her to keep a bit of folded cloth to protect the area from such a pressure.

A healthy child, breast-fed, often the first one, generally a male, may be brought to you screaming. The child has been passing almost pure blood or blood-stained mucus in the stools, thus simulating an attack of dysentery. Between the screams the child is quiet. At times nothing definite may be found on examination of the abdomen. Where the diet and the care of the infant are above reproach, consider the possibility of intussusception before you decide to prescribe a purgative.

If the child screams almost from birth at the time of micturition and the child is male, examine the infant for phimosis.

If the child screams on passing urine where it was not usually doing so before, the possibility of excessive acidity of urine and of pyelitis should be borne in mind.

Sometimes a strong and well-nourished infant strains and screams while passing motion. The history is one of constipation

that is, of a motion once in a day or two. As a result of constant straining there may be an umbilical hernia. But to one's surprise the motion is not hard as one expects in constipation but rather soft and semi-liquid. I have seen convulsions follow such screaming with straining. In my experience these have been cases of over-action of the anal sphincter. Dilatation of the sphincter with the little finger brings about an immediate cure, and, what is more surprising, a lasting cure.

Some obscure causes of screaming:—A first-born child was brought for incessant screams by night. On examination it looked healthy and there were hardly any signs of any hereditary defect or disease. It was breast-fed. On careful enquiry it was discovered that the mother had syphilis for which she had received inadequate treatment. On administering small doses of mercury in the form of grey powder the screaming attacks ceased. This was in the pre-Penicillin days.

A child screams constantly more or less from birth. The history may reveal that the child had been rather slow. There was delay in holding up the head erect. On careful examination the baby exhibits signs of amentia. It may have a small head or does not recognize or fix its gaze when a bright light is focussed on the eye. On passive movement of the extremities a certain degree of jerkiness and spasticity are noticeable. Here the cause is congenital mal-development of the brain and sedatives have to be given.

In inflammation of the brain or the meninges, screaming is naturally to be expected as a prominent sign. Curiously enough, it is not so common. In tuberculous meningitis it is supposed to be one of the classical symptoms. In my cases it has been present in only about 10%.

In the course of a fever, just before an impending convulsion, screaming may often occur.

Another cause of screaming in a child that has been previously normal, subsequent to an attack of fever, is encephalitis lethargica, when this may be regarded as a form of sequela.

If a child suffers from a chronic illness often associated with diarrhoea and is brought in looking emaciated, pale with a waxy complexion, and with a long-drawn pinched face, crying day in and day out, as if it is in severe pain, it is a case of frank or latent scurvy. If 100 mg. of Vitamin C are given intramuscularly, the relief is immediate and dramatic. If this possibility is not remembered, all the other methods of treatment fail to give relief.

A few children, in good health, and without any sign of disease, may scream and then go into a convulsion. The possibility of infantile epilepsy should be borne in mind.

In conclusion it is to be understood that this is not a complete survey of screaming, but rather a short essay to draw your attention to some features worthy of remembrance.

4, Gangu Reddy St.,
Egmore, Madras.

THE COMMONER FORMS OF DIARRHOEAS IN CHILDREN

M. M. CHATTERJI, M.B., B.S. (Cal.),
Medical Officer, The Tata Iron & Steel Co., Ltd., Calcutta.

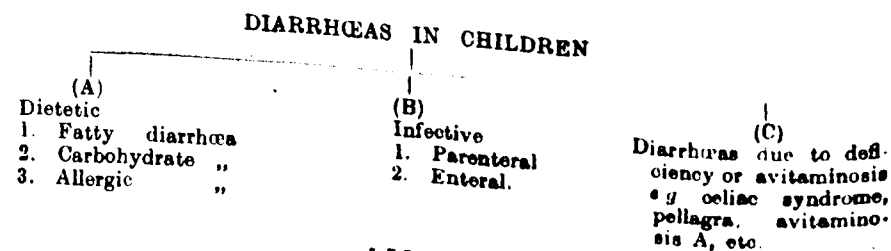
K., aged 1½ years, the only child of a widow, with the complaint of a large number of watery motions with green flakes of mucus and undigested food particles was seen on an emergency call with a complete picture of toxæmia and dehydration. The eyes were sunken, the nose was pinched and the whole body assumed a peculiar ashy colour. The skin was shrivelled up and the extremities were cold and clammy. The child was crying feebly in a sunken voice with a depressed ant. fontanelle. The pulse was quick, thready and almost imperceptible.

The child started this malady with the 'H' of irregular loose motions about a fortnight back and to start with there was vomiting associated with slight fever off and on. Later on gradually the diarrhoea became worse from day to day and the vomiting at the highest peak of the illness was almost incessant. So much so, that even sips of water were not to be retained.

Now let us take another very common form of diarrhoea, so frequently met with in the medical outdoors. The child usually coming of low income family is brought with the 'H' of a chronic diarrhoea of long standing (say about 6—8 months) and œdema over the whole body but more marked on the lower limbs. Such cases are frequently associated with a generalised dermatitis or may present the typical pellagroid lesions of the skin. It is the bloated up appearance of the child that possibly makes the parents feel about the urgent need for medical aid.

Now I am sure that my colleagues will bear me out, when I say that the pictures painted above, represent two different types of diarrhoea in children. One popularly known as summer diarrhoea and the other diarrhoea of nutritional origin, both being encountered commonly in our day to day practice and they are at times very bad emergent cases in pædiatrics.

This brings in the problem of the commoner forms of diarrhoeas in children, which may conveniently be classified etiologically, under the following heads:



A. Dietetic diarrhoeas.—Under this broad heading are included the various gastric disorders of children which can directly be attributed to the quality of their feeds.

1. A child accustomed to mother's milk if suddenly changed over to undiluted cow's milk feeds may react by developing whitish vomiting and watery motions containing lots of white curds. Such cases are usually associated with severe griping pain. Thus sudden weaning, specially in the summer, when the bacterial infection factor is at its optimum, should be discouraged. This type of fatty diarrhoea is due to the failure, on the part of these tiny beings, to cope with the sudden increased demand on the secretion of the pancreatic juice to split off the excess amount of fat particles in the altered diet. As a result, the intermediate products of fat metabolism viz. the pyruvic and the other organic acids are produced which by increasing the intestinal peristalsis give rise to fatty diarrhoea.

2. Another very common form of dietetic diarrhoea in children is what is commonly known as carbohydrate dyspepsia where, due to an imbalanced diet, the child gets a plentiful supply of feeds, rich in carbohydrate, so much so, that the gastric ferments fall inadequate and, as a result, food particles enter the intestines almost undigested. A fermentation reaction is being initiated by the intestinal bacterial flora, by which the carbohydrates are changed into lactic acid and oxalic acid which by irritating the intestinal mucosa produce frequent watery motions. The associated gas formation explains the frothy appearance of the stool, which has got a characteristic pungent, sour (acid) smell. Its irritant nature is often manifested by the formation of small sores round about the anus.

This sort of malady is mostly seen amongst children of the poorer class who are hardly provided with a proper well-balanced diet. The main article of food in such cases usually consist of some cheap form of cereal like barley adulterated with flour and powdered rice or shotti food (a rich carbohydrate feed). Milk is more or less a luxury food to them. Such fermentative diarrhoea of some duration tells heavily on the general health and growth of the child and an ultimate result is the development of nutritional œdema owing to further depletion of body proteins.

3. There is another form of dietetic diarrhoea, where the child is sensitive to a particular item of food, usually to some protein factor e.g. egg protein or milk protein and reacts violently to the respective allergens in the form of loose motions associated with colic, vomiting and other allergic manifestations. These allergens may also reach the gastro-intestinal system of the child through the mother's milk when the mother has taken any such item in her food.

B. Infective diarrhoeas.—1. *Parenteral type*:—It is a type of diarrhoea where the site of infection is situated outside the gastro-intestinal tract, the latter being influenced reflexly or via

circulating toxic metabolites, as in:—(a) Acute infective fevers like measles, broncho-pneumonia, bronchitis etc.; and (b) suppurative conditions like mastoid abscess, suppurative tonsils, pyelitis, multiple furunculosis, empyema etc. etc.

2. *Enteral type*:—Here there is some form of bacterial invasion of the gut, specially by the Salmonella group of food-poisoning bacteria. Such invasion is possible on account of low gastric acidic content. The rate of child mortality and morbidity from this condition is rather very high in the summer and, as such, the condition is also known as summer diarrhoea.

According to the severity of the degree of infection, the summer diarrhoeas may again be subdivided into:—(a) Simple diarrhoea; (b) febrile diarrhoea associated with mild fever and slight toxæmia; and (c) choleraic diarrhoea, where the signs and symptoms of not tackled early usually end fatally.

