ABSTRACT OF CURRENT LITERATURE

ACUTE INFECTION.

MODERN VIEWS ON THE ETIOLOGY AND TREATMENT OF ACUTE ANTERIOR POLIOMYELITIS: P. CLOAKE, *The Practitioner*, **156**: 10, 1946.

Acute anterior poliomyelitis is caused by infection with a filter-passing neurotropic virus which can be isolated from the central nervous system of fatal cases. It has also been isolated from the nose and throat of patients during the acute stage and exceptionally from other tissues and from their stools. It has been detected in the nasopharynx of individuals not known to have had clinical symptoms and it is possible that healthy "passive" carriers exist and that "active" carriers suffer infection from the virus resulting in a minor illness, such as "cold" or mild fever, and that either of these groups may transmit the disease.

Patients are infective since they are known to harbour the virus in nose and throat and in stools, but once the paralytic stage has appeared, case-to-case infection is rare and the greatest danger is to children who have had less chance of acquiring immunity. It has been stated that once the symptoms of poliomyelitis appear, infectivity ceases, but this rule is too absolute. There is ample evidence, however, that contagiousness is low, or, perhaps, that susceptibility is low, since second cases in the same family or household occur in only about 6 per cent of cases during epidemics.

Man is the only animal known to harbour the virus and the only one to suffer from the natural disease, and in man the organism can apparently develop only in the nerve cell, although extensive inflamation of the reticulo-endothelial system, lymphatic system and other organs has been found.

Adults are usually highly immune to infection. It is probable that this adult immunity is acquired through the successful resistance to subclinical attacks of the disease in earlier years. Children are, therefore, the most frequent victims. The following are the suggested possible modes of transmission:

1. Infection by droplets from nasopharynx of carrier or patient to other nasopharynges.

2. Alimentary tract and tonsils. The virus has been isolated from stools of patients and from sewage when poliomyelitis is epidemic.

3. Non-biting flies by feeding on infected human fæces may contaminate food with virus, themselves being found infected with the virus and thus spread the infection.

4. Water and food—Food, milk and water may be the vehicle of transmission.

The following are the possible route of invasion:—

1. Through the nasopharynx via the olfatory nerves to the bulb, then by olfactory tracts to the brain (rhinencephalon) and on to the lower motor neuron by passage along the axons.

2. From the throats to the brain, via the nerves.

3. From the alimentary canal via sympathetic nerve to the central nervous system.

1. Isolation of contacts—Contacts should be quarantined for 3 weeks and should an illness develop the child should be isolated and watch kept for pre-paralytic stage.

2. The fæces of the patients and all contacts should be disinfected as in typhoid fever and special care taken that in disposal of them there should be no access for flies.

3. Protection from flies--All food must be protected from flies.

4. Passive immunization—I.m. injection of 5 cc. of convalescent serum is probably of value in the passive immunization of the children during epidemics.

The acute phase of the disease has been divided into two stages. The pre-paralytic and the paralytic. Although these two distinct stages exist it must be remembered that the first manifestation of the disease may be the appearance of paralysis, and on the other hand the preparalytic stage may proceed to resolution without the appearance of paralysis anywhere (abortive type).

The first stage is characterised by symptoms of general illness, of catarrhal inflammation of the nose, throat and bronchi, of gastrointestinal inflammation (vomiting and diarrhœa) and of meningeal and neural irritation (headache, muscular tenderness, rigidity of neck and spinal muscles, anxiety and misery, tremor and sometimes delirium or convulsions). This stage lasts from several hours to a few days and is characterised by predominantly polynuclear leucocytosis in the c.s. fluid, with increase in the protein, fibrin clot and change in the Lange curve. The polynuclear cells rapidly disappear and are replaced in a few days by mononuclear cells. The paralysis appears often simultaneously in all affected muscles and is soon maximal in the degree and extent it will attain in the given patient. Various clinical types are distinguished, *i.e.*, ascending, descending and bulbar.

Sulphonamide or penicillin therapy has no value.

Serum Therapy: The administration of immune bodies in serum from people who have had clinical or subclinical infection of acute ant poliomyelitis have been used for a long time but said to have no effect when applied in the incubation period.

It is, however, very difficult to assess the value of serum therapy either in the preparalytic or paralytic stage. It is said to have some effect in the preparalytic stage, but is of no value when once the paralysis has appeared.

Non-specific Treatment: Lumber puncture and the withdrawal of 10 to 20 cc. of spinal fluid daily for several days together with intravenous injection of 100 to 250 cc. of 25 per cent glucose solution every twelve to twenty-four hours, have been claimed to be beneficial in diminishing pain, rigidity, and headache and the amount of residual paralysis. The application of diathermy and X-ray irradiation to affected areas of the chord has been advocated. Great care is necessary to assure the correct method of application and dosage and the treatment should be applied as early as possible. Local hot water baths in which

each affected limb is placed, are of value in maintaining good circulation, but must be given four or more times a day for thirty minutes, the temperature being gradually raised from 92 to 112°F. Diathermy to the paralysed limbs every alternate days and applied at the earliest stage fulfils the same purpose.

Analgesics including morphine, if required must be given to relieve pain.

Intensive treatment with potassium chlorate in the preparalytic and early paralytic stage 0.3 gm. daily at one month up to 5 or 6 gm. daily for the average adult in divided doses throughout day and night is given during the febrile period. Then reduced and stopped on the fourth to sixth day. 2 per cent potassium chlorate is instilled into the nose frequently at the same time.

After the acute stage, there is a period of 12 to 18 months during which muscles that are partially paralytic regain a valuable degree of their normal power; and treatment consists in establishing the most favourable condition for this.

A soft and resilient mattress must be used and strict confinement to bed for at least three weeks is necessary even for the mildest cases and more in those cases in whom the muscles maintaining the erect posture are paralysed.

Removable celluloid splints should be used when other devices fail and should be worn day and night when the patient begins to get up.

After muscular tenderness has disappeared massage and passive movements are started, and voluntary muscles should be actively exercised for a few minutes twice daily.

Partial immersion of the child in a warm bath is a useful aid to active movements. Douching of the body with stream of hot and cold water is of value at this stage in stimulating vascular flow in the skin and deeper tissues.

Acute movements are gradually increased in duration and resistance allowed to be exercised against them, and unparalysed muscles must not be neglected specially while the patient is confined to bed. As soon as the child is allowed to sit up spinal muscles are examined in that position and if required a spinal supporting appliance must be worn.

Kenny's Treatment: Kenny introduced a new method of treatment some 12 years ago. Her method of treatment consists in two hourly hot packs to the affected areas, hydrotherapy and remedial exercises; stimulation of circulation in affected muscles and adjacent tissues; avoidance of immobilisation and splints; passive movements from the early stage with early attempts at active movements and maintenance of optimism in patient's outlook. Her views were unacceptable to many neurologists.

GAMMA GLOBULIN AND PLACENTAL GLOBULIN FOR MEASLES: M. GREENBERG, *et al, J.A.M.A.*, **126**: 944, 1944.

This is a report of a comparative study of the effectiveness of gamma globulin and placental globulin for the prevention and modification of measles. Gamma globulin was administered in a uniform dose of 2 cc. to 814 household contact (between the ages of 6 months through 6 years) cases of measles. None developed regular measles, 78. 7 per cent were completely protected and 21.3 per cent had modified measles. Among the latter, 92 per cent were mild and 8 per cent moderate measles. There was a tendency for the effectiveness to decrease with age, but the amount of complete protection was not affected by the day of

exposure on which the injection was made from the third to the eighth day following initial exposure to the original case. Untoward reactions were rare.

