

THE 1939 POLIOMYELITIS EPIDEMIC IN THE CITY OF DES MOINES

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While the decline in infant mortality rates and the control of communicable diseases are among the proudest achievements in the field of preventive medicine, other health problems have been brought into the foreground. Many of these problems cannot be successfully solved by the methods which have proved effective in the past. It is necessary to work out new methods by well conceived research studies and investigations. For example, on January 3, 1938, the National Foundation for Infantile Paralysis was organized for the purpose of leading, directing and unifying the fight on every phase of infantile paralysis, with operations confined to those of a medical and educational nature relating to the crippled individual.

HISTORICAL NOTE

Attention was directed to the subject of anterior poliomyelitis as early as 1774 by Underwood, an English physician. Heine was one of the first to recognize poliomyelitis as a definite disease entity in 1840, and Medin accurately described the acute stage of the disease in 1889. Hence it was termed Heine-Medin disease until the term poliomyelitis given by Kussmaul was generally accepted.

THE 1939 OUTBREAK

In 1939, there were 63 reported cases of acute anterior poliomyelitis in the city of Des Moines, with six deaths. During the same year there were 197 reported cases with thirty deaths in the state of Iowa. As shown by Fig. 1, this was an unusually high incidence of cases for the city of Des Moines. Since 1922, the previously reported cases had never exceeded 27 in any one year. Several interesting factors associated with this epidemic are worthy of note.

SYMPTOMS

Ten to eighteen days are generally accepted as the period of incubation, with the period of greatest infectiousness during the first four days. In Table I the presenting and admission signs and symptoms are shown. These recordings closely correspond with signs and symptoms tabulated during previously reported epidemics. In Table II the extent of paralysis is recorded.

TREATMENT

Thirty-four patients were given convalescent serum, although no definite proof exists that this form of therapy was of value. All patients were given absolute bed rest.

Proper splinting of paralyzed extremities was carried out by the use of wire splints, plaster moulded splints and plaster casts. The Drinker respirator was used when necessary due to paralysis of the respiratory muscles. Five of these machines are now available for use in Des Moines.

Table I  
Signs and Symptoms

Presenting	
Headache.....	14
Neck pain.....	8
Generalized aches and pains.....	7
Stiff neck.....	5
Vomiting.....	5
Fever.....	5
Chills.....	5
Leg pain.....	4
Paralysis.....	2
Nausea.....	2
Back pain.....	2
Voice change.....	2
Jerking and twitching.....	1
Sore throat.....	1
Anorexia.....	1
Delirium.....	1
Weakness of legs.....	1
Hyperesthesia.....	1
Admission	
Fever.....	45
Rigidity of neck.....	31
Paralysis.....	19
Sensorial difficulties.....	7
Dysphagia.....	4
Sore throat.....	4
Anorexia.....	4
Pain in extremities.....	3
Nasal voice.....	2
Pain in neck and back.....	2
Irritability.....	2
Abdominal distention.....	1
Rigid back.....	1

TABLE II  
Extent of Paralysis

Paralysis	Patients with other Paralysis	Patients without other Paralysis	Total
Right leg .....	7	0	7
Left leg.....	3	2	5
Both legs.....	6	8	14
Right arm.....	1	4	5
Left arm.....	1	1	2
Both arms.....	0	6	6
Respiratory muscles..	2	7	9
Spinal muscles.....	0	1	1
Facial muscles.....	1	1	2
Totals.....	21	30	51

## AUTARCESLIOLOGY

There are numerous instances in medical literature of the occurrence of poliomyelitis in members of immediate and remote branches of the family. Aycock<sup>1</sup> and <sup>2</sup> reports his studies would indicate that poliomyelitis occurs with a higher frequency among relatives of persons who have had the disease than among persons at random. These studies indicate a familial tendency in the occurrence of poliomyelitis, and are taken as an indication that the constitutional factor which determines the selective occurrence of the paralytic disease is inherent. However, recurrence of the disease in the same individual is rare. As high as 24 per cent of families have had multiple infection in an epidemic<sup>3</sup>.

[Fig 1. Comparison of Reported Cases of Poliomyelitis – 1922 – 1939. Below.]

There were seven families involved in the Des Moines epidemic of 1939 where multiple cases of poliomyelitis occurred. In one family, a brother, nineteen months of age, and a sister three years of age, developed the disease at the same time. In another family a boy, five years of age, developed a severe case of poliomyelitis requiring the aid of the respirator. Ten days later this boy's father developed acute poliomyelitis and died in three days. In a third family, a girl, two years of age, developed poliomyelitis four days after her sister, none years of age. In another family, a patient and his cousin developed poliomyelitis at the same time. In the fifth family, a brother and sister developed the disease within one week's time. In the sixth instance, an older brother of the patient had had poliomyelitis five years previously. In the seventh family, a brother of the patient had had poliomyelitis ten years previously, and an aunt of the patient had suffered the disease in her youth.

