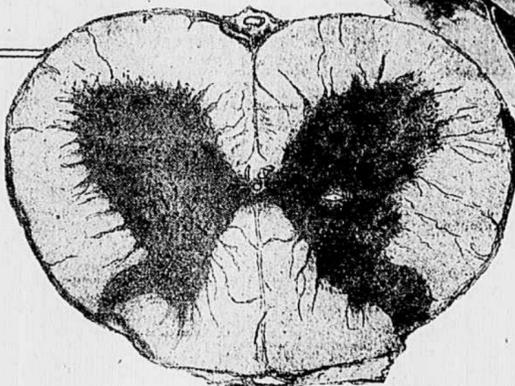


A Cross Section of the Spinal Cord of a Sufferer from Poliomyelitis, Showing How the Micro-organism Breaks Down the Nerve Tissue causing the Typical Paralysis of Arms and Legs and Death by Paralysis of the Respiratory Centres.



How to Fight the Scourge

By DR. HAVEN EMERSON,

Commissioner of Health, City of New York.

- (1) Spray the child's nose several times a day with a solution of boric acid and water. Use an atomizer and not a "dropper." If the child has sore lips or nose, touch these with dry boric acid powder every few hours.
- (2) Any sickness of your child should demand instant medical observation.
- (3) The moment you notice suspicious signs of sickness in your child separate him from all other children until medical diagnosis has been made. "Suspicious signs" are fever, digestive upset (even of mild type), lameness of any joints, or any complaint of weakness.
- (4) Remember, infantile paralysis is highly contagious. It can be spread by food handlers, flies and by personal contact with handlers.
- (5) Don't let your children use common drinking cups or go to carelessly conducted soda water and ice cream stands.



The Mysterious Disease That Either Cripples or Kills Our Little One

THE present epidemic of infantile paralysis in New York, costing scores of children's lives and leaving a great, unknown number of martyred little cripples, running into the hundreds, brings us face to face with one of the worst, most mysterious plagues of childhood against which science has as yet found no certain remedy.

Allied with the plague of infantile paralysis is the ever-present deadly pest of the common fly, whose menace is explained in detail elsewhere on this page.

Dr. Simon Flexner, of the Rockefeller Institute, in his advice about protecting children from infantile paralysis—called also "poliomyelitis"—has given warning that the virus of the disease is carried on the feet of the common house fly. A theory has also been worked out by prominent scientists that the disease is conveyed by the bite of the common stable fly, which ranks next to the house fly in frequency. Although the researches of the Rockefeller Institute have not confirmed this view, it still receives so much support that the New York Health Department specially warns people to screen their houses against flies and particularly against stable flies, because it is believed the latter transmit the disease.

Infantile paralysis is caused by a virus which will pass through the finest filter without leaving a germ behind. No bacillus can be detected in this. The virus blows about in the dust and besides being transmitted by flies, is scattered by coughing and sneezing, by food carelessly exposed, dirty food and drinking utensils and by children rubbing their fingers over one another.

Dr. Flexner and his colleagues of the Rockefeller Institute first demonstrated the existence of the virus by infecting monkeys with portions of the spinal cord of human beings, who had died of it. These scientists are seeking to prepare an antitoxin for the disease, but so far have been unsuccessful.

The virus is believed to make its way through the nose to the brain, whence it descends to the spinal column, setting up an inflammation in the "anterior horns" of the spinal cord, which is the specific cause of the disease.

Infantile paralysis does not kill in the majority of cases, but except where the patients receive the most skillful treatment it produces most cruel deformities, including extreme curvature of the spine and twisted and useless limbs.

A singular feature of the disease is that it starts with a peculiar drowsiness and dullness which is common in children. This first stage of the disease lasts about three days and is also accompanied by high fever. The drowsiness appears only once or twice and then disappears, but when it increases and runs into a steady stupor condition with the onset of the acute stage.

In the commonest form of the disease the paralysis appears on the first or second day after onset. "By this time," say the Rockefeller Institute experts, "the child may be found lying on its back in a frog-like manner and the legs usually bent to one side. The eyes are partly or wholly closed, and there is a tired, weary expression. From this drowsy or almost comatose condition the child can be roused suddenly, often by a gentle touch or manipulation of the extremities. Very frequently when the legs are lifted only a few inches from the bed an expression of annoyance, rather than distress, crosses the face, and if the leg be the paralyzed one the child often tries to free it from the experimenter's hands by twisting the shoulders. This procedure is a surprisingly common one, and is usually accompanied by a fretful, pettish, or even hoarse look and whine. But when the ex-

aminer stands back from the bed the patient lapses almost at once into the drowsy state."

A curious thing is the unheralded advent of the paralysis. One may observe in the morning that a child can move his arms easily; a few hours later, on going to the bedside, the patient is found lying quietly, as before, but when he rolls over one arm falls back limp.

One of the peculiarities of the disease is the very unsystematic distribution of the paralysis. Thus, in one case both the legs are paralyzed and in another one leg and one arm. In a third there is a paralysis of one lower leg and one upper arm, or perhaps facial paralysis.