C. Diarrhoeas due to deficiencies and avitaminosis.—Under this heading, in our country particularly, avitaminosis in the different forms is to be regarded as the etiological factor.

Vitamin A deficiency is a frequent cause and beside enteritis, ocular lesions like xerosis of the conjunctiva and keratomalacia and met with.

In coeliac syndrome probably Vitamin B complex deficiency has its part to play. Avitaminosis D is also responsible in certain cases where defective bone formation is a feature.

Treatment of diarrhoeas in children will obviously depend on the etiological factor but primary consideration will be due to the aftereffects.

The immediate reaction is in relation to the fluid loss from the system together with the electrolytes. The total fluid content of the tissues in a child is comparatively more than in the adult, in proportion to the solid components. Besides, loss of alkaline intestinal contents together with a starvation metabolism account for acidosis developing in the system. The important aftereffects specially of long-continued diarrhoea will be hypo-proteinæmia with varied degrees of degenerative changes in the liver and nutritional oedema. These effects have got to be counteracted before or at the same time, that the etiological factor is tackled.

Thus the principle of management will be as follows:—

- (1) In acute diarrhoea. (2) In chronic diarrhoea.
1. *In acute diarrhoea*:—(a) Replacement of body fluids. In cases of severe toxæmia and a marked dehydration—

An intravenous or subcutaneous Glucose Saline has got to be started immediately and should be repeated till the fluid balance is maintained. Rectal medication in such conditions is useless. For intravenous medication in severe cases even the sinuses in the cranial cavity may have to be selected. But for ordinary purposes saphenous vein in the leg or even ante-cubital vein may be found useful. Bone-marrow is at times selected for this purpose. If I.V. medication is not possible, the subcutaneous route is one of choice. Intra-peritoneal administration sometimes has to be taken recourse to.

(b) *Elimination and absorption of the toxins*:—Castor oil, in tea-spoonful doses or in repeated doses in the form of emulsion, helps the process of elimination considerably. It is not at all scientific to stop the diarrhoea all at once, as this is, in fact, a very good safety valve, so far as the elimination of the toxins is concerned. Alternatively the following powder may also be used for the same purpose in repeated doses:—

R	Calomel	
	Dover's powder	} 55 gr. ½
	Sacc. Lact.	... gr. v

Osmokaolin in 3p doses suspended in glucose water in the form of sips *ad lib*, absorb the toxins in the bowels appreciably.

(c) *Specific treatment*:—In infective diarrhoeas.—Sulfa drugs like Thalazole or Sulfaguanidine may have to be administered in suitable dosage in infective diarrhoeas. Of late, anti-biotics like Streptomycin (orally), Chloromycetin, and Aureomycin have been and are being used with effective result in selected cases when given judiciously.

In dietetic diarrhoeas.—Stoppage of the dietetic articles proving to be the cause of diarrhoea and the use of cathartics, are all that is needed. In the allergic group, the avoidance of the Sp. allergens and the use of anti-histaminic drugs and vitamin C sedatives are indicated.

(d) *Symptomatic relief*:—For the incessant vomiting and for the pain and restlessness, the following prescription is of great help:

R	Chloretone	... gr. ii p
	Menthol	... gr. ¼
	Phenobarbitone	... gr. ½
	Ext. Hyoscyamus	... gr. 1/6
	—Gentian	... qs.
	Ft. pill send 8 such.	

Sig. One pill stat and every half an hour till the symptoms subside.

3. *Chronic diarrhoeas*:—Here over and above the specific treatment and the symptomatic relief one must take the nutritional oedema, the hypo-proteinæmia and the associated degenerative changes in the liver into account.

Thus, a salt free, high protein diet with an adequate dosage of the essential Amino acids and drugs like Meonine prove very effective within a short time.

The use of green cocoanut water by the I.V. method specially in cases of diarrhoeas with nutritional oedema has given gratifying results in the hands of some paediatricians, possibly owing to its contents of the electrolytes and the essential Amino acids.

The judicious use of iron tonics and the multivitamin preparations (preferably in aqueous solutions) definitely curtail the period of convalescence.

Last but not the least comes the question of feeding the baby.

In acute diarrhoeas for the first 24-48 hours, no feed by mouth, excepting 5% glucose drinks (in boiled water) with lemon juice and salt. Then gradually the feeds are to be supplemented with butter-milk, Lactic acid milk, Eledon etc. Gradually fresh fruit juice, milk or malted preparations, boiled eggs are to be added to make the feeds a balanced one.

In chronic diarrhoeas with oedema, the elimination of salt is of great importance. In such cases a high protein diet should be given from the very beginning.

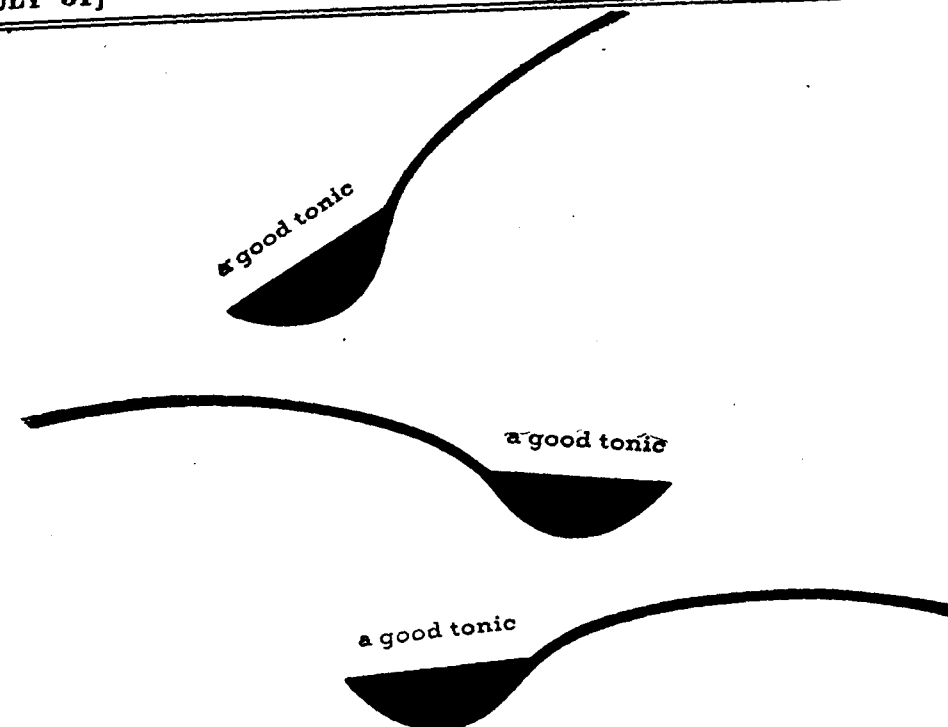
Acknowledgment.—I have great pleasure in expressing my indebtedness to my teacher and my professional senior, Dr. A. B. Mukherji, M.D. (Cal.), M.R.C.P. (London), Visiting Physician, Calcutta Medical College, for the very many valuable suggestions that he has kindly made after going through the whole of the article.

References :

Majumdar, N. G.—Journal, Indian Med. Assoc., Vol. xx, No. 6, March '51, p. 212.

Treatment of Whooping Cough with Vitamin C

De Wit reviews the results of a study he made on 90 children. Groups of children of the same ages were given vitamin C by mouth or by injection beginning with a daily dose of 500 mg. (10 tablets of 50 mg. each of ascorbic acid—vitamin C) for 7 days decreasing by 2 tablets (100 mg.) every other day down to 100 mg. (or 2 tablets a day) and continuing at that level until the cure was complete. The average duration of illness was only 14 days in those treated by injection, 20 days in those having it by mouth, and 36 days in comparable cases treated by vaccines. If vitamin C was given in the early stages, it prevented the severe convulsive cough in 80% of cases. Fever complications occurred in children treated with vitamin C than in those having vaccines. The excretion of vitamin C was studied by the author in all these cases at regular intervals, and he recommends that the daily dose of 100 mg. should be continued until 3 days after the entire dose is eliminated in the urine. This stage corresponded to complete clinical recovery.—(*Maandschr. Kindergen. (Eng. Summary)*, 17, 367-74, 1950).



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DIARRHOEA IN CHILDREN

Dr. RAJANINATH R. GHAREKHAN,
District Medical Officer, Mehsana.

I HAVE no approach to a Library or to a Laboratory, and hence I will not discuss the history or the theories of the disease or its various laboratory findings. These are of almost academic interest, and a general practitioner is not much benefited by these. This is a short article which deals mainly with treatment.

The diarrhoea in children is, to a very large extent, seasonal. It is distinctly of two types, one occurring in the summer and the other in the rainy season, and mostly it occurs during the change. Cause in both is different, and hence the treatment also differs.