Placental globulin was injected into 90 similar contacts in a dose of 5 cc. Severe measles occurred in 23.3 per cent, 38.9 per cent were completely protected and 37.7 per cent had modified measles. Among the modified measles 70 per cent were mild and 30 per cent were moderate. Reactions occurred in 41 per cent of those injected. In a group of 65 contacts of similar age distribution who received no prophylaxis 54, or 83 per cent, developed measles. Of those 31 per cent were severe, 12 moderate and 10 mild. This experience is consistent with that of similar groups reported elsewhere. Physicochemical and immunologic studies of gamma globulin and placental globulin demonstrated that gamma globulin is the more potent of the two agents. It was concluded from this study that gamma globulin (human immune serum globulin) is the material of choice in the prophylaxix of measles.*

ANTI-BODIES IN HUMAN SERUMS AFTER INJECTIONS WITH CHOLERA VACCINE: J. J. GRIFFITHS, *Public Health Reports*, **59**: 1374, 1944.

This study from the Biologic Control Laboratory of the National Institute of Health, U.S. Public Health Service, was made in order to obtain data on the appearance and persistence of serum anti-bodies in man after injection with cholera vaccine. Samples of blood were withdrawn from 35 young men, none of whom had had a history of cholera vaccination nor been in an area where cholera was endemic or epidemic. Following the withdrawal of blood samples, each student was given an injection subcutaneously of 0.5 cc. and after one week, 1.0 cc. of a cholera vaccine prepared at the institute. Blood samples were taken from the entire group 2 weeks, 3 months, 6 months, 12 months and 18 months after these injections had been completed. Following the bleeding at 6 months, 16 of the students received an additional 1.0 cc. of vaccine. The serums for mouse protection tests were separated from the samples of blood soon after withdrawal.

The mouse protection tests were patterned after the methods described by SILER and others, of the U.S. Army Medical School, for serum protection tests against *E. typhosa*. Twenty-five hundredths cc. of the individual serum diluted 1 : 2.5 with a physiologic solution of sodium chloride, was injected intraperitoneally into each mouse. Each mouse thus received 0.1 cc. of serum. One hour after serum was given, six groups of 5 mice each, received varying doses of living vibrios in mucin by intraperitoneal injection. End points (50 per cent) were calculated on the number of lethal doses against which mice were protected by the serums. The 10-1 dilution was the largest dose of the series which could be used to show protection even when hyperimmune rabbit serum was given to the mice. Mouse protective substances appeared in the serum of human volunteers one week following vaccination. These anti-bodies were present at least 18 months after vaccination and were more concentrated in serums at one week and one month than at three or six months. Agglutinins which appear one week after vaccination remain at high titer (1 : 180-1 : 1620) for one to two weeks and then decline, the majority of serums having low titers at six months, one year and 18 months. Definite correlation between height of agglutinin and mouse protective titers was not demonstrated in this study. It was concluded that mice may be of definite value in demonstrating specific protective substances in serum against cholera organisms and that these substances may be present in the absence of agglutinins for the vibrio.*

* By Courtesy of U.S.O.W.I.

CHRONIC INFECTION.

TUBERCULOSIS IN CHILDREN: J. SCHWARZ, *American Review Tuberculosis*, **52**: 392, 1945.

A comparison between anatomical material from Buffalo (U.S.A.) and Santiago (Chile) shows that the percentage of infected children and the death-rate of tuberculosis are very much higher in Santiago.

The incidence of tuberculin-positive reactors is much higher in Chile than in U.S.A.

The rarity of intestinal foci in Santiago is explained by the insignificant consumption of milk, specially in the uncooked stage.

While in Buffalo most children, dead of tuberculosis, had only hematogenous generalization, in our material we frequently found bronchial spread combined with hematogenous dissemination.

Especially in this last group (group B) we found numerous Ghon foci with cavitation and with extensive involvement of the bronchial mucosa; we emphasize the great importance that bronchial foci hold for bronchogenic dissemination and intestinal (secondary) infection.

Tuberculous laryngitis in children—even in cases with large pulmonary cavities—is infrequent. Examples are presented of a case of hematogenous laryngitis and of a case with hematogenous tonsillitis, without exudative or cavitary pulmonary lesions.

Multiple Ghon foci were found only in 3 cases; we emphasize the diagnostic difficulty when multiple foci of similar appearance are found in the same lobe. It is chiefly the size of the primary focus that determines central liquefaction and the formation of a cavity. In this indirect way the size of the focus determines the evolution of the disease; a large, not ulcerated focus has, in our opinion, no other consequences than a small focus in the same circumstances. Only the formation of a primary cavity indicates a bad prognosis, not the size itself.

The distribution of cavitary Ghon foci greatly favours the right lung. (Out of 9 cavitary cases, 8 were found on the right side.)

The liquefaction of the focus depends apart from its size on the age of the child. The number of cases with primary cavities decreases rapidly after 2 years of age. The large number of ulcerations and cavities in our material is partially explained by epidemiological factors, as the curve of infection still ascends (53 per cent of the progressive foci were found to have cavitation).

The great importance of bacteriological diagnosis of whooping-cough is discussed; many cases of "pertussis" are in reality either symptomatic cough of tuberculous processes such as bronchial compression or cavitary tuberculosis of the lung.

Two cases of atelectasis (epituberculosis) are presented; we emphasize the infrequency of this picture, the importance of accumulation of causes that produce atelectasis and the necessity of a careful prognosis of these cases, as in our (and other) material atelectasis is always accompanied by a tuberculous infection of the atelectatic lobe. The prognosis of "epituberculosis" will depend on the general evolution of tuberculosis and not only on the elimination of causes of atelectasis.

Bronchogenic dissemination is shown in 4 groups:

(a) Perforation of bronchial wall by caseated lymph nodes.

(b) Bronchial perforation related to pulmonary cavities.

(c) Ulcerations of bronchial mucosa, with or without perforation.

(d) Bronchogenic dissemination without a macroscopic involvement of the bronchial mucosa.

The importance of the Ghon focus in the formal pathogenesis of hematogenous dissemination is discussed. In 2 cases we have observed macroscopic lesions of large blood vessels with thrombosis near the Ghon focus. Microscopic lesions of the vessels are frequently found. The circulation of tubercle bacilli in the blood is admittedly frequent in all stages of progressive tuberculosis.

In our material girls are more seriously affected (without relation to puberty); out of 20 cases of tuberculous meningitis 12 were girls; out of 17 softened Ghon foci 13 were in girls; out of 18 cases of combined bronchogenic and hematogenous dissemination 13 were girls.

Tuberculous meningitis is generally observed in early hematogenous generalization; after the third year of age the frequency of meningitis diminishes.

We consider the presence of brain tuberculomata of great importance for the formal pathogenesis of tuberculous meningitis, because of:

(a) The frequency of tuberculomata.

(b) Finding of tuberculomata without meningitis.

(c) Difference in the ages of meningeal nodules and in other organs.

(d) Lack (nearly without exception) of miliary tubercles in the brain substance.

CONGENITAL TUBERCULOSIS: E. LOEWENSTEIN, *American Review of Tuberculosis*, **51**: 225, 1945.

Congenital infection occurs from the placenta and, therefore, not earlier than the fourth month of pregnancy. Germinal infection plays no role. Infection by aspiration or ingestion of amniotic fluid is rare.

Placental tuberculosis is far more frequent than generally known, even in cases with very small lesions in the lungs.

Congenital foci, especially in the liver, may heal spontaneously.

Blood from the umbilical cord contained tubercle bacilli in 3 babies whose mothers had rheumatic endocarditis; all 3 babies stayed well. Bacilli were found in the blood from the umbilical cord of 9 cases out of 59 tuberculous mothers; one baby died of miliary tuberculosis. Positive umbilical cord blood was found in 2 out of 210 apparently healthy mothers; the 2 babies remained well.

Therefore, the prognosis of congenital tuberculosis is not absolutely hopeless, especially when the blood invasion occurs only during delivery.

The autopsy of congenitally infected babies may show no gross lesions, but sections and especially cultures from the heart blood prove the presence of tubercle bacilli.