Most frequent are paralysis of the leg, and next to this paralysis of the arm, resulting from injuries from the fifth to the first segment of the spinal cord.

But in a large number of cases the paralysis is traceable to some injury caused to a definite locality in the brain by the virus. To these cases facial paralysis belongs. Another injury resulting from the brain affection is paralysis of the eye muscle. The investigators believe that slight attacks of infantile paralysis are a frequent cause of squinting.

Disturbances of speech are frequently met with and may be of all degrees of severity, from hoarseness to complete inability to speak. Very often in cases which have not received skillful treatment the parents imagine that the little one is suffering from a sore throat, when he is really in the grip of a disease that will cripple him for life. Difficulties in swallowing are sometimes seen at the acute onset of the disease. This may be a passing symptom which lasts a day or two and consists only of inability to swallow solids. In other cases there may be total inability to swallow, lasting for many days.

In fatal cases of infantile paralysis the most remarkable feature is the startling effect upon the senses shortly before death. The little sufferer then becomes endowed with an abnormal acuteness of perception. With the onset of difficulty in breathing, which is the last stage of the disease, it seems almost as if the children were suddenly awakened and made to realize the struggle before them. Little children seem to age in a few hours. One sees a heedless, careless, sleepy baby become all at once wide awake, high-strung and alert to the crisis, which is breathing.

"The whole mind and body appear to be concentrated on respiration," say the Rockefeller Institute experts. "Respiration becomes an active, voluntary process, and every breath represents hard work. The child gives the impression of one who has a fight on his hands. All he wants is to be let alone, not to be interfered with, to be allowed to carry out his fight on his own lines. Instinctively he refuses his strength, refuses food and speaks when speech is necessary, quietly and with few words. One little child of four, so helplessly paralyzed that she was unable to move, but with a mind which seemed to take in the whole situation, said to the nurse clearly, but rather abruptly, between her hard-taken breaths: 'My arm hurts,' 'turn me over; scratch my nostril,' and then when the doctor approached: 'Let me alone, doctor; don't touch my chest.'"

When death occurs directly from the paralysis and not from a complication, it is due to the failure of the muscles that control the act of breathing. These muscles are the diaphragm and the intercostal muscles which are attached to the ribs. The patient may live after paralysis of either the diaphragm or the intercostal muscles, but when both become paralyzed breathing ceases and death occurs. The average mortality of the different epidemics of infantile paralysis varies between 10 and 20 per cent.

The Rockefeller Institute investigators admit there is no specific cure for infantile paralysis and it is impossible to forecast the progress of the disease. Even when paralysis has begun to show itself it is impossible to tell whether it will progress to the point of making the sufferer a helpless cripple, will kill him, or will leave him uninjured. The doctors say

there is no specific form of therapy by which paralysis can be prevented or by means of which resolution of the inflammatory process may be hastened.

The problem of treatment, therefore, consists principally in preventing the spread of the disease in other persons, in giving such remedies as have been known to procure relief and in attempting the restoration of muscular power and the prevention of deformities.

The general treatment is the same as for other infections, such as scarlet fever. A great difficulty in treatment is due to the intense pain which the children suffer whenever moved. Not infrequently this pain is so great that they develop a great dread of being touched and cry out long before they are hurt.

In patients with spontaneous pain the weight of the bedclothes may be sufficient to cause discomfort, and a cradle to raise them off their limbs is often a relief. Wrapping the limb in cotton-wool blankets and hot water bags is a great comfort. A sudden change from a warm summer day to a cold rainy day is accompanied by acute attacks in the patient. The hospital ward is therefore kept at a warm temperature. When the acute disease has passed away and deformities have begun to make their appearance it is necessary to resort to mechanical treatment. Massage is a helpful aid in the treatment. Heat, and especially baking, exert a good influence on the circulation. Of all the methods, by far the most valuable one is muscle training, which can be done with a large variety of ingenious apparatus.

The direct contagiousness of infantile paralysis and its dissemination by healthy as well as sick persons are definitely established. Therefore the maintenance of strict quarantine is essential to the safety of our children.

Dr. Flexner has given the following useful suggestions for the protection of the children during the present epidemic.

"1—Kissing, coughing, sneezing, carry the secretions of the nose and throat from one person who may be infected to other persons who may not be."

"Since the disease attacks by preference young children and infants, whose nasal and buccal (mouth) secretions are wiped away by mother or nurse, the fingers of these persons readily become contaminated. The care of other children by persons with contaminated fingers may, therefore, lead to the conveying of the infectious micro-organism indirectly from the sick to the healthy."

"This danger also exists in connection with venders of food which is eaten uncooked. The existence of cases of poliomyelitis in the homes of venders of food is, therefore, a potential source of danger."

"2—Since the discharges from the intestines carry the infectious micro-organism, they are also potential sources of infection."

"Flies also often collect about the nose and mouth of patients ill of poliomyelitis unless protected by screens. These flies also become contaminated and may serve to spread the infection."