Diarrhoea occurring in summer.—This is called summer diarrhoea. It actually starts during the change of season from cold to hot. The onset may be gradual but is mostly sudden. The younger the child, the more likely it is to be green, and in infants it is usually green. The green colour is also present when the diarrhoea is associated with broncho-pneumonia. There is hardly any blood or mucous, and slight colic if at all. The child passes the stool almost without its knowledge. The infant cries after the stool is passed. Some colic is present if the stool is green. The frequency may be upto 12 or 15. I am not talking of the so-called choleraic diarrhoea.

The cause is over-activity of the intestines; the food rushing through, before it is digested and absorbed. This over-activity may be due to various causes, which I am not dealing with here. The reaction is usually acid (except when colour is green, when the reaction is alkaline due to bile) and the anus becomes red and raw. The acidity is due to acid fermentation in the intestines. The stomach acidity may be actually low.

About treatment, I shall not deal with elaborate book description hospital treatment, which is largely theoretical, and hardly available even in large, so-to-say well equipped, hospitals, and that too for the mass of people, living in villages, coming on foot from a distance of 5 to 7 miles, and who want medicines for 5 to 7 days at a time.

As is well known opium is a great stand-by, and next are acids. Both these together work much better, so much so that their action may be called synergistic. The action of opium need not be described. Acids work on account of their acidity as well as antiseptic action. In my experience whenever there is a green stool, opium mixed with Ol Ricini in the form of mixture Ol Ricini with Opii is the best. The formula is:—

R	Ol Ricini	...	3 ii
	Mucilage Acacia	...	q.s.
	Tr. Opii	...	℥ v
	Aqua ad	...	℥ i
	Mft. Mixt.	(Baroda State Pharmacopoeia)	

[565]

Dose.:—One drachm per year of age three or four times a day is enough. The frequency becomes less and the green colour disappears almost at once, and for this result the mixture need not be repeated for more than 2-3 days. This does not usually stop the diarrhoea because the cause is not removed by this treatment. Then the mixture without opium should be given for a day or two. Now the case becomes a case of simple diarrhoea. For this I use the following mixture:—(Mixture Anti-Diarrhoea).

R	Liq. Hydrargyri Perchloride	}	... ss ℥ x
	Liq. Ferri Perchloride		
	Liq. Morphia Hydrochloride		
	Aqua. ad		3 i Mft. mist.

I have found this mixture very efficacious, and the child responds extremely well. The dose is usually one drachm for every year upto 3 years, three or four times a day. The diarrhoea stops in a day or two, very rarely it lasts for 4 or 5 days.

Sometimes Acid Phosp. Dil alone acts very well. Sometimes instead of Ferri Perchloride, I use Ext. Bella. Liq. because I feel that the former occasionally causes irritation.

Diarrhoea occurring during the rainy season.—This also occurs mostly during the change of the season, from dry heat to moist heat. The cause, heat, is common in both the types.

Here the attack is usually not sudden. The child cries for a day or two or more previously, the frequency of stools increases and it at first looks like the former type, the difference being that here the child cries almost every time it passes a stool, and it cries even when it does not pass a stool, showing that there is colic. The stools are small and frequent. Usually there is blood and mucous also. Tenesmus is present which is very disturbing to the little patient. Sometimes there is green colour also; though due to bile, the remote cause is different from that in the first type.

As I said before I am not dealing with the cause, but it is usually germs (bacteria) or worms.

Here opium or acids are of no use. They, on the contrary, are contra-indicated; the cause being some irritant substance, either a foreign matter or some produced in the bowels, mostly large bowels, and this should be removed. The liver should be made to work, which will sooth the bowels.

This type of diarrhoea may be better called dysentery, and the mixture that I use is therefore called Mist. Anti-Dysentery.

The formula is:—

R	Sodii Sulphate	...	3 p
	Spt. Ammon. Aromatic	...	℥ x
	Tr. Hyoscyami	...	℥ xx
	Spt. Chloroform	...	℥ x
	Aqua ad	...	3 i Mft. mist.

I prefer Spt. Chloroform and Aqua, to Aqua Chloroform. The dose is usually one drachm per year of age upto 3 years and then according to age. To be given 3 or 4 times a day.

I have found this effective. If the frequency is too great Tr. Camphor Co. or Chlorodyne may be added, but is hardly required. No hypnotic is necessary, because the child feels relief very soon. This mixture is not based on the once famous. "Sulphate treatment of dysentery". The above mixture is very useful for dysentery in adults also, improving the condition quickly.

Of course, diet is very important in all diarrhoeas. For at least one or two days all food is stopped. Then "Chhas" is the most ideal food—it is almost a medicine. I don't know if there is any correct English equivalent for "Chhas". "Whey", in its English sense is not "Chhas."

"Broken curds" is nearer. The curds from which 'Chhas' is prepared should not be quite "sweet". It is believed that it should not taste acid at all. This is incorrect because it is only sour milk, which is, I believe, irritant, rather than soothing; because it probably contains intermediate products. The 'Chhas' therefore to be effective, should taste slightly acid, and it should be thin. A thick "Chhas" known as "Matha" is harmful. It should be prepared to taste and for this, salt (preferably Sindhav or rock-salt) jira, asafœtida etc., may be usefully added. It should be given in repeated small quantities. Then other liquid food may be given. One has to be more gradual when there is blood and mucus, especially mucus.

I practically never use Bismuth. Somehow I have not found it useful. It may be soothing, and may be forming a protective coat over the irritated mucous membrane, as it is said, but my experience is that mucous remains behind it, under it, and the irritation to the mucous membrane caused by the mucous itself, which should go, continues. Moreover, Bismuth being a heavy salt, forms masses. It probably does not spread like a lime wash on a wall, because of the continuous movement of the intestines. These masses, small or big, themselves cause irritation. Therefore it may be soothing perhaps for a day or two, but are afterwards useless.

It is said that Vitamin A in large doses is sometimes useful. I have no experience, because it is costly and not possible for cases with which I have to deal.

This is not an exhaustive article. I have touched only ordinary diarrhoea and ordinary out-door treatment. That occurring with other condition like rickets, enteric, tuberculosis, malaria, syphilis, worms etc., should be treated along appropriate lines.

I am not in favour of using Sulpha drugs or any such chemicals.

In short, appropriate and judicious use of drugs I have mentioned above give extremely satisfactory results, with very little cost and no risk.

WEANING—EARLY MIXED FEEDING*

S. P. BHATTACHARJEE, M.B. (Cal), D.C.H. (Lond.),
Calcutta.

'WEANING' has been particularly selected as the subject of the present paper, because it is a very important step in the development of children: a step which, in our country, is neglected, overlooked and put aside. There are even controversies regarding the actual meaning of the word. The proper meaning of the word 'to wean' is not to take away from the breast, a sense in which it is commonly used: to wean a child really means to accustom him to something new. Here the word is used to mean mixed feeding.

The ancient law-makers of our country quite understood the importance of the process of weaning. They advised the introduction of vegetables, sweetened rice with milk and other things at the age of six months in a ritual function. The function is observed to the present day, but the advice of those men of yore is followed only on that particular day. In the majority of cases, the people of our country do not give their babies anything else but milk or its substitute as they think that feeding of other things at this very small age would be detrimental to the health of their children. They are over-conscious of the liver of their children and they think that babies cannot tolerate starchy food because, most probably, of the old idea that in young infants the diastatic capacity of the pancreatic juice is still insufficiently developed. The people, however, are not to be blamed for these erroneous notions. A quarter of a century ago these ideas were considered to have a scientific basis; but with the evolution in the knowledge of paediatrics these wrong conceptions were rectified. The fact became established that even in the case of the young infant, starch, if not given in excessively large amounts, is well digested. The doctors are of opinion that liver, which has great recuperative power, is an organ that cannot be easily damaged. These new ideas need a constant emphasis for a considerable period before they are accepted by the lay people.

For various reasons, the mothers are psychologically quite satisfied in keeping their children on milk only. They are quite prepared to feed their babies half a cup of milk than one cup of vegetable soup, as milk is considered by them to be very nutritious. Moreover, food preparations, other than milk, means, for the mother, a great deal of botheration. Treatment of this aspect in the psychology of mothers should be tactfully managed by medical practitioners. They should be told emphatically that although milk is undoubtedly very nutritious, it can supply the nutritional requirement of a growing baby only up to a certain stage, after which addition of

other food is absolutely essential. Well-to-do parents take pride in declaring that their child, aged one and half or two years, takes one and half or two seers of milk daily; on the other hand, they complain that the child is not growing normally, is becoming pale and is not playful. These parents are to be tackled in an intelligent way as it is often difficult for medical practitioners to stop them from giving so much milk and to compel them to add other food materials. People of low economic status keep their babies for a long time only on breast milk, which becomes insufficient in quantity as well as in quality as the child grows; or they add other types of food in a haphazard manner and it produces chronic indigestion. The chronic indigestion, prolonged barley water feeding and insufficient diet produce dystrophy, atrophy or marasmus which is, now-a-days, a great problem in our country.