The tuberculin reaction of such babies remains negative for a long time, even in cases in which tuberculosis is proved at autopsy.

Examinations of the blood of the umbilical cord should be started on a large-scale, especially of mothers with tuberculosis and rheumatic endocarditis.

The fate of congenitally infected babies should be observed for two decades.

TREATMENT OF PULMONARY TUBERCULOSIS IN CHILDREN: T. H. SELLORS, *Proc. Royal Society Medicine*, **37**: 588, 1944.

In any discussion on tuberculosis in children we must include a small but definite group who are affected by the typical adult form of the disease with parenchymatous infiltration, ulceration and cavitation. This is quite apart from the primary class of lesion and its immediate sequelæ. The "adult" type of disease may occur in children as young as 5 or 7 years, but most of the cases are recognised a few years later and merge into the numerically larger age-group of the young adolescent.

The features of the condition in children are largely dominated by the instability of the actual pulmonary lesions. Rapid cavitation, which is probably of distension type in many instances, appears with little warning and bronchogenic dissemination occurs even when adequate control seems to be established. It more or less follows that the average prognosis is poor, though strict sanatorium treatment coupled with appropriate collapse measures can give good results.

As is now widely recognized the general appearance of the patient is little indication of the degree of involvement in the lung fields. Children with extensive disease can look extremely robust and healthy, especially if they have been held under strict conditions of treatment. Girls tend to be well developed and mature, but in the long run do less well than boys. Terminal or toxic cases naturally do not give this false impression, but show the traditional features of phthisis.

Sanatorium regime for children has several special points that must be observed. First, there is the insistence on complete bed-rest over a much longer period than might be needed for the adult: the child who is out of bed cannot be satisfactorily controlled and rested, and it is consequently important to err on the side of caution. Secondly, there is the need for diversion and educational facilities, and it is noticeable what a relatively high standard of knowledge is attained when a teaching staff such as is employed at Highwood and other large children's sanatoria is available. The high standard of morale and general contentment is a further indication of satisfactory conditions of treatment.

Cough and sputum have certain differences from these features in adults. Children can undoubtedly cough and splash in a manner that is difficult to control, but the exhibition of sputum is usually delayed until the child is anything up to 7, 8 or 9 years. Until expectoration is obtained sputum examination for tubercle bacilli has to be done through gastric lavage with the additional help of culture and guinea-pig inoculation. The presence of "open" cases in a youthful community leads to problems in segregation which are much more important than in an adult sanatorium.

As regards the employment of collapse therapy or surgery in the phthisical child, all the procedures that are available in the adult can be applied to children with one exception—namely, thoracoplasty. Surgical tradition is against the use of extensive rib resection in growing children on account of the extreme scoliosis and deformity that results as the child increases in stature.

Artificial pneumothorax is the most valuable collapse measure and it is often employed at a much earlier stage than would be considered suitable in adults. This is a question of expediency rather than choice and it may have a dramatic

effect in reducing fever and improving the general condition. In spite of the tendency to early use of artifial pneumothorax effusions are not as common as might be expected, though re-expansion and obliteration may occur quickly and call for careful control. Thoracoscopy, in which the ordinary adult instrument can be safely used, is a valuable supplement to pneumothorax treatment and helps to complete the collapse and healing of many areas of cavitation.

The indications for phrenicectomy are as indefinite as they are in adults though there is a natural tendency to keep to the crush or temporary paralysis rather than to produce irrevocable loss of function in the hemi-diaphragm of a young child. A tribute to the training and morale of even the youngest patients lies in the fact that these operations are undertaken with local anæsthesia with a great deal less fuss than may occur with many adults. Pneumoperitoneum used in conjunction with a one-sided phrenic paralysis has not been persisted long enough to assess its final value in children. The early stages are not so well tolerated as in older patients, but the elevation of diaphragm obtained is so extensive in some cases that the procedure demands careful consideration as a collapse measure. In the absence of thoracoplasty and if other methods fails this combined manœuvre will have to be given a thorough trial.

Cavity drainage has proved valuable in a few cases but the difficulty has been to maintain the obliteration of the cavity after the suction drainage has been stopped. In the adult a limited thoracoplasty usually proves successful, but at present we do not feel that this is practicable in children. What sometimes happens is that a child of 14 to 15 years has reached such an advanced state of physical growth and maturity that thoracoplasty becomes a practical proposition by the time drainage treatment has been prolonged to its limits. However, if this does not appear likely, attempts to maintain closure by phrenicectomy and pneumoperitoneum may be considered.

Extrapleural pneumothorax has had a limited application and some success has been achieved in cases of pneumothorax failure and in which special collapse cannot be attained by other methods. The difficulty has proved to be maintenance of the extrapleural space and prevention of too early lung expansion. Even most assiduous care and persistence with refills is not enough to prevent obliteration of the space earlier than is desired.

Treatment therefore in this special class of case follows the same lines as in adults with minor modifications, but the important thing to realize is that these patients can and should be treated and not left to form an obscure and neglected group. Admittedly it is difficult to distinguish between some of the primary manifestations of the disease and the later phase of activity, but careful observation and radiological examination of suspect cases should do much to prevent the disease progressing too far and too fast before treatment can be instituted.

DISEASES OF SKIN.

SKIN DISEASES OF THE FOOT : G. B. DOWLING, *Practitioner*, **156** : 104; 1946.

Fungous Infection (Athlete's foot, toe rot, Hong-Kong foot).—The type of fungous infection most commonly met with in the feet is that generally known as *tinea pedis*, or epidermophytosis, or trichophytosis interdigitale.

The technique of microscopical search for ringworm of the feet is quite simple. The roof of a fresh vesicle, which in this condition is often fairly large, is picked up with forceps and snipped off with a small pair of sharp scissors, laid upside down in a watch glass and covered with 20 or 30 per cent solution of

potash ; or the material may be collected from the toe clefts, the epidermal edge of a recent blister, or the frequently found dry scales or white macerated skin lining the sides of the toes. After half an hour, or perhaps a little longer, the material is generally found to be sufficiently soft to be ready for microscopical examination. The fungus is easily identified under low-power magnification and confirmed under higher power, as strands of septated mycelial threads, often branching, sometimes scattered and few in number, but often plentiful enough to form an interlacing feltwork.

The clinical picture of this infection is too well-known to require more than the briefest comment. Peeling and whitish maceration and fissuring of the skin lining the toe clefts and of the undersurface of the toes, are usually to be seen in cases of more or less long duration. In more recent cases there will be blisters in these places, or desquamation without epidermal thickening and maceration ; and the blisters will probably be found also on the underfoot at the base of the toes and quite often in the instep. These will, of course, be followed by desquamation, or desquamation and fresh vesicles may be seen at the same time. The blisters are rather large, larger than those of non-fungous eczema, with the exception of those of non-fungous dysidrosis, which condition incidentally is seen rather more often on the hands than on the feet. There is little tendency for the infection to encroach on the dorsal aspect of the feet or toes, but the picture is sometimes complicated by secondary pyococcal infection, and in this the dorsum is not spared ; to it may be added cellulitis of the feet and lymphangitis of one or other leg. Whether *tinea pedis* be complicated or not by secondary infection, the acute phase is more often than not accompanied by a dysidrotic secondary eruption of the palms and fingers, and occasionally by a widespread erythematous or urticarial type of rash. In severe cases the picture may be so obscured by œdema and pus infection that the diagnosis from similar change due to other causes is often clinically impossible, and, further, it is difficult to obtain suitable material for microscopical examination ; this has to be deferred until the acute phase has subsided.

