MEDICINE

A Skyrocket Scourge

Infantile Paralysis Epidemic In South Found To Shoot Across an Area to a Focal Point and Then Burst

By ROBERT D. POTTER

IN THE blistering heat of a mid-July day the two men looked at the wall map with its multi-colored pins.

"That makes 338," said one as he pushed another black-headed pin into place.

The map was the outline of North Carolina. The men were Dr. Carl V. Reynolds, State Health Officer, and Dr. J. C. Knox, State Epidemiologist. Each pin represented tragedy in some North Carolina home: a disease-wracked little body tossing in a bed; a case of infantile paralysis.

In the offices of North Carolina's health department at Raleigh the epidemic of poliomyelitis — more often known as infantile paralysis—seemed far away. There was no rushing of nurses to aid stricken victims; only the high ceiling, dim room, the wall map with its ever-spreading pins and the ringing telephones.

"Dr. Knox, this man wants to know if it's all right to take his three children on a trip to his shore cottage," said the secretary at the phone.

"Here's some more telegrams, Dr. Reynolds. A woman from Detroit wants to know if she dare takes her children to camp in the mountains," said another.

"Dr. Jackson reports a case in Dare County over near Cape Hatteras."

And another black pin, used to designate cases in July, was stuck in the wall map.

"Staff headquarters" in the current fight of medicine against disease was in action.

Pins Tells the Story

"Look at the pins," agreed Drs. Reynolds and Knox—the men on the spot —when asked how the epidemic came about and where it was going.

The pins tell the story.

"See that orange pin," said Dr. Knox. "Here it is way over in Jackson County near the western boundary of the state. That's a case last February.

"Then look at the dark and light blue pins. They are cases in March and April. See how they come eastward across the state. Those green pins for May take an alternative route and scatter a bit more, but they also come east.

"And now look at the red pins."

One can't very well miss them. They from a red blot all over Wake County, where Raleigh is situated.

"Here's where it burst," said Dr. Knox.

"What burst?"

"The skyrocket," he replied. "Maybe I'm wrong but the spread of this epidemic across North Carolina resembles, for me, nothing so much as a menacing skyrocket. It came across the state from west to east. Then it hit Wake County and burst around and in Raleigh. See how it spread to the surrounding territory from the focal point in the city."

What carried the disease across the state? Why did it pick on Raleigh as a "bursting point?"

How Does It Spread?

Medicine would give a lot to know the answers to those questions.

It is known, however, that direct contact with stricken victims of the disease is not necessary for its transmission. Rarely, for example, are there two cases in the same family.

Like typhoid fever and diphtheria, infantile paralysis can be and usually is spread by "carriers"; people who have the disease in so mild a form that they are not classed as sick, and yet provide a menace for others.

Fortunately, it seems, the greatest number of people with whom the carriers come in contact have sufficient natural immunity to prevent the incidence of the poliomyelitis. Persons without the natural immunity are the ones who contract the affliction. Wandering about, a single carrier can thus give rise to several cases. When the disease is brought into fertile territory where non-immune persons are numerous, an epidemic may result.

Apparently Raleigh and Wake County were virgin "soil" for the polio virus. From the way the epidemic waged there for a few weeks and then spread north, it seems as if the disease — like some plant pest—finally ate itself out of food and then moved on.

For frightened parents to the northward in the path of the approaching scourge, there is only one sure and almost impossible method of prevention with which to protect their children. That is to keep them, as much as possible, away from playmates and all types of gatherings. Complete isolation is the only sure preventive.

What do the pins in the wall map tell of the future?

Their numbers tell that for North Carolina, at least, the worst of the epidemic is apparently over. The peak seems to have been passed.

Epidemic Heads North

But North Carolina's problem has turned out to be Virginia's.

Put a map of Virginia above one of North Carolina and you have the picture. Where North Carolina's cases are dwindling, those of Virginia are on the increase. And the biggest increase is coming in those counties right on the North Carolina border. Roughly, the case pins in the Virginia map spread out in a broad band following the great north-south highways through the state.

How far will the epidemic progress northward? Health officers in the cities of Richmond, Washington and Baltimore would like very much to know. Richmond already seems to have been reached by the scourge.

Past experience with polio epidemics points to a decline in the number of cases after the middle of August. The coming of cooler weather usually brings the end. How far the epidemic will spread north, therefore, is in many ways a race with the seasonal weather.

Federal H Men

The epidemic of infantile paralysis now working its way northward into Virginia has brought into public notice the Federal "H Men." You've never heard of the "H Men"? Few people have.

H Men are the medical scientists of the Public Health Service in Washington. There are few better ways of describing these physicians who work from the "top" in the nation's capital and trail epidemics of all kinds from Maine to California.

Like the G Men of the Department of Justice, the H Men can not be touch-

ed by local communities, and for the great experiment of modern medicine now going on in North Carolina this freedom from restraint is the saving factor.

Poliomyelitis — polio for short — is their current Public Enemy No. 1. See how the H Men are working the matter out in North Carolina.

At present there is no certain way of immunizing children from polio. If you have natural immunity, you probably won't get the disease. If you haven't natural immunity, you have to stay clear of all gatherings and other crowded contacts until the danger during epidemics is past.