Weaning—A vitally important step.—The economic condition in our country compels the majority of mothers to keep their babies on breast milk for a long time. There is no harm in prolonged breast feeding, so far as the child is concerned, provided breast milk is sufficient and other types of food containing iron, minerals and vitamins are given. When a healthy baby is 5 or 6 months old and weighs 11 or 12 pounds, he requires 28 to 30 ounces of breast milk in 24 hours to maintain the caloric requirement. It is not practicable to expect a mother to be milched out 30 ounces or more of milk daily. Naturally if the baby is kept on breast milk alone at and after the age of 5 or 6 months, the caloric requirement will not be fulfilled. The caloric requirement might be satisfied by complementing the diet with cow's milk or, in other words, by introducing the so called "Zwiemilchernahrung" ("double milk feeding"). In that case even, the proper amount of iron, minerals and vitamins will not be supplied. Iron is essential for the proper formation of blood. During the first five or six months of life the baby derives his daily supply of iron largely from its intrauterine store in the liver. So from this age period exogenous supply of iron is essential. Now all milk is poor in iron, so if exclusive milk diet is continued after the 6th month, the baby will naturally develop nutritional anaemia. Better results are obtained by earlier supply of exogenous iron. If small amount of fruit, vegetables and egg yolk are given from the 5th month, the baby will get all the iron he needs and also mineral salts and vitamins necessary for the growth. It may be interesting to note that young animals instinctively choose green iron-containing food at an early age. Man is the only creature that drinks large amount of milk for a longer period.

* From the Department of Paediatrics, Medical College, Calcutta.

the mouth. They may be produced by some irritation in the gums resulting from dentition, or in the tongue, or it may be due to something else—an instinctive urge to put something new inside the mouth. He is not gratified with the liquid milk which he gets during his feeding time. He wants something new, and this, not in the liquid form. By putting infected material inside the mouth he produces diarrhoea; and this is the reason why babies get diarrhoea during dentition. It is high time that the association of diarrhoea with dentition should be forsaken. Dentition is a physiological process and it has got nothing to do with any disease entity. It has been noticed that if a healthy child is weaned at the 5th month and be given semi-solid or solid food like vegetable broth, rusk or toast, he is quite satisfied, very seldom gets the bad habit of putting other things inside the mouth and does not get attacks of diarrhoea during dentition.

Parents often complain that their children, although grown up in age, do not eat properly. This capriciousness for food—particularly solid food—is not due to any physical illness. These children, without any obvious illness, refuse to eat any solid food or they eat a small amount at a time, or eat too slowly and dandle over their food. Naturally, the physical growth is hampered and they become a problem. Parents often console themselves by the delusion that the holes in the throats of these children are too small for the passage of the swallowed material. The case history of these children would, however, reveal that in most of the cases weaning was not started at the proper time. If the child is not accustomed to solid feeding in a gradual process, if he is not taught to chew properly and to swallow, it is quite natural that he will refuse solid food. The process of eating is an art, and this is to be practised in a gradual degree. It is very unfair to think that one fine morning parents will be able to find that their children are chewing and swallowing solid food. Sometimes the case is more complicated with the advent of negativism—a psychological disturbance in the child. This is produced by the parents and near relatives who begin to fuss with the feeding of the child. The child is made to occupy the centre of attention in the home. The scene is rendered as dramatic as possible by constant admonitions, instructions, warnings, threats, coaxing, punishing, bribing, cajoling and others. The child, in turn, whines, screams, fights and behaves unmannerly. In all such cases the inherent fault lies with the parents, who do not wean the child at the proper time or where the weaning process is not properly steered.

These considerations justify the conclusion that weaning is vitally important in the rearing up of children.

The right time of weaning.—The weaning should be started in the 5th or 6th month when the weight of the child is 12 pounds. The process is to be followed very gradually, as tiny babies may

become upset if many new types of food are started at the same time or in quick succession. The process should extend for at least three months and during these three months the baby is to be accustomed to new items of food gradually. The process should not be started in hot summer months as during this period gastrointestinal upsets are common in babies. It is better to begin earlier if it is expected that the proper time of weaning will fall in very hot weather. Incidentally, it may be mentioned that the American schools let the baby to be nursed as long as the mother has serviceable supply of milk but they make sure that the baby gets enough food, whether from the breast alone or in combination with other material. Almost from the beginning they supplement the breast-feeding with special food rich in vitamins and little later with food rich in minerals.

Technique of weaning.—In a practical sense the problem of weaning is to search for the best of all possible correlations and to derive a method from it. Babies are individuals not alone in their pathologic but also in what may be assumed as their normal attitude to food. For this reason it seems desirable in a practical discussion to omit all tables of feeding schedules and to reduce all figures to a flexible minimum. In the preparation of a diet, care must also be taken to limit it to the foodstuff that is easily available. A very important point to be remembered is that weaning should never be started when the baby is not feeling well.

Here the discussion is restricted to an ideal case where a healthy baby of 5 months old is wholly breast-fed and gets the milk five times a day at 6 a.m., 10 a.m., 2 p.m., 6 p.m., and 10 p.m.

The first addition to make is fruit juice and raw fruit pulp. These should be given fresh and ripe and should never be cooked. Oranges, musambis, tomatoes, bananas, papayas and apples may all be given. The fruit is to be washed well, passed through a sieve, sweetened with a little cane sugar and given from a spoon immediately before 10 a.m. feed. At first the fruit juice should be given in small amount ($\frac{1}{2}$ —1 teaspoon) and gradually the amount is to be increased to 8—12 teaspoons a day. Following the fruit juice the baby is to be put to the breast as usual after allowing the baby to 'break the wind up', by making him sit up and patting on the back. Of course the time of breast-feeding is to be gradually diminished as the quantity of fruit juice is increased. Usually healthy babies tolerate the fruit juice if it is started in small amount and increased gradually with the tolerance of the baby.

At the age of $5\frac{1}{2}$ to 6 months, the next addition is to be made with vegetable soup before the 2 p.m. feed. 1 or 2 carrots, $\frac{1}{2}$ potato, $\frac{3}{4}$ green plantain, $\frac{1}{2}$ or 1 onion are washed, cut into pieces and cooked in slow fire till soft, in just enough water to cover them. Then they are to be passed through a sieve and replaced in a saucepan with 2—4 ounces of cow's milk and little salt. It is better to thicken the soup with little flour ($\frac{1}{2}$ to 1 teaspoon). Cane sugar may also be

added to the soup if the baby likes sweetened feed. To start with, one teaspoon is to be given and gradually the amount increased according to the tolerance of the baby till the whole breast-feeding is supplemented with the soup. As the child grows older, the amount of vegetables is to be increased, fish is to be added and the soup thickened by mashing the vegetables.

With the cutting of teeth, rusk or biscuit or toast can be given and little soft rice mixed with soup is to be added before the vegetable soup at 2 p.m.

The next addition is to be made with cereal water at 6 a.m. feed. Rice is the most easily available cereal in our country. Rice, thoroughly washed with water, is to be dried in the Sun, and then powdered and stocked in a bottle. In 8 ounces of water one level teaspoon of powdered rice is to be added and made to boil till the water is halved. To begin with, one teaspoon of rice water is to be given and gradually the amount increased to 2 ounces. Following the rice water the baby is to be put to breast as usual. In a similar way rice water is to be added gradually at 6 p.m. feed, in addition to breast milk.

Difficulty arises with many babies, when egg yolk is added. If gastro-intestinal upset does not occur and if allergic skin manifestations are not noticed, the amount of egg yolk is to be gradually increased up to the yolk of one egg. Egg yolk, if tolerated, is to be given two days a week in the early morning feed.