Moniliasis—Thrush Infection of the Feet. Whitish, rather mushy maceration of the skin lining the toe clefts is always present, and in addition a dry eczema, rather densely covered with scales, invades both the dorsal and the undersurfaces of the feet from the base of the toes. The fungus can be found easily in scrapings from the sides of the toes ; it is recognized by numbers of grape-like clusters of spores and by thin non-septated mycelium, showing little tendency to branching. Usually in these cases moniliasis is present elsewhere, especially on one or both of the webs of the third interspaces of the fingers, the well-known erosio blastomycetica, a small sharply circumscribed lesion in which whitish, soft macerated epithelium is found to overlay a moist, bright-red erosion.

Non-Fungous Infection of the Feet. Pyococcal infection of the toes is nearly always followed by the eczema type of change in the toe clefts, and then on the toes generally, the process tending generally to invade the dorsal rather than the planter aspect of the foot. The toes are swollen, tender, and in acute cases covered with serous exudate and crusts. It is easy to be led to suspect microbic rather than fungous infection by the distribution and by the size of the eczematous vesicles, which are likely to be considerably smaller than those found in epidermophytosis.

Œdema and cellulitis of the feet are probably more often seen in eczema of pyococcal origin than in fungus infection. The condition occurs sometimes in children, complicating traumatic injury, *e.g.*, after playing barefooted. In children, also it is not uncommon and often somewhat persistent sequel of scabies.

In the most severe and acute cases it is impossible to achieve success without complete rest. The feet, after the larger blisters have been opened, may be soaked for about ten minutes twice a day in solution of potassium permanganate, 1 in 200 to 1 in 4000, whilst the toe clefts are painted with Castellani's carbol fuchsin paint or 1 or 2 per cent aqueous silver nitrate. The rest of the eruption need not be treated in this way, the distal reaction requiring no treatment at all other than sedative lotions, *e.g.* calamine lotion or liniment. In the course of about a fortnight of this type of treatment, the major part of the trouble may be expected to subside, leaving the toes and underfoot to be dealt with for some considerably longer period. Sometimes Castellani's paint is an adequate remedy throughout, but patients are generally glad to dispense with it as soon as possible for the sake of their clothes, bath mats, baths and such-like. Silver nitrate up to 5 per cent is a less disagreeable remedy. In due course the vesicular phase will be replaced by a desquamation phase, and then it may be desirable to use one of the fungicide ointments, of which WHITFIELD'S probably remains the most useful, in spite of numberless efforts that have been made to improve upon it. The treatment, which was introduced by FRANCIS in 1941, consists of applying a mixture of pure camphor and phenol, triturated in a mortar until liquefied. BENTLEY PHILLIPS applied the preparation four times daily with a small paint brush to all parts infected with tinea. The average time for cure was four-and-a-half days and that the percentage of relapse three months later was 1 per cent.

The treatment of *moniliasis* of the feet is fairly satisfactory, although somewhat slow. The infection is not responsive to fungicidal remedies in general, but Castellani's paint is effective when it can be made to reach the infection satisfactorily: To deal with the infection in the feet it is necessary first to scrape away or otherwise remove the generally rather dense layer of macerated horny material that lines the sides of the toes, applying Castellani's paint thoroughly after this has been done.

Pyococcal Eczema of the Feet. Potassium permanganate foot baths, and Castellani's paint or ½ or 1 per cent aqueous silver nitrate for the foci of active infection, whilst the rest of the foot may be treated by calamine liniment to which ½ per cent argyrol or gentian violet has been added. Gauge soaked in one of these medicated liniments and wrapped around the foot is usually a satisfactory method of application. In the course of a week or two the greater part of the inflammatory reaction is likely to subside, leaving residual inflammation between the toes and on the feet at the base of the toes. The patient should not be allowed to walk until this residual inflammation has almost subsided. Later still the infection may be treated with silver nitrate, 1 to 2 per cent in water. At the appropriate time it is desirable to determine if possible whether or not the underlying cause has been ringworm infection. If not, the application of fungicidal remedies may do harm.

Hypostatic and Varicose Eczema of the Feet. Whether varicose veins be present or not, hypostasis is a common cause of eczema of the feet. It occurs most often in the moist feet of seborrhœic and often heavily built subjects; secondary sepsis is a common event in such cases.

The treatment of non-infective eczemas of the foot differs from that of fungous and microbic origin only in the type of local medicaments employed. Rest is essential and, in the absence of secondary infection, the use of sedative applications, such as calamine liniment, siccolam (B.D.H.), the B.P.C. zinc cream or a zinc cream made by mixing one part of lanette wax, two parts of zinc ointment and three parts of water. Sometimes a residual indolent or lichenified eczema may persist indefinitely. For this later phase crude coal tar 1 to 3 per cent, solution of coal tar 5 to 10 per cent, ichthyol 1 to 2 per cent, or pyrogallol ¼ to

½ per cent, incorporated in zinc cream or zinc paste, may be helpful. Finally, small doses of superficial X-rays may be used for resistant residual patches.

Plantar Warts. Like other types of infective papilloma except the so-called venereal warts, these occur rather more often on the soft moist feet of children than in adults, and are of especial importance and difficulty in schools, particularly girls' schools, through which they have been known to spread with alarming rapidity. Fortunately they are often single, although large numbers are often met with on one or both feet.

Plantar warts are too well-known to require any description, and it is only necessary to discuss methods of getting rid of them. Single warts, or small numbers grouped closely together, are often dealt with successfully by a single large dose of X-rays. The surrounding skin has to be carefully screened. X-rays can only be used once. Alternative treatments are as follows. Warts may be curetted out of their cup-like cavities with a sharp spoon under general or local anæsthesia, depending upon their number, and the cavity is then cauterized with the direct cautery or by diathermy.

The recent publication of a new method of treating warts by THOMSON has probably been followed by its extensive trial all over the country. The method consists of soaking the warts for ten minutes daily in 3 per cent formalin ; this is put in a small saucer and the affected part is kept in it for the necessary time, care being taken not to allow the formalin to overlap on to the softer skin of the toes or dorsal aspect of the feet. The wart tissue becomes softened by this treatment and can be curetted out from time to time with a spoon. The treatment is reported to take a month or somewhat longer.

INTERNAL MEDICINE.

CONGENITAL MEGACOLON. TREATMENT WITH MECHOLYL BROMIDE—M. G. PETERMAN,—*Journal Pediatrics*, **27**: 484, 1944.

The etiology of congenital dilatation and hypertrophy of the colon still remains a mystery. "Many cases of moderate dilatation remain undiagnosed for years in spite of the persistent constipation which usually becomes obstipation. Surgical treatment of this condition has been for the most part unsatisfactory and carries a high mortality. The later surgical treatment by lumbar and presacral sympathectomy has also been hazardous and unsatisfactory."

A method of medical management which has been highly successful elsewhere in the treatment of patients forms the basis of the treatment in the cases described in this paper.

"The regimen depends on the action of acetyl-beta-methylcholine bromide which increases the tonicity of the dilated colon and relaxes the spasm of the anus. The patients are all hospitalized and the colon is first cleansed. The drug is then given orally in small initial doses, 0.05 Gm. before or after breakfast, and the dosage is increased as necessary to 0.2 Gm. once or, if necessary, twice a day to produce results. An enema is given two hours after the drug is administered, and mineral oil is given every night to keep the stool soft. After a definite evacuation time is established the enemas may be discontinued and subsequently used only when necessary. When a satisfactory diet has been established the mineral oil may be gradually reduced in amount and then discontinued. The mecholyl bromide may be gradually reduced as satisfactory results continue." The writer has seen no toxic reactions to the drug although one patient, A. J.,

received 2.0 Gm. daily for three days in error. He has also seen no unfavourable reactions to the continued dosage of 0.2 Gm. twice daily for 16 months.