## SEWAGE, OUTSIDE TOILETS AND WELLS

For many years, Toomey<sup>4</sup> has presupposed the entry of the virus of poliomyelitis to be by way of the gastro-intestinal tract. Trask and his associates<sup>5</sup> have reported finding the virus of poliomyelitis in the feces of a child ill from the disease, twenty-four days after onset of the symptoms. This virus remained viable for ten weeks in a refrigerated stool. These investigators<sup>6</sup> also recovered the virus of poliomyelitis from sewage during the 1939 epidemic in Charleston, South Carolina, and reproduced the disease in monkeys.

Paul and Trask<sup>7</sup> believe there is a strong case for considering poliomyelitis as an intestinal disease, but the evidence is still presumptive. Kramer and his associates<sup>8</sup> recovered the virus of poliomyelitis from the feces seven and nine days after the onset of illness. This would indicate that the virus withstands gastric acidity, which under normal physiologic conditions tends to keep gastric contents relatively free of bacteria. It further suggests that

improper disposal of feces from patients with poliomyelitis may have serious public health consequences, especially in smaller communities where inadequate sewage disposal may result in contamination of surrounding beaches or even local water systems. Recovery of the virus from the gastro-intestinal tract with as great frequency as from the upper respiratory tract does not alter the concept of Kramer and his so-workers that the mode of entrance of the virus into the body is by way of the upper respiratory tract. The physiologic passage of nasal and oral secretions into the gastro-intestinal tract by reflex swallowing is predicated as the basis for the presence of virus in these organs. They also suggest that since the gastro-intestinal tract functions as a temporary reservoir for secretions from the upper respiratory tract, the intestines should, after a time, contain the virus in higher concentration than any single sample of secretion obtained from the upper respiratory tract by nasal washing.

Ellsworth<sup>9</sup> has reported that from the evidence in Massachusetts, the incidence of the disease during epidemics is generally highest in communities situated along the seacoast or along rivers, the waters of which are subject to sewage pollution. Given a sufficient concentration of the virus in sewage-polluted water, Ellsworth believes it conceivable that infection can be caused by the admission of such water into the nasal passages of the bather.

In Fig. 2 [Map of Des Moines, below, are shown the locations of residence for patients involved in the epidemic of 1939 in the city of Des Moines. The circles represent those patients who resided within two blocks of wells and outside toilets. The squares represent those patients who resided more than two blocks from wells and outside toilets. Although it is considered significant that over 70 per cent of all cases occurred within two blocks of outside wells and toilets, no further deductions regarding the importance of such data are drawn.