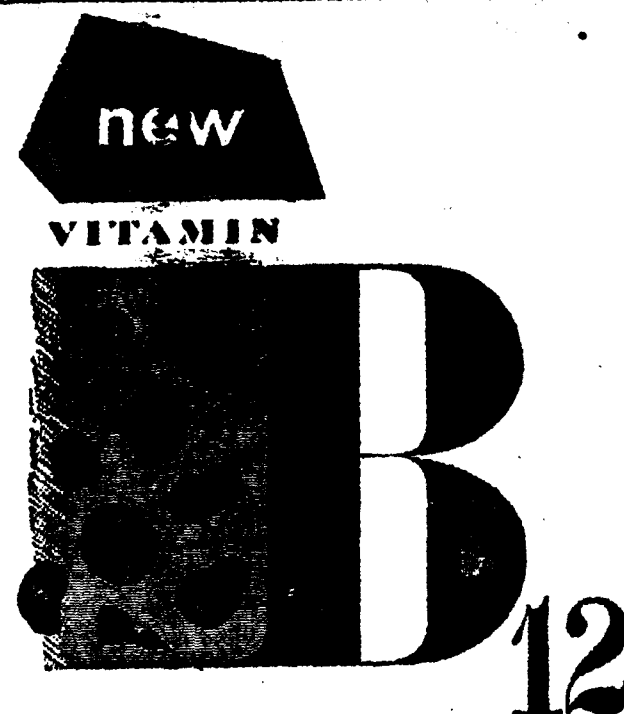
As the child grows older, the time of feedings should be gradually altered and the number diminished to four (7 a.m., 11-30 to 12 noon, 4 p.m. and 8-30 p.m.).

With the diminution of the amount of breast milk, cow's milk should be gradually supplemented and given mixed with cereal water and cane sugar. In those cases where breast milk is not sufficient from the beginning, cow's milk mixture with water or cereal water, in the dilution of 1:1 or 2:1 according to age and tolerance, is to be given. As conditions exist in our country, with the adulteration of cow's milk by dirty polluted water and other material, preference should be given to powdered milk available in the market. Care must be taken to see that the powdered milk is genuine and properly sealed.

The detailed time table of mixed feeding may be different in each individual case, but the above mentioned routine has been found to be quite convenient. If during weaning the child becomes ill, the process cannot be proceeded with. As the child gets well and leads his normal life, the mixed feeding is again to be started right from the beginning. But this time the process is to be followed with a little rapid succession.

In conclusion, to give more emphasis, it is again stated that "weaning", which should be considered as a vitally important process in child's life, is to be started at the proper time and under proper guidance. In no case the completely weaned child should get more than 20 ounces of milk a day.

I am indebted to Dr. D. C. Chakravarty, Principal, Medical College, and Dr. K. C. Chaudhuri, Chief Physician, Department of Paediatrics, for permission to publish the article and for valuable suggestions.



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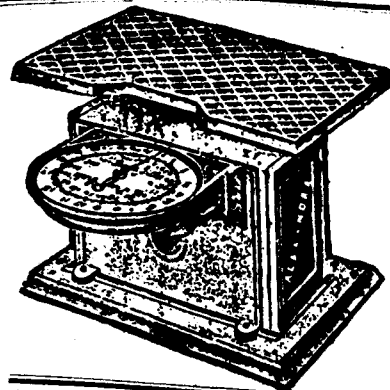
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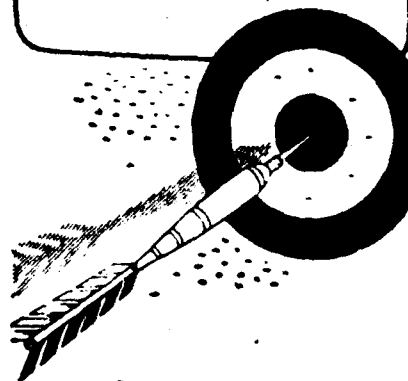
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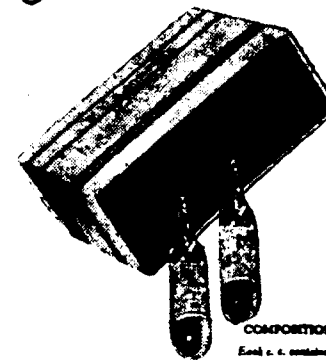
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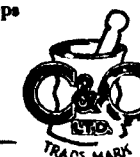
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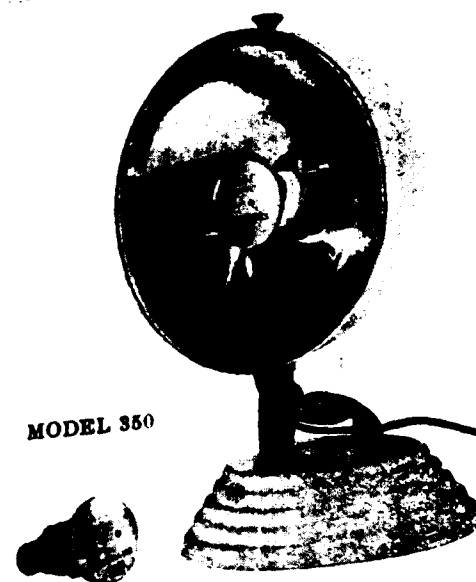
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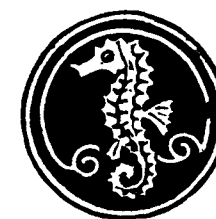
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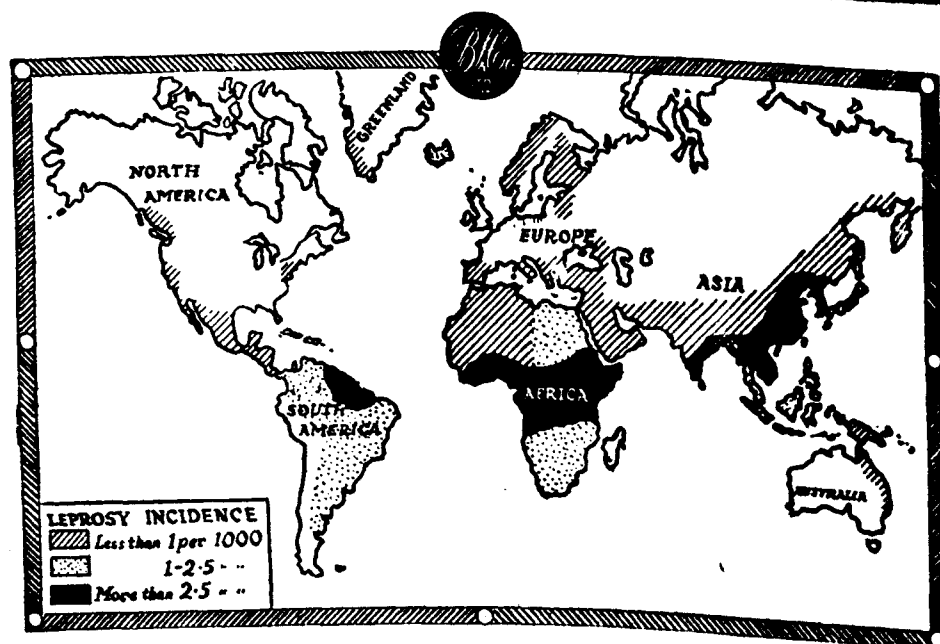
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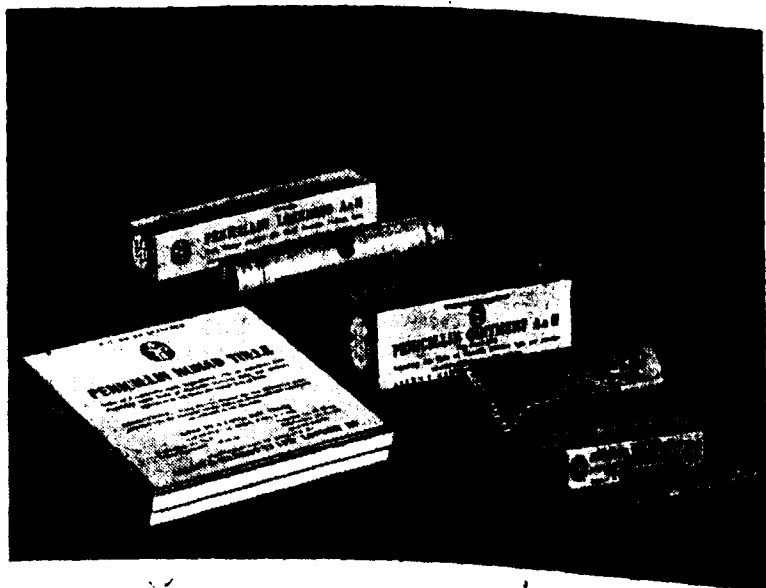
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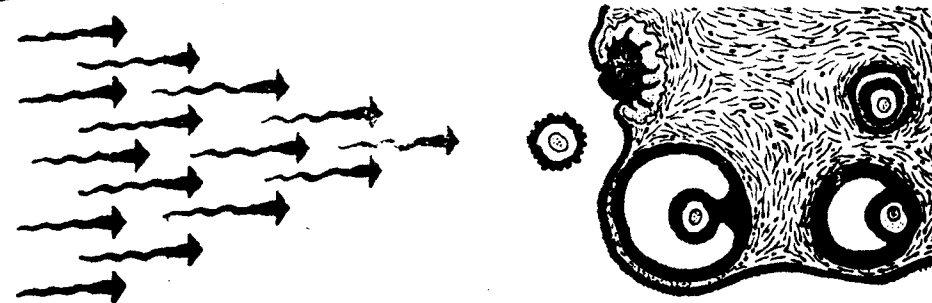
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Cortisone · Vitamins · Streptomycin · Penicillin · Reagents · Fine Chemicals