"The infectious agent enters the body chiefly, if not exclusively, through the mucous membranes of the nose and throat."

"Prophylaxis involves isolation of the acutely ill, proper care and destruction of the contaminated discharges, supervision of persons in contact with the acutely ill, and of venders of food, exclusion of all flies and general sanitary control of the personnel and habitations of families in which the disease exists."

"Healthy, robust children are subject to the disease in greater degree perhaps than delicate children."

"Most interesting was Dr. Flexner's description of how his colleagues found that the virus of the disease reached the brain by travelling up the nerve of smell from the nose. This was one of the discoveries resulting from the famous experiments upon monkeys. Portions of the spinal cord of infected human beings conveyed the disease to the monkeys. An autopsy on

monkeys killed at various stages of the disease illustrated its ravages in their bodies. The virus produced diseased cells in the brain, in various parts of the spinal column and especially in the matter of the "anterior horns" of the cord, the latter fact giving the disease its name.

Then came the conclusion that could only reach the brain by the known method of travelling along. This is described in these words:

"It is known that in monkeys incapable of passing the barrier of or slightly abraded skin, or being from the stomach or intestine into the tissues of these organs are previous and arrested by opium, and it is found that it traverses with difficulty, at all, the substance of the lungs. On the other hand, it is established that the virus with readiness and constancy from or practically intact, mucous membrane to the central nervous system."

"To illustrate this point I wish to briefly describe an experiment. The spine of a paralyzed monkey contains the virus. If a camel's hair pencil of cotton is covered with some of the tissue of such a cord and placed in contact with the mucous membrane of rhesus monkey animals will develop in due time and other symptoms of poliomyelitis. The virus enters the body from the even though no gross injury has been upon the membrane."

"We should now ask ourselves, actually ascends to the brain by path of the olfactory nerves (nary or indirectly after first entering the brain). It is the same question that has been asked in regard to epidemic meningitis in the nasal mucus of persons in cases of meningitis and in the snot. Opinion is divided as to whether once to the membranes of the brain and penetrate into the blood."

"To produce meningitis in monkeys not suffice to inoculate the nasal mucous membrane. The virus must be injected into the meninges themselves. But, so in escape in part along the nerves of the nose. The virus of poliomyelitis that implantation in the nose does to cause infection. If a monkey about forty-eight hours after an inoculation and the brain and spinal cord removed, and then the olfactory bulb of smell in the brain), portions of the spinal cord are separately injected into the olfactory lobes, infection is produced. The virus has not yet reached other distant parts of the nervous organ."

"Were the virus distributed by the medulla (head of the spinal cord) would have become infective the olfactory lobes, since they exhibit selective affinity for the parasite. This is unavoidable that the virus the nerves of smell to the brain, in and about the olfactory lobes passes, as I believe, into the liquid (fluid between the coverings and spinal cord), which carries it of the nervous organs."

It has been observed that infantile paralysis is common in old, dusty and dirty country districts, and a similar condition has been noted in dogs, horned chickens. So common is a kind with chickens that some doctor suggested that they were important infection to human beings, but proved.



The Diagram Shows How the Virus of Infantile Paralysis Makes Its Way Through the Nose to the Small Nasal Nerves—A; Thence to the Olfactory Bulb—B; and Travels Thence Through a Part of the Brain to the Spinal Cord, Where It Produces Its Characteristic Lesions. Below is a Photograph of One of the Outward Effects of the Disease, the Withered, Paralyzed Side of a Victim of the Infection.

The Fly---the Super-Murderer

By Dr. Daniel D. Jackson

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THE common house-fly, regarded in the light of recent knowledge, is more dangerous than the tiger or the cobra. Worse than that, he is, in our climate, much more to be feared than the mosquito, and may even be classed as the most dangerous animal on earth.

The fly which you remove from your milk picher has been wallowing in filth before he took his milk bath. The falling of infected flies into milk on the farm or in the carrier has made possible many a local epidemic of typhoid fever. This same propensity of the fly for milk baths has made the child's "second summer" a thing to be dreaded by all mothers.

The disease transmitted through the agency of the house-fly cut short the average span of human life in the United States by at least two years. During a generation this means a loss of 170,000,000 years of life, or 4,500,000 lives of the present average length, or a money loss of \$20,000,000,000.

The first precaution to be taken by everybody against flies is to screen the house absolutely against them. Laws should be passed in all our States, requiring the thorough screening of all public kitchens, restaurants and dining rooms. All food—particularly that which is eaten uncooked, exposed for sale during the fly season—should be screened. The same care should be taken with all food in the house.

Dealers who allow their food products to be exposed to flies should be carefully avoided. In hospitals and at home flies should be kept away from the sick, especially those ill with contagious diseases.

We should abolish open privies and properly dispose of our sewage and our other waste products. Our sanitary inspectors in cities should be instructed that to disinfect and then remove all exposed filth wherever found. Stable manure should be thoroughly screened or kept in tight, covered receptacles and removed at regular intervals.