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City of Des Moines

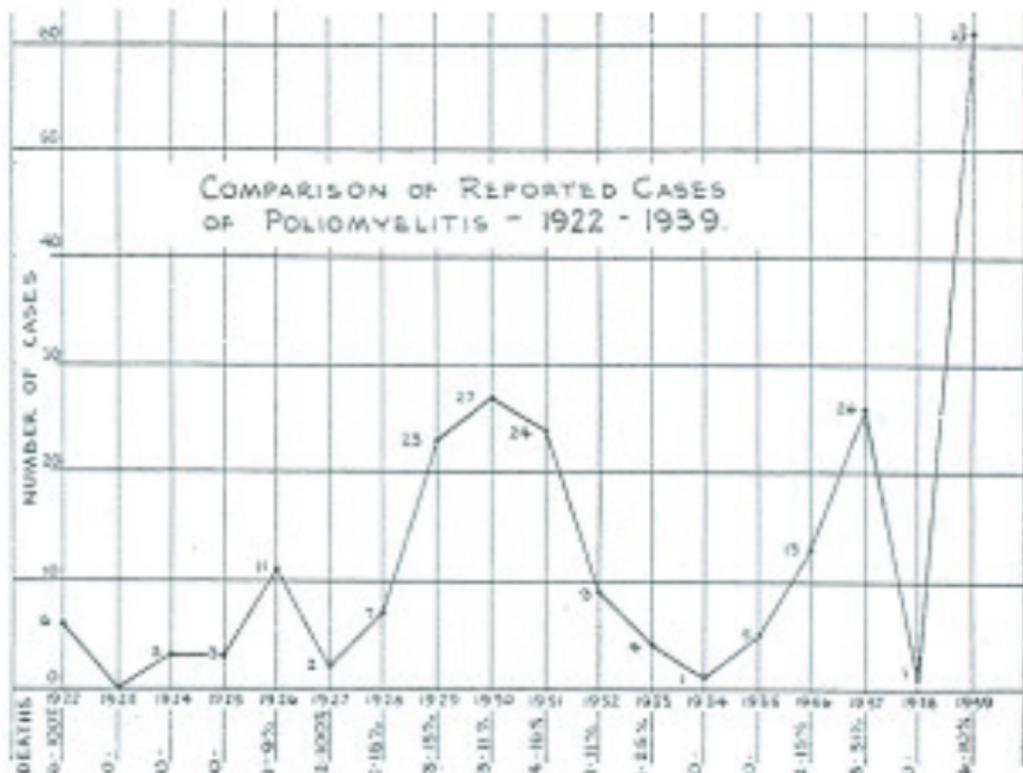


Fig. 1.

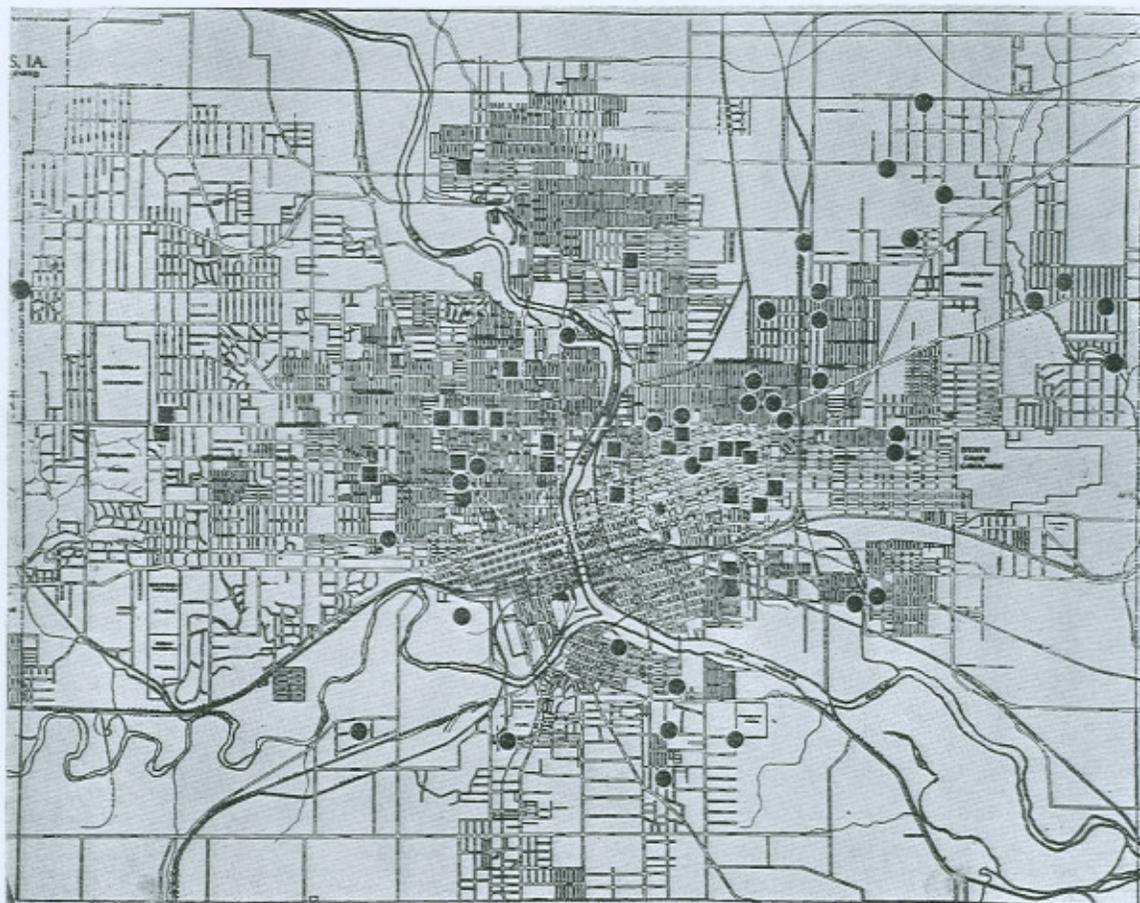


Fig. 2.

- Poliomyelitis within two blocks of wells and outside toilets.
- Poliomyelitis more than two blocks from wells and outside toilets.

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