"...a more nearly ideal drug..."

for use in pediatric infections

CRYSTALLINE
Terramycin
HYDROCHLORIDE



RESULTS OF TERRAMYCIN THERAPY IN 62 CHILDREN*

DIAGNOSIS		NO. WITH GOOD RESPONSE	NO. WITH NO RESPONSE
14	Lobar pneumonia	14	0
31	Bronchopneumonia	31	0
8	Otitis media	6	2
1	Tonsillitis	1	0
1	Sinusitis	1	0
2	Infectious hepatitis	0	2
1	Exanthem subitum	0	1
1	Measles	0	1
1	Typhoid fever	0	1
1	Laryngo-tracheo-bronchitis	1	0
1	Gonorrheal vaginitis	0	1

*Folterfield, T. G., and Starkweather, G. A.: J. Philadelphia Hosp. 2:6 (Jan. 1951).

Terramycin is available in CAPSULES, 250 mg., bottles of 16 and 100;
100 mg., bottles of 25 and 100; 50 mg., bottles of 25 and 100.

ELIXIR (formerly Terrabon), 1.5 Gm. with 1 fl. oz. of diluent.

ORAL DROPS, 2.0 Gm. with 10 cc. of diluent, and calibrated dropper.

INTRAVENOUS, 10 cc. vial, 250 mg.; 20 cc. vial, 500 mg.

OINTMENT, 30 mg. per Gm. ointment; tubes of 1 oz.

OPHTHALMIC OINTMENT, 1 mg. per Gm. ointment; tubes of 1/4 oz.

OPHTHALMIC SOLUTION, 5 cc. dropper-vials, 25 mg. for preparation of
topical solutions. TROCHES, 15 mg. each troche; packages of 24.

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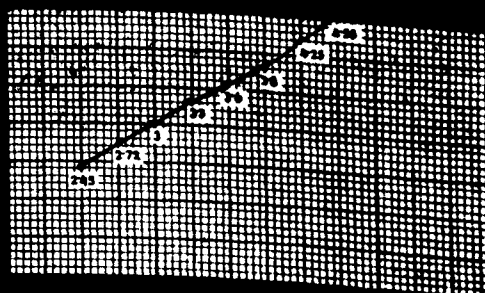
CIPALON

**PROTEOLYSED
WHOLE LIVER
EXTRACT**

Tropical macrocytic anæmias are easily and readily controlled by and quickly respond to whole crude liver extract which contains all the valuable potent factors present in fresh mammalian liver. A new process of proteolysis of liver has been evolved by our Laboratories for preparing crude whole liver extract for parenteral use. By this process liver extracts are produced in high concentration containing all the active principles of liver including L-Casei factor (Folic Acid). This is issued under the name of CIPALON which conforms in every respect to the highest standard and quality of liver extract for the treatment of tropical anæmias.

**ADEQUATE
RESPONSE**

ADEQUATE RESPONSE SHOWING
THE RISE OF R.B.C. AFTER TREATMENT



INITIAL R.B.C. IN MILLION PER C.C. BEFORE TREATMENT

BLOOD EXAMINATION:

In all cases of anæmia it is advisable to do blood examinations before commencing the treatment and again after a fortnight, to watch the progress of the patient. This will also give a clinical proof of the adequate response produced by CIPALON within the prescribed time.

INDICATIONS:

**ALL TYPES OF MACROCYTIC
ANÆMIAS, SPRUE, PELLAGRA,
AGRANULOCYTOSIS, ETC.**

DOSAGE:

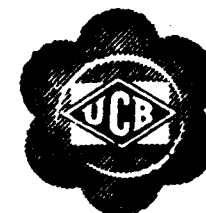
In moderate cases of anæmia 2 c.c. intra-gluteally every alternate day. In severe cases 2 c.c. every day or 5 c.c. as depot treatment once a week.

STANDARD AND POTENCY of CIPALON

There has been great confusion about the strength of injectable liver extracts. According to accepted principles 14 U.S.P. Units of liver extract represent that quantity of liver extract expressed in c.c. which when injected will raise the initial R.B.C. count determined before the administration of the injection to a corresponding adequate level exactly in 14 days after the first administration. Calculated on this basis clinical trials have shown that 4 c.c. of CIPALON will achieve this result within 14 days. The curve given above shows the adequate response corresponding to the initial R.B.C. counts.

LITERATURE and MEDICAL SAMPLES on request
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Bottles of 1000 and 100 tablets 0.5 gm.