Case 1.—B. R., a 2-year-old girl, was first seen April 10, 1937. "She had been constipated from birth. The stool was said to be ribbon-shaped. Constipation was not relieved by excessive doses of cathartic, and the bowels could be evacuated only by repeated enemas. Examination revealed a prominent abdomen, distended with large loops of dilated colon. X-ray after barium enema December 20, 1941, showed the large dilated and redundant loops of colon. This child was treated palliatively until December 24, 1941. At that time mecholyl bromide was started, 0.1 Gm. every morning. Mineral oil was given, 30 cc. every night. This seemed to produce one to two large stools a day until April, 1942, when fecal masses remained after evacuation. The mecholyl was increased to 0.2 Gm. twice a day, and oil enemas were given as necessary. The stools continued, one or two a day, but they were still large. The abdomen remained large and distended. The child seemed always to be soiled due to leakage of some fecal material (and mineral oil?). However, the anal sphincter was tight. August, 1943, the mineral oil was replaced with zymenol, 30 cc. every night. The mecholyl was reduced to 0.1 Gm. twice a day. There was little soiling. The child continued to have large stools but at least one daily until August, 1944, when the mecholyl was changed to 0.2 Gm. daily. March, 1945, the stools were still excessively large although there were one or two daily. The dosage of mecholyl bromide was changed to 0.4 Gm. once daily. At time of writing the abdomen is no longer large. There are one or two stools daily. There is no soiling or leakage.

NUTRITIONAL EDEMA: WILENSKY, ABRAHAM O., *Connecticut State Medical Journal*, **9**: 761, 1945.

Nutritional œdema has come under intensive study only in the past few years. "In clinical medicine this condition is found as follows:

"1. With the general undernourishment incident to widespread warfare and in times of famine localized to certain backward segments of the world, cases of starvation, protein deficiencies (hypoproteinemia) occur with subsequent states of general edema. Considering the number of persons involved in such widespread geographic areas, the number of cases reported of nutritional edema is not large. This seems to be corroborated in the published pictures of inmates of concentration camps, in which the pictures show individuals emaciated down to skin and bones. But none of them shows gross evidences of œdematous states. It seems then that some other factor is necessary besides starvation to produce states of nutritional edema.

"2. In ordinary civil practice, one occasionally sees patients who have general—subcutaneous, serous cavity, etc.—œdema without the evidence of the usual forms of pathology which produce such water-logging. They have no elicitable manifestations pointing to nephritis, hypertension, cardiac disease, cirrhosis, hypertension, or a malignant growth, and there is no gross evidence of a state of deficient nutrition or starvation.

"The one objective finding that one can uncover is that the latter patients have moderate or excessive degrees of hypoproteinemia sometimes as low as 4.5 Gm. per cent of the total serum protein."

Under either of these two basic conditions, the mechanism is definitely a physicochemical change in the distribution and retention of fluid in the body.

"Starling was the first to call attention to the part played by the osmotic pressure of serum proteins in regulating the interchange of fluid between the blood stream and the tissues.

"The Starling hypothesis has helped to explain these clinical conditions. Sufficient available protein helps to maintain a normal colloidal osmotic pressure in the blood stream, and in the capillary bed. Protein deficiencies are not thought to disturb the physicochemical conditions to the extent that water is retained in the body tissues with the formation of œdematous areas, and in the hollow spaces with the accumulation of effusions. This change causes more or less reduction in the amount of urine secreted, causes states of hemoconcentration, and facilitates pseudo-obstructive manifestations. Nutritional edema and the otherwise obscure accumulations of fluid in the hollow spaces and cavities are only understood on this basis.

"Occasionally similar forms of general œdema occur when the total serum protein level is apparently in the normal range. In these seemingly paradoxical cases, it is found that the albumin fraction is low and that the globulin fractions are increased; that because the osmotic pressure of the globulin fraction is much lower than that of the albumin fraction, there is a lower total osmotic pressure; and that this disturbed physicochemical relationship permits fluid to accumulate in the tissues and hollow spaces.

"In the cases in ordinary civil life which the author has seen, there is much reason to believe that underlying all of this abnormality is a disturbance of liver function associated with a latent or demonstrable liver parenchymal disease. Essentially, there seems to be difficulty in the production of proteins—a function of the liver cell and its retention in the body, as evidenced by the rapid excretion of protein when this is supplied in sufficiently overabundant quantities by all known methods—food, blood or plasma transfusions, etc. Frequently, in addition, one can detect abnormalities in liver function by the various laboratory tests. It is added proof that the disturbance is corrected and/or controlled with difficulty and is time consuming because of the unknown original cause of the anatomical change in the liver parenchyma and of the consequent functional impairment.

"Reference in the recent literature to the attempted use of thiamine is interesting because the occurrence of the 'wet' forms of beri-beri falls in with the other known facts. There is much undernourishment and wasting in beri-beri and this eventually must cause deficiencies in the protein content. The sequal then is quite obvious. In addition thiamine formation probably takes place in the liver so that the whole ties up very well together. Again it seems that the essential disturbance is deficient protein formation and retention."

"It seems that for the present one must treat this condition empirically." All that one is able to do for the present is to replace the needed protein to build up the proper amount of body protein and the proper amount of necessary reserve proteins. "In any case protein replacement therapy should always be carried out under proper laboratory guidance. It should be understood that each case is a feeding problem in itself and gains or loses in importance in accordance with the relative acuteness or chronicity of the disturbance and with the information received from continued laboratory study. The sources from which replacement is to be made include food, transfusions of blood, plasma, transudate fluids, and oral or parenteral protein digests. One should rely upon these methods until the cause of the disability is made clear.

"In calculating the daily necessary amount of protein, the following factors must be considered (1) The patient's nitrogen balance; (2) any estimated deficiency in the tissue and reserve protein; and (3) it is advisable to consider not

only the degree of protein deficiency, but also the possible continuance of the original disability which causes the deficiency. Finally, an additional amount should be given because of any unavoidable error in the computation.

"In bad cases one may follow the same rule of thumb as one frequently does with abdominal drainage—whenever in doubt, give more, and in very bad cases one should give as much as possible by every available channel and method up to the limit of tolerance."*

CHILDREN'S IDIOSYNCRASIES: T. W. CLARKE, *Archives of Pediatrics*, **62**: 554, 1945.

It is not the amount of food offered a child which counts in its growth and development, but the amount of it that he actually eats. For this reason, in any consideration of the problem of feeding, the factor of appetite is of quite as much importance as that of dietetics.

The normal healthy infant is usually glad to absorb food until its stomach is stretched in the semblance of a football, the normal active growing child will take all the food he can hold and will only regret that his capacity has any limitation. If he has not this voracious desire for food, there is something wrong. The trouble may be physical, due to some actual illness, or it may be mental, due to faulty training or improper environment. If a child does not take its meals with pleasure, the case should be investigated and the investigation should be continued until the cause is discovered and eliminated, for without adequate food consumption there cannot be perfect health.

In the nursing baby, provided it is fed with proper regularity, and not given an over supply of water, sugar and water, or other concoctions, loss of appetite is rare indeed unless there is some underlying physical abnormality or disease. The newborn baby that refuses the breast may be simply lazy, or he may be suffering from an injury to the head at the time of birth, to an abnormal heart, to weakness due to prematurity or to the jaundice of the newborn. The physician's attention should be called at once to a lack of interest in nursing on the part of the baby, as especially in the case of the brain injuries, prompt and adequate treatment may prevent dire results. In the case of the jaundice of the newborn; the trouble is simply, that the jaundice makes the baby so drowsy that he will not take the trouble to nurse. This may result in a failure to gain in weight for the first two or three weeks, but in most cases it is a self-limited disease, and, as the jaundice clears up, the appetite returns with redoubled vigour. It is usually of no especial importance except insomuch as it causes the mother to worry and thus interferes with her milk supply.

Loss of appetite in the bottle fed baby usually means too frequent or irregular hours of feeding, or overfeeding with sugar, either milk sugar, corn syrup or one of the malt sugar preparations, or else fat intolerance due to overfeeding fat through the high fat content of top milk mixtures. A few days on a low fat and low sugar milk will usually improve the appetite and cause astonishingly large gains in weight.