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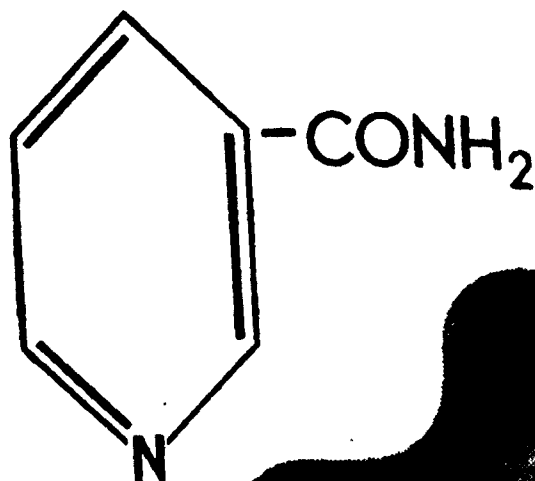
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" Lilly 4-0; Cheap 3-4	Sulphathiazole Boots 1000 50-0; [60-0]
Penicillin G. Sodium or Potassium:	ICI. Sulphamezathine 100 7-0; 500 32-0
1 2 5 10 laos.	Yeast Tab. B.D.H. 1000 7-4; Eng. 6-8
Pfizer 0-15 1-0 1-12 2-12	Liver Ext. 2 USP. 4-11; 5 USP. 9-8; Combox
Merck 0-14 0-15 1-10 2-10	BW. Sulphetrone 100 13-4; 500 55-0 [10 cc. 7-2]
Procain Penicillin 3 laos x 10 cc. Merck, Pfizer	Sandoz Cal. 10% x 10cc. x 5, 6-8; 20 amp. 23-0
Aquas Merk., 4 x 1 cc. 3-6 [10-8; 11-8]	Ind. Cal. Glu. 10% x 10cc. x 100 18-0; 100 98-0
Penicillin Eye Oint. 8-8; Skin 14-0; Lozenges	Redoxon 6x2cc. 7-0; 2x5cc. 6-8; 25x2cc. 48-12
Procain Penicillin 20 laos 8-12 Merck [doz. 11-0]	" 50x2cc. 59-0; Tab. 20. 3-4; 250. 26-0
Aureomycin 8 Caps. 25-8	Cylotropin IV. 14 5-0; Atophynal IM. IV 10 8
Chloromycetin Caps 12 28-12	Ephedrin Tab. 1gr. x 1000 Ind. 12-8; Eng 13-12
Quinine Bengal or Madras 49-0; Stand lb. 45-0	Saridon Tab 10 19-8 doz 250 34-0; Thymol oz
" Sulph. Roche 80-0; Java 62-0; Howds 75-0	Sulphanilamide Cream 4 oz. 7 8; doz. Lilly [5-0]
" oz. Ind. 4-0; Howds 6-4; Bihydro oz. 8-8	Vitamin B; Tab. 500 USA. 1-8; Vitamin Compd.
Quinine Bihydro Amps. 10 grs. x 2cc x 100	Nicotinic Acid 500 Eng. 4-8 [USA. 500 5-0]
Ind. P.C. B.D.H. Evans B.W. P.D.	Potas Chloras tab 500 6-0; Powd. lb. 4-0
20-0 32-0 31-8 31-8 43-0 55-0	Omnopon Amps. with Needles Comp. Tab 1-0
Quinine Amps. Italy 15grs. x 2 cc. x 5 1-12; 100 30-0	Hæmocytoserum 10-0; Campolan 6x2cc. 6-8
" Bihydro 2gr. x 100 4-4; Howds 5gr. 9-0	Entodan amps. 11-8; Feradol 11 lb. 8-0
" Bisulph 2 gr. x 100 3-8; 5 gr. B.W. 7-0	Metatone 12 oz. 7-0; Gentian Violet Jelly doz.
" 5 gr. x 1400 Howds 85-0; 1000 75-0	Platues Folio doz. 80-0; Liver 45-0
" 5 gr. x 1000 BDH. 46-0	Hypo. Syringe (S.N. Re. one more) 8 N.
" Sulph. 3 1/2 gr. x 500 Java 20-0	2 5 10 20 30 40cc.
Euc Quinine Holland 5-12; Java 5-12; Roche 7-3	All Glass Japan 1-0 1-8 2-2 3-8 6-4 7-8
P.A.S. Herts 250 grms. 34-0; Eng. lb. 28-0	" " Italy 1-14 2-14 3-14 6-8 9-0 11-8
100 grms. Italy Bayer Dumex Rodia	" German 1-8 2-0 3-0 4-8 8-0 10-8
6-4 12-12 14-12 8-8	" Ideal 5-12 7-8 10-0 11-8 18-8 25-0
100 Tabs. 6-0 11-10 — 11-10	" Record German 4-0 6-0 7-4 10-4 15-8 23-0
250 " 14-0; Italy 500 25-0; Herts 49-0	" Comp. Ger. 7-8 9-0 11-8 — — —
Pamaquinine tab. any strength 300 1-4	" Italy 3-12 5-8 6-10 8-12 12-0 17-8
Acriflavine 25 grm. L.P. Boots 5-0	B.D. Lear Lock 7-8 12-0 14-0 17-0 23-8 32-8
Soda Salicylas lb. (Natural oz. 3/4) 8-0	Japan " 3-0 4-0 5-4 8-4 10-12 17-0
Menthol oz. 6-0; Santonine dr. MB. 10-8	Indian Metal case 1-4 1-12 2-4 3-0 5-12 5-12
Argyrol Orig. 17-0; France 5-0 5-4	Italian " 1-8 2-4 3-0 4-0 — —
Protargol oz. 6-0; Oil Chinopodium 7-8	Backelite case 1-8 2-12 3-0 3-0 — —
Mepacrine ICI 11-8; Quinaquine 1000 8-12	Record Needle D.B. 4-8; German 2-12; Japan 2-8
Quinaquine Tab. M.B. 500 6-8; 1000 11-0	U.S.A. 5-8; B.D. doz. 10-8; Sature 4-0
Atebrin Tab. Bayer 15 doz. 10-8; 300 10 8	All Glass Mount, Japan 3-4; German 4-0
" Amps. 1 grm. x 5 4-0; 5 amp. 35-0	Rubber Gloves Superior 7 1/2 or 8" USA. dz 12-0
" 0-3 gr. x 5 8-4; 25 " 27-0	Stethoscope Tubing Latex 3-8; Plastic yrd 2-4
Paludrin 3 grms. 500 25-0; 1 grm 1000 29-8	Tooth Forceps Universal 5-0; U.S.A. 2-8
" amps. 25 11-8; 5 amps. 4-0	B.D. Stethoscope 21-8; Triple 34-0; German 11-0
Vitamin B12 amps. Glaxo 6, 4-12; 50 mic. 9-0	" USA. 2-0; German 2-0; Japan 1-8; BD 8-8
Rubramin amps. 16-0; Berubigen 10 cc. 12-8	Hoarse Hair 2-0. Baunometer 125-0
M.B. 693 500 40-8; M.B. 760 500 31-0	German Blood P. Instruments Erkometer 70-0
N.A.B. 15 1-2; 3 1-5; 45 1-8; 6 1-11	Personal Weighing Machine U.S.A. Detecto 45-0
Neosalvarsan 15 1-15; 3 2-12; 45 2-13. 6 3-8	STETHOSCOPE POUCH PLASTIC
Sulfarsinol 1 1-1; 2 1-4; 3 1-7; 4 1-10	First Aid Box 10-8; Aletris each 6-8
Acetylarsen adult 8-8; Child box 5-4	Wampole Phospho 17-0; Waterbury's Red. 13-8
Neptal 6 x 1cc. 3-4; 6 x 2cc. 4-0	Distil Water 5cc. x 100 7-0; 10cc. 6-8
Emetin Hydro Endo 6x 1/2 gr. USA. 2-8	Penicillin Tab 1/2 lac. 3-8; 1 lac. x 12 tab. 8-12
" BW. 1/2 x 12 8-12; 6x1gr. 8-12	Saline Apparatus 300cc. 9-0; 500 cc. 11-8
" 1/2 gr. x 100 65-0 1 gr. x 100 BDH 100-0	Fountain pen Battery 4-0; GripeWater dz. 27-8
" PD 1/2 gr. x 6, 7-8; 6x1 gr. 9-12	Dispensing Scale Brass 4-4; Nickel 5-12
Gibazol tab. 250 17-12; Sulphatriad 100 10-0	Glycerine Syringe Metal 1 oz 5-12; 2 oz. 6-12
Enterovioform 20 2-14; 100 11-4	Sterilizer 6" 15-0; 8" 23-0; Asparine 1000 7-0
Berin 25 mg. 2-8; 50 mg. 4-4; 100 mg. 6-8	B.W. Cal-Gluconate 100 Amp. 10 % 10cc. 65-0
Sulphanilamide tab. Eng. 7 1/2 gr. 10-0; 5gr. 7-4	
" MB 500 7-0; Glaxo 1000 15-0; Powder oz 1-8	
Sulphaguanadine Aust. or Eng. 1000 32-0	
" 500 Eng. 16-8; M.B. 22-0; BW 17-0	

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In a series of tests performed on under-grown children, it proved that when given orally in the proportion of a few micrograms (1/1000 mgm.) it increased the effects obtained by a well balanced diet, an open-air life and a rational hygiene. In addition, it caused a rapid resumption of growth in children who did not respond to conventional measures; all the children treated became more alert, more active and their appetite increased whilst their general behaviour improved appreciably.

UCEMINE B12 in tablets is especially intended for treatment of growth disorders in children.

POSODOLOGY: 1 or 2 tablets of 10 micrograms of Vitamin B12 per diem for several weeks, taken with a glass of milk, or at meal times.