Persistent loss of appetite in the older child is a more complex problem, and may be due to faulty regime, physical abnormalities and constitutional diseases.

Among the commoner faults of regime is lack of fresh air and sunlight. If the child is kept in the house all winter, by spring all food is distasteful.

Perhaps the most common cause is irregular and improper feeding. The all too common habit of allowing the child to select his own diet is an improper procedure. If this is done, he develops the habit of deciding what he does not want, and the list becomes progressively longer. When he has once made up

* Summary, INT. MED. DIGEST.

his mind that he cannot eat a certain article, the power of the childish imagination is such that the attempt to force it may produce actual nausea and gagging. The child should be offered a well balanced ration and should be taught at the earliest age to clean up his plate. Where a well marked aversion appears, it is advisable to make protein skin tests for the articles objected to before insisting on their administration. These being negative the child must be taught that he is to eat all food placed before him. If very small portions are started with and the quantity increased gradually, the dislike usually is replaced, first by tolerance and then by liking. In such cases it is of course necessary to refuse all desserts and sweets unless the substantial articles of diet have been eaten. The common practice in such cases of forbidding all sweets is wrong. It takes away from the child the only attractive part of the meal and makes him come to the table with an increased aversion to his food. Attractive desserts should be included in the menu. With these to look forward to, the ordeal of swallowing less palatable food is greatly lightened, especially if the child clearly understands that the dessert will pass him by if his plate has not been cleared with promptness. It is sometimes advisable to keep on hand a supply of simple candy, one, two, or three pieces to be allowed after meals in proportion to the enthusiasm with which the meal has been eaten.

The offering of candy and sweets between meals, however, is not advisable. For the strong hearty child with a normal appetite, a slight refreshment in the middle of the morning and afternoon adds to the pleasure of the day, increases the activity of the body and certainly does no harm. If, however, the child is inclined to refuse his meals, then the titbits between meals must be strictly interdicted. The common idea of mothers, and of some physicians, that the child that does not eat enough at mealtime must be given a lunch to keep up his strength until his next regular meal is the foundation of much of the loss of appetite and undernourishment that occurs among children. Such a lunch is usually an undesirable form of diet, or inadequate in quantity, to do more than ruin his appetite for the next meal. The first rule in the treatment of the child who does not eat his meals is that he shall not be forced to eat it, but if he does not do so, he gets nothing until the next mealtime.

If the child does not want his breakfast and in the middle of the morning is given a cookie to keep up his strength until dinner time, not only has he no appetite for his dinner, but he has learned that the best way to get the cookie is to refuse his breakfast. His dinner being left untouched, he gets perhaps an ice cream cone in the afternoon, just late enough to take away his appetite for his supper. His entire nutriment for the day has consisted of the cookie and the ice cream cone. If, on the other hand, the child that does not eat his breakfast is allowed nothing until dinner time, he eats his dinner with gusto, does not need the afternoon luncheon, and is ready for a hearty supper. He also quickly learns that, if he wants a happy, comfortable morning, he had better eat a good breakfast. Do not nag him to eat. This rouses his opposition, or satisfies his vanity in the commotion he can produce. Appear not to care whether he eats his meals or not, but if he does not eat them, let him go hungry until the next mealtime.

In this connection, it is timely to say a word in condemnation of the fad of the untrained nutrition workers for school luncheons. There is no one factor better qualified to interfere with a child's nutritional standard than the prevailing custom of giving him a glass of milk and a few crackers at eleven o'clock in the morning. All it accomplishes is to hold out a reward for refusing breakfast, and then to destroy the appetite for dinner. A great hue and cry was made a few years ago over the child who came to school breakfastless. If such a child exists, there are two ways to correct it: educate the mother through the school nurse, and if this fails, give it its breakfast upon its first arrival at the school in

the morning. It is neither rational nor kind to let it go hungry for two hours and then give it just enough to ruin its appetite for dinner. It is truly astonishing to see how many undernourished children begin to pick up when eating between meals is forbidden and the school luncheon is passed by.

When, in spite of a correct regime, the appetite is poor, the physician should be consulted to make a careful search for physical abnormalities and constitutional diseases.

A careful inspection of the mouth and throat is of importance. Not only are bad teeth a prolific cause of loss of appetite, but even more important are infected tonsils and adenoids. It is astonishing in how many cases of loss of appetite and undernourishment a visit to the dentist, with the filling of cavities and the extraction of decayed roots, or to the throat specialist for the removal of the tonsils and adenoids, will cause a complete change in the child's mental and physical condition. The listlessness in the matter of food often disappears almost overnight and the pale, thin, sickly child in a few weeks becomes a picture of robust health.

In this connection it might be mentioned that many of the children who have periodic attacks of vomiting, with or without fever, will recover completely if the bad teeth and diseased tonsils are removed. In other cases this recurring vomiting is of allergic origin.

One chronic digestive disturbance which is a frequent cause of loss of appetite is that due to falling of the abdominal organs as a result of bad posture, especially among school children. The so-called " debutante slouch ", so popular among young girls a few years ago, has resulted in serious abdominal disturbances among older girls, and similar conditions are found even among very young children. This is a common cause of loss of appetite in children.

It must be remembered, too, that the loss of appetite may be due to real physical abnormalities or constitutional diseases, such as appendicitis or tuberculosis and so it is important that every child that does not eat properly should be kept under the close observation of a physician so that abnormalities may be corrected and the symptoms of any illness may be recognized at the earliest possible moment. The home administration of tonics to increase a child's appetite may cause apparent improvement, but may result in delay in discovering the underlying source of the condition which may result even in the sacrifice of the child's life.

RADIOLOGY.

CHOLECYSTOGRAPHY FOR CHILDREN : V. E. HRDLICKA, C. G. WATKINS and J. A. ROBB, *American Journal of Diseases of Children*, **70** : 325, 1945.

The technic is simple. It may be summarized as follows :

1. The regular evening meal is given but it contains no fat. 2. Priodax suspended in fruit juice is given about two hours after the evening meal. 3. No breakfast is given, but water is allowed. 4. Roentgenograms are taken at twelve, fourteen and sixteen hours. If the gall-bladder is not visualized, the same procedure should be repeated again that evening.

The recommended dose of Priodax is 0.5 Gm. per Kg. of body-weight.

In an attempt to find the best dose of Priodax per kilogram for the various ages, we have arbitrarily divided the entire series of subjects into age groups as follows : under 6 months, 6 to 12 months, 12 to 18 months, 18 to 24 months, 2 to 4 years and over 4 years.

In the group under 6 months of age there were six attempted visualizations with none successful. The infants' ages varied between 1 and 6 months. The dose in this group went as high as 1.6 Gm. per 10 Kg. These infants were fed their regular diets.

In the group 6 to 12 months old. there were only 4 patients 1 having good, 1 very good and 2 no visualization. Neither of the patients for whom results were successful had visualization on the first attempt, and Priodax was administered on successive nights. In 1 patient (M.C.) the gall-bladder showed no shadow until after three nightly doses, which were increased until the total dose was approximately 1.6 Gm. per 10 kilograms of body-weight.

The group 12 to 18 months old included 4 patients, in 1 of whom the gall-bladder was visualized only fairly well ; 2 others, both of whom were given only ordinary doses (0.5 Gm. per 10 kilograms), had good shadows. There was one failure in this group, in spite of double doses given on three successive nights.

Visualization in the group 2 to 4 years old was only 50 per cent successful, although two of the unsuccessful attempts for (B.T. and N.C.) probably were due to too small doses and 1 patient (P.S.) was unable to have the cholecystography repeated.

Priodax is a satisfactory contrast medium for infants and children over 9 months of age.

The ordinary dose of 0.5 Gm. per 10 Kg. of body-weight is adequate for children over 4 years, but larger dosage even 1.5 Gm. per 10 Kg., may be necessary for younger children and infants.

Toxic effects are minimal, even in very young infants given two or three times the ordinary dosage.

SURGERY.

SURGICAL TREATMENT OF BRONCHIECTASIS IN CHILDREN: R. S. PILCHER, *Proceedings of the Royal Society of Medicine ;* **37** : 578, 1944.

Resection of lung for bronchiectasis is done on the assumption that there is an irreversible change in the lung which condemns the patient to chronic ill-health if not an early death and that its removal holds out a hope of complete and permanent cure. How far this hope is justified remains to be seen, and although some of the earlier cases have grown into robust adolescents, many years must pass before we know how they will fare in adult life. Our aim has been to remove all the diseased lung and no case has been rejected for surgery in which this was thought possible. We do not yet know how much lung can be removed but unless all the part in which there is an irreversible change is excised there is no hope of cure, although incomplete surgical treatment may give such relief of symptoms as to make it worth while in some cases. The disease is not merely a septic process but in addition the part of the lung which is collapsed or fibrosed acts as an arteriovenous shunt since the blood flowing through it in the pulmonary circulation is not oxygenated. This factor becomes important when there is sudden collapse of large areas, a common incident in bronchiectasis that may be mistaken for pneumonia. While it is essential for cure to remove all diseased tissue it is equally important, especially in extensive cases, to spare all that is healthy. For this reason the conception of the lobe as the minimal unit for resection should be abandoned. CHURCHILL and BELSEY (1939) have described segmental resection of the lung and reported its application to the lower lobe with preservation of the dorsal segment. We have recently completed a bilateral case in which only the lingula was removed on the left, and on the right the middle lobe and all of the lower except the dorsal segment. The

amount of lung that can be removed depends on what happens to the residue, and about this we know little as yet but we believe that in children there is a possibility of true hypertrophy of the residual lung and that the danger of pathological emphysema is less than in adults. We have, however, already observed that in some children after extensive resections physical development seems to be retarded.

When we started this work we decided to use the method of dissection both for pneumonectomy and lobectomy. By this method removal of the disease is more complete, bronchial closure and hæmostasis are more certain and bronchial stumps are of minimum length; we thought too, that there was less risk of pleural infection than with the tourniquet method. Our early mortality was discouraging and may have been due in part to the longer time required for the dissection operation, but with increasing experience we have a better understanding of the hazards of operation and how to deal with them. Although there have been 7 deaths in the whole series of 60 operations there has been none in the last 30. Reduction in mortality may be due in small part to experience of operative technique but is mainly attributed to more thorough preoperative preparation and to control of bronchial secretion at operation. The preoperative preparation is essentially the medical treatment of the disease and we prefer not to operate until we think the patient has the maximum benefit therefrom. At operation we rely for control of bronchial secretion mainly on bronchoscopy immediately before and after operation but we also use aspiration through the intratrachæl anæsthetic tube.

There are two complications which we have not yet learnt how to prevent, empyema and delayed re-expansion of residual lobes. Of these the latter is the more important and in the absence of atelectasis empyema is much less serious. No doubt many pleural infections occur at the time of operation but we have seen them develop late in cases where there has been persistent atelectasis. The most serious aspect of atelectasis, however, is not its association with empyema but the occasional development of bronchiectasis in the residual lobes, and in three cases we have had to remove a previously healthy upper lobe for this indication. In two of these there was empyema and atelectasis of the upper lobe after resection of left lower lobe and lingula. In the third, after left lower lobectomy the upper lobe re-expanded but collapsed again after the child had left hospital, and when she was seen again the upper lobe bronchus was found partly blocked by a granuloma arising from the lower lobe stump. Of the possible causes of post-operative atelectasis obstruction of the bronchus is almost certainly the most important. For this reason patients are encouraged to expectorate after operation as soon as they are conscious and if re-expansion is delayed bronchoscopic aspiration is done. In the prophylaxis of empyema chemotherapy may be of value but so far we have found no evidence of this in a parallel series of controls and cases treated by local application of sulphonamides in the pleura. Empyema has in our experience been particularly associated with resection of the left lower lobe and lingula and this may be due to leakage from the cut surface of the upper lobe made in separating the lingula. If so, we may expect the same difficulty with segmental resections. We do not drain the pleura as a routine but sometimes put in a fine intercostal tube which is kept closed except for daily aspiration. This has no advantage over aspiration with a needle except that it requires less fortitude on the part of the patient and children do not take kindly to repeated needling. In the treatment of empyema we have recently had some success with penicillin but this does not justify an attitude of complacence towards this complication. Moreover penicillin cannot be expected to cure an empyema if there is a large bronchial fistula, although a small one is no contra-indication to its use.

TROPICAL DISEASE.

USE OF DDT FOR CONTROL OF ANOPHELES QUADRIMACULATUS: R. L. METCALF, *et al*, *Public Health Reports*, **60**: 753, 1945.

This report is based on laboratory and field studies conducted in the Tennessee Valley during 1943 and 1944 in order to provide information on the use of DDT as a residual house spray for the control of adult A. quadrimaculatus and on its effectiveness as an anopheline larvicide and adulticide when applied as a dust, a spray, or a thermal aerosol. The results may be summarized, in part as follows: Spray chamber tests indicated that the median lethal doses of DDT for adult A. quadrimaculatus males and females are about 7.0 and 12.0 mg. per 1,000 cubic feet (28 cubic meters), respectively, as compared with 1.0 and 1 5 mg. of pyrethrins. Laboratory observations of wall board sprayed at rates of 40.200, and 1,000 mg. of DDT per square foot (0.09 square meter) showed that there was no significant difference in the inital toxicity to adult A. quadrimaculatus at the different dosages, the per cent mortality being determined primarily by the period of contact. Residual toxicity, however, was dependent on the rate of application, though not directly proportional to it; sufficient residual toxicity to produce 100 per cent mortality to adults exposed for 60 minutes persisted for 4 to 16 weeks, depending on the dosage. Barns treated with DDT at a rate of about 200 mg. DDT per square foot (0.09 square meter) remained almost entirely free of flies and mosquitoes for at least 11 weeks. Unoccupied experimental houses treated with DDT at a rate of about 250 mg. DDT per square foot (0.09 square meter) remained toxic to A. quadrimaculatus adults for at least 15 weeks; occupied dwellings lost their toxicity more rapidly than unoccupied houses but remained toxic to A. quadrimaculatus for at least 3 months. The loss of residual toxicity by a DDT-treated surface appeared to be due primarily to the flaking off of DDT crystals. Smooth enamelled or papered surfaces lost their toxicity more rapidly than rough wooden surfaces. The pattern of reaction of A. quadrimaculatus adults to DDT-treated surfaces remained rather constant over a period of 15 weeks following treatment. Exposure to DDT surfaces completely reversed the normal light reactions of the mosquitoes, making them positively phototropic. Solutions of 2.5 per cent DDT in kerosene gave effective control of anopheline larvæ when applied by boat oiling units at rates of approximately 0.1 pound DDT per acre (0.11 kg/hectare), thereby making possible a reduction of about 98 per cent in the amount of kerosene normally used, DDT had to be diluted with 95 per cent soapstone before a satisfactory airplane dusting mixture was obtained. With this mixture 90 per cent control of A. quadrimaculatus larvæ was obtained over 200-foot (60-meter) swaths at actual treatment rates as low as 0.05 pound per acre (0.056 kg/ha). DDT dusts and thermal aerosols gave no evidence of injury to fish or other aquatic organisms when applied by airplane at rates of 0.1 pound DDT per acre (0.11 kg/ha). Five per cent solutions of DDT in kerosene applied at rates of about 0.25 pound DDT per acre (0.28 kg/ha) were quite destructive to aquatic insects living in close contact with the water surface, particularly Hemiptera and Coleoptera. *

SULPHONAMIDES IN BACILLARY DYSENTERY: J. G. SCADDING, *Lancet*, November 3, 459-53, 1945.