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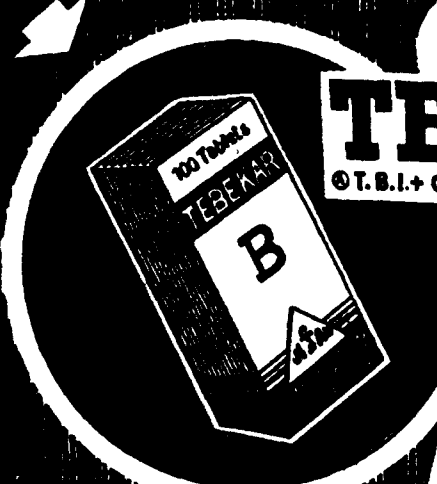
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Atobrin U.S.A. 100 1-4; 1000 tabs. bot.	12-0	Easton Syrup 1 dr. 100 2-8; 1000 tabs. bot.	21-0
" Bayer's 15 1-0; 300 10-8; 1000 tabs. "	19-8	Laxative Vegetable 100 2-0; 1000 " "	14-0
" " 0-3 gm. 2 amps. 3-0; 25 amps. box	25-8	Nicotannic Acid 0-5gm. 100 1-4 500,, tin.	4-8
" " 0-1 gm. 1 " 0-12; 50 amps. box	28-8	Sodamint 100 0-14; 1000 " "	2-8
Neperis I.C.I. 1000 11 8; 1000 tab Eng. tin	9-8	Yeast 100 tabs. 1-0; 1000 " bot.	6-8
Quissaris U.S.A. 100 1-0; 1000 " U.S.A. bot.	9-0	Eng. ProcainHydrochloride 1% 300. 25,, "	4-8
" M & B. 500 6-8; 1000 tab. tin	11-4	Glaxo's Adexolin Liq. 14 cc. 2-0; 100 caps.,	6-0
Poludrin 3gm. 8 tab. 7-6; 500 tab. 3gm.,	26-4	" Berin 1mg. 25 tabs. 0-9; 100 tabs.	1-2
" 2c.c. 5 amps. 3-4; 25 amps. box	11-4	" " 1mg. 500 " 5-8; 1000 " "	10-12
Pamaquin 0-01 gr. 500 tabs. bot.	1-2	" " 50 mg. 10c.c. 4-0; 100 mg. ea. 0-8	0-8
" 0-02 " 300 tab. "	1-2	" Fersolate 100 1-10; Codopyrin 10tab. 0-12	0-12
Sulphaguanidine 500 tab. Boots or Eng. tin	17-0	" Erbolin 10 tab. 1-4; 100 tabs. bot.	5-4
" Australia 1000 34-8; 10000 " "	340-0	" Celin 6 x loc. 4-14; Berin 25 mg. 10cc. 2-8	2-8
" Sulphadiazine 25 2-14; 100 tabs. bot.	11-8	" Celin 50 mg. 25 tabs. 1-10; 100 tabs. 3-12	3-12
" 500 53-0; 1000 tab. bot.	93-0	Hypo Record Needle Japan 3-0; Italy doz.	3-0
Sulphanilamide U.S.A. 5gr. 1000 tab. "	7-8	" " German 3-0; Down " "	4-12
" Eng. 7 1/2 gr. 1000 13-8; 500,, "	6-12	" All Glass " Japan 3-8; German " "	4-0
" M & B. 500 6-12; Glaxo 1000 tab. tin	15-8	Hypo. Syringe All Glass Nacket:—	
Sulphathiazole Boots 500 tabs. "	26-8	C.N.:— 2c.c. 5c.c. 10c.c. 20c.c. 30c.c. 50c.c.	
Suquinine Holl. or Java 6-0; Rooche oz.	7-4	German 1-2 1-12 2-12 4-0 8-0 10-8 8	
Eng. Vitamin B; 25 0-9; 100 tabs. bot.	1-2	Italy 1-10 2-10 3-8 5-8 8-8 11-0	
" 500 5-12; 1000 tabs. "	10-8	Japan 1-0 1-8 2-8 3-8 6-12 8-12	
" 500 5-12; 1000 tabs. dos.	22-8	S.N.:—Re. 1-0 More	
Litserine Liquid Small	66-0	Hypo. Syringe All Glass in Metal case with	
Waterbury's Compound large	15-8	2 Needles:—C.N.:—	
P.D. U.S.A. Ferradol 2 1/2 lb. bot.	43-8	2cc. Japan 3-8; German 3-12; Italy 4-0 each	
Quinine Sulph Govt. B.P. 51-0; Std. lb.	73-0	5 cc. Japan 4-14; German 5-4; Italy 5-8	
" Rooche 79-0; Java 70-0; How,,	8-12	Hypo. Syringe Leur Lock Nacket:—	
" Ind. 4-0; How 6-0; Biydro oz.	7-12	B.D. (C.N.) 2c.c. 5c.c. 10c.c. 20c.c. 30c.c. 50c.c.	
" Bisulph 2 gr. 100 3-0; 5 gr. 100 tab.	7-12	7-10 12-4 14-0 16-8 25-8 32-0	
" 5 gr. 1400 90-0; 1000 tab. How bot.	75-0	Ideal (C.N.) 7-4 10-0 12-0 15-8 21-8 30-8	
" 5 gr. 1000 tab. B.D.H.	4-4	Japan Clinical Thermometer Flat 1/2 Min. dz.	13-0
" Bihydro How 2 gr. 100	9-0	Lavandar Smelling Salt Eng.	13-8
" " 5 gr. 100 tab.	1-4	Litmus Paper Book Assor	1-0
" " Italy 15 gr. 2c.c. 5 amps. box	5-0	Leukoplast Elastic 3x5 yds. 2-0; 2 1/2x5 tin	1-12
" " S.W. 10 gr. 12x2 c.c. 5-4; Evans,,	9-12	Lilly's Gentian Violet Jelly 4 oz. Tube.	1-0
" " 10 gr. 2cc. 50 amps. Ind.	1-14	" Sulphanilamide Cream 4 oz.	0-10
" " 5 gr. loc. 6 amps. B.D.H.	25-8	" Lexton Ferrous 84 caps.	18-0
" " 5 gr. loc. 100 " Ind.	7-4	M. & B. 693, 100 tabs. 9-0; 500 tabs. tin	42-0
" " 5 gr. loc. 50 " Ind.	7-4	" Neptal 6 x loc. 2-8; 6 x 2 cc. box	3-14
Quinine Bihydro 10 gr. 2cc. 100 amps:—		" Sulphatriad 25 2-4; 100 tabs. bot.	9-0
B.D.H. Evans B.W. P.D. Ind.		" Propamidine Jelly 1 lb. bot.	9-10
Rs. 31-8; 31-8; 40-8; 55-8 19-8 box		" N.A.B. 15 1-2; 3 1-5; 45 1-8; 6gm. ea. 1-11	
B.W. Atrophia Sulph 1/100 gr. 20 tabs tube	0-8	P.D. Chloromycetin 12 Caps. bot.	29-12
" Emitin hydro 1/2 gr. 100x loc.	18-8	" Benadryl 50 cap. 6-0; Combex 10 cc. 6-12	
Ciba's Cibazol 250 tabs	3-0	" Carnoquin 3 tabs 1-15; Metatone	6-14
" Coramine Liq. 15c.c. 3-14; 20 tabs.,	10-8	" Benadryl Syrup 4 ozs.	3-14
" 17c.c. 5 amps 2-12 20 amps	12-4	" Dinaltin Sodium 100 caps	6-0
" Enterovioform 20 2-14; 100 tabs bot.	12-4	Pulv. Ipecac B.P. 4 oz.	5-4
" Privine Emulsion with Cibazol 10cc.	2-15	P.A.S. Italy 250 tabs 14-0; Italy 100 bot.,	6-0
Clinical Thermometers 1/2 min:—		" Italy 100 gm. 6-4; 250 gms. tin	17-8
German Eng Japan. U.S.A. Zeal, Hick's		Rubber Gloves "7 1/2" or "8" USA per pair	1-4
Rs. 19-8 22-8 15-8 23-4 35-8 60-0 doz.		Scissors "5" 2-0; Scalpel "5"	each 1-12
Dihydro Streptomycin Merck's 1gm. vial	3-10	Suture Needles 0-4 Saline Needle	each 1-14
" P. 1gm. "	0-14	Saline Apparatus 300 cc. 7-0; 500 c.c.,	10-0
Evans' Camphor-In-Oil 3 gr. 12x1 cc. box	0-10	Menthol Crystal loc. oz. 6-0; Speeton tabs.	1-14
" Mercury Biotin 12 x loc. box	0-10	Urodonal 49-8; Sindol Pow.	doz. 13-8
" Rado's Biotin Hydro 1/2 gr. 5x1 cc.	1-0	Gynomin tabs. 22-8; Dextro-ol 1 lb.	25-8
" Eye Dropper USA type 0-5 Finger Stall doz.	2-4	M & B Thiasamide 100 7-0; 500 tabs. tin	29-8
" Mastoplast 2 1/2x5 yds. 3-0; 3x5 yds. tin	2-4	Penicillin Crys. G. Pfizer's or Merck's:—	
" Eng. Acriflavine 500 2-8; 1000 tabs. bot.	4-8	1 lac. 0-14; 2 lac. 0-15; 5 lac. 1-10; 10 lac. 2-12	
" Aspirin 5x100 0-14; 1000 " "	9-0	each	
" " Onclin 100 2-4; 1000 " "	14-8		

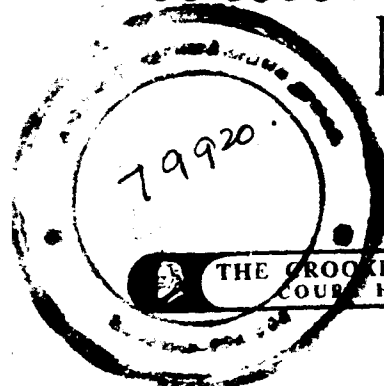
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Collosol Manganese has been widely and successfully used by the Medical profession for the successful treatment of staphylococcal conditions for over 30 years. Used alone, or in conjunction with penicillin, it is invaluable in the treatment of boils, for it lowers the relapse rates significantly. Collosol Manganese may be administered orally or by injection. Within the range of dosage recommended Collosol Manganese is stimulating and tonic in action and is entirely free from side effects.



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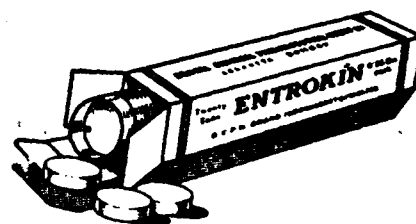
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- REDUCES HIGH BLOOD-PRESSURE
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Anthrax	Paratyphoid fever
Bacterial pneumonia	Pertussis
Dysentery	Primary atypical (virus) pneumonia
Enteric fever	Prostatitis
Epididymitis	Psittacosis
Gonococcus infections	Rocky mountain spotted fever
Granuloma inguinale	Scrub typhus
Hemophilus influenzae infection	Surgical infections
Herpes zoster	Trachoma
Infectious mononucleosis	Tularemia
Laryngotracheo-bronchitis	Typhoid fever
Lymphogranuloma venereum	Typhus fever
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Mumps	Undulant fever
	Urinary tract infections

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