Previously published observations suggested that patients suffering from bacillary dysentery showed no significant differences in the duration of their diarrhœa or their length of stay in hospital whether treated with sulphanilamide, sulphapyridine or sulphaguanidine. The present paper records further observations on the sulphonamide treatment of bacillary dysentery. Because sulphaguanidine is the standard drug for the treatment of this disease in the Middle East, first succinyl-sulphathiazole and then sulphadiazine were tested against

* By Courtesy of U.S.O.W.I.

sulphaguanidine; secondly, observations without controls were made on the effect of smaller doses of sulphadiazine; and, finally, a comparison was made of sulphaguanidine-treated and untreated control cases.

The disease was mild, and in cases where organisms were isolated, 75 per cent were Flexner infections. The criteria of severity were the duration of diarrhœa before admission to hospital, the number of stools in the 24 hours before admission, and the incidence of fever. The results of treatment were judged by the duration of fever after admission, the duration of diarrhœa, and the total number of days spent in hospital. Treatment, besides sulphonamides, consisted of rest in bed, ample liquid intake, and a bland diet. No toxic complications of sulphonamide treatment developed throughout the investigation. Sulphaguanidine was given in a dosage of 7.0 gm. followed by 3.5 gm. four-hourly, reduced after 48 hours if the patient's condition had improved the average total amount given being about 70 to 80 gm.

Succinyl-sulphathiazole, less well absorbed than sulphaguanidine was given in a dosage of 2 gm. five times daily for 3 days, then four times daily for 4 days, the course being cut short if there was early improvement. With this course the durations of fever and diarrhœa were very similar to those of the patients treated with sulphaguanidine. The only differences were that the sulphaguanidine-treated patients were in hospital, on the average, 1.3 days longer than those treated with succinyl-sulphathiazole, and showed a greater tendency to recurrence of diarrhœa during convalescence.

In the comparison of sulphadiazine with sulphaguanidine, the former drug, being readily absorbed, was used in dosage of 1.0 gm. five times daily, reduced after 48 hours if there was improvement, to thrice daily. The cases in the two groups were comparable in severity. Those treated with sulphadiazine had, on the average, slightly shorter fever and very slightly shorter duration of diarrhœa and of stay in hospital than those treated with sulpaguanidine. With reduced doses of sulphadiazine, down to 3 gm. daily, the results were little different, the duration of fever and of diarrhœa was very slightly longer, but the stay in hospital was rather shorter than in the series treated with larger doses.

In the series of control cases treated by rest and diet only, the mean duration of diarrhœa was 5.0 days, and of stay in hospital 12.3 days. The corresponding figures for alternate cases treated with sulphaguanidine were 4.4 and 10.8 days. The differences between treated and untreated groups were not statistically significant, but it is possible that in the figures for all cases a beneficial effect on a few severe infections was being masked by dilution with a large number of mild self-terminating ones, and in six Shiga cases there was suggestive evidence that sulphonamide treatment had proved beneficial.

The author gained the impression that sulphadiazine cut short long-continued bacillary-type dysentery on which the poorly absorbed sulphonamides had had no effect. He suggests that in these chronic cases the action of sulphonamides is to combat invasion of the bowel wall by secondary invaders, by virtue of their concentration in the blood, rather than on the dysentery bacilli by their concentration in the lumen of the bowel, where there are likely to be inhibitory substances. On this hypothesis action in acute cases is simply prophylactic against ulceration, either by the dysentery organisms or by the secondary invaders. This would explain the difficulty of detecting any differential effects in mild cases, the irregular response in severe cases, since the response will depend on what secondary invaders are prominent, and finally the fact that small doses of readily absorbable sulphonamides, which for other infections would be regarded as prophylactic rather than therapeutic, give as good results in acute bacillary dysentery as larger doses of the poorly absorbable compounds.

DYSENTERY BACTERIOPHAGE, REVIEW OF THE LITERATURE ON ITS PROPHYLACTIC AND THERAPEUTIC USES IN MAN AND IN EXPERIMENTAL INFECTIONS IN ANIMALS: H. E. MORTON and F. B. ENGLEY, Jr., *J. Amer. Med. Ass.*, **127**: 584, 1945.

This is an excellent critical review compiled with the object of evaluating existing evidence relating to the prophylactic and therapeautic use of dysentery bacteriophage. It is itself a summary which should be read in the original. In adequate trials there must be bacteriological confirmation of all cases, and the phage used must be shown to be potent *in vitro* against the infecting strain. Since dysentery mortality is low, the best criterion of effectiveness is the time taken to clear the organism from the fæces. This test may be vitiated by the presence in the fæces of natural or administered bacteriophage which may inhibit the growth of dysentery bacilli in culture, so that the formaldehyde method of KLIGIER *et al.* should be used.

The authors examine nine reports which purport to show that dysentery phage is therapeutically ineffective in man. Discarding those trials in which the groups were too small to have scientific value or the control group was inadequate or the bacteriological investigations were open to criticism, two reports are regarded as worthy of further consideration. One is a trial described by DESSEL and ROSE who found in comparison with an untreated control group, no significant difference in case mortality or length of stay in hospital of bacteriologically confirmed cases of Flexner dysentery treated by a phage shown to be potent *in vitro*. The numbers are, however, too small and the suggested clearance test would have been a better criterion. The other trial is that of BOYD and PORTNOY in North Africa. They found no significant difference in the percentage of their treated and untreated individuals who developed dysentery or required admission to hospital, and no difference in the duration of stools containing blood and mucus. The average stay in hospital of the treated group was 2.86 days less than the untreated group. The reviewers comment on the low titre of the phage used.

Of 19 reports which have been cited as evidence in favour of the therapeutic value of dysentery phage, few, if any, are able to withstand criticism for reasons similar to those noted above. The most extensive trial is that of MEINIK KHASTOVITCH and NIKHINSON who observed a mortality of 1.4 per cent in 282 cases treated with Shiga phage compared with that of 2.5 per cent in 1,059 untreated controls. It was claimed that, of the treated cases, 55.3 per cent left hospital within 4 days, compared with 18.8 per cent of the control group. Bacteriological cure was, however, not determined, so these results may indicate only alleviation of symptoms. These workers noted that recovery might be delayed in cases in which the dysentery bacillus was associated with *Proteus* or enterococci. This may be an important factor in the evaluation of treatment.

The verdict on the therapeutic value of bacteriophage in dysentery in man must therefore be "not proven".

In estimating the prophylactic value of dysentery phage it must, of course, be established that the phage which was used was active against the strains subsequently encountered. Four reports examined are regarded by the authors as showing that phage is capable of preventing bacillary dysentery in man. The most encouraging results were obtained by ASHESHOV *et al* MEINIK NIKHINSON and KHASTOVITCH (Chinkov. Inst., 1935, v. 1, 89); and KLIEWE and HELMREICH BOYD and PORTNOY (above) obtained less striking results in tests in which they used phage captured from the enemy on prisoners of war in North Africa.

The effect of phage on experimental dysentery infection in animals has been studied by a number of workers and, during the past two years, reports have been published by RAKIETEN. These reports show, without any doubt, that bacteriophagy can take place *in vivo* and protect developing chick embryos and white mice against fatal infections with dysentery bacilli ; that phage increases in amount *in vivo* ; that it is not eliminated from the blood in 24 or 48 hours : and that quite small quantities are sufficient to have a protective effect.

The authors point out that it is illogical that tests in man were made before the animal experiments, and they consider that a carefully planned prophylactic and therapeutic trial in human beings might now appropriately be made.*

* Summary, TROP. DIS. BULLETIN.

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