Two Weapons Needed

Medicine needs two things to fight the disease successfully. It would like some simple quick test to tell who is immune and who is not, like the Schick test for diphtheria. There is no such test now available.

Second, medicine would like some serum or vaccine which would provide artificial immunity in those unfortunate enough to lack the natural kind. Medicine may have such vaccines right now.

The vaccine applicants for the honor are two. One is the discovery of Dr. Maurice Brodie of the New York City Health Department, the head of which is the world-famous bacteriologist Dr. William H. Park. This is the so-called Park-Brodie vaccine about which one reads so much.

The second vaccine is the development of Dr. John A. Kolmer of Temple University Medical School in Philadelphia. It differs from the Park-Brodie type somewhat in its preparation but appears to obtain the desired results in patients into which it is injected.

Both vaccines—and their discoverers will frankly admit it—are still in the experimental stage. They have been tried on hundreds of cases, to be sure, but medicine, from long experience, demands further proof of their value in treating poliomyelitis.

Medical Proving Ground

The current North Carolina-Virginia epidemic is providing the "field" laboratory and medical proving ground to test the vaccines' worth. The Federal H Men have been assigned to the job of making the test.

The eyes of the medical world are on the North Carolina test for two reasons: it is the first epidemic which has occurred since the vaccines were developed and tested in a small way on human beings; and strange as it sounds—the test is really a "test."

Dr. James P. Leake, senior Public Health surgeon in charge of serums and vaccines, directs the crucial vaccine test. In his opinion it will be the most impartial and hence the most valuable experiment of its kind ever undertaken.

Under him, working at Greensboro, N. C., is Dr. A. G. Gilliam, who selects the children who are to serve as the controls in the experiments and those who are to receive the Park-Brodie vaccine.

And there is Dr. W. P. Dearing, who hopes to set up a similar control experiment on the vaccine's value in another part of the state.

These are the three H Men now fighting poliomyelitis.

Giving the vaccine to one child, withholding it from the next, and so on, seems like a simple matter, but for Dr. Gilliam particularly the pressure is on.

Consider the experiment from the parents' point of view, and you can see why. Here is a vaccine which offers the hope, at least, of protecting their own children from polio. It may not help but at least it does no harm. To a parent the situation is one where there is everything to gain and nothing to lose. Each parent feels that his child has to have the vaccine. But Dr. Gilliam knows that for a successful test the vaccine just can't be passed out to those who want it, and the children of "don't care" parents used as controls.

That's been the trouble with past tests of a similar nature.

Disease Hereditary?

There is a strong suspicion now that heredity plays a part in the incidence of polio. Dr. W. Lloyd Aycock, of Harvard's Infantile Paralysis Commission, can tell you many reasons why this seems to be so.

Dr. Aycock is working in North Carolina, incidentally, with the Federal H Men on other investigations to test further his belief that the family history tells who may contract the disease. But more of that later.

Suppose Dr. Gilliam gave the vaccine to the careful parents who are eager for their children to receive the possible protection and that he used the less intelligent part of the population who by ignorance or prejudice don't want it as controls for the test.

He would arrive at results, to be sure, but what kind would they be? Dr. Gilliam, if he worked in this fashion, would be balancing one type of society against another. The same criticism applies if he used children in institutions for both controls and for vaccination, as has been done before.

What is wanted, and what brings pressure on the problem from every angle, is a complete, impartial and rigid sampling of North Carolina's population from all grades of the social scales, Negro and white alike. The selection of children to be vaccinated needs to be done with all the randomness of a "straight" lottery.

The situation is hard on individual parents, but medicine will find out something of immeasurable value if the crucial test is so carried out. It's the job of the H Men to see that it is.

Selection of Children

Dr. A. G. Gilliam's Greensboro experiment is the key test in the whole experimental program now under way.

Alternate children rigidly selected by lot receive the Park-Brodie vaccine and the others serve as controls. The choice of who gets the vaccine and who doesn't means much to individual cases. So much pressure has been brought to bear on Dr. Gilliam that the state health officers are only too glad to have an outsider—a Federal H Man—come in and accept responsibility for administering the test.

A prominent doctor in the North Carolina Medical Society, for example, pulled every string he knew to have his children chosen to receive the vaccine. He failed and this illustrates how sentiment can not be allowed to interfere with a true scientific test.

How Dr. Gilliam circumvents outside pressure is shown by the Greensboro set-up.

All parents in the community who wish to have their children considered as applicants for vaccination notify their family physician. The physician submits the names to the office of Dr. Gilliam.

Half the names are chosen to receive the treatment and the other half serve as controls. Then the parents of those children chosen for vaccination are notified to report back to their family doctor to receive the injections and at the same time the doctor is supplied with the vaccine.

Both Groups Important

No one knows, unless they talk too much, who receives the treatment and who does not. For medicine, the two groups are equally important.

If Mrs. Smith finds out that Mrs. Jones' little boy was given the vaccine while her daughter was not, she meets a stone wall when and if she complains to the family physician, who points out that the whole matter is out of his hands. The advantage to medicine of using outside H Men, (*Turn to Page* 74)

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is thus apparent.

From the hundreds of cases, both vaccinated and control, Dr. Gilliam hopes to determine whether fewer new cases will be reported among those who receive the vaccine than among those who did not receive it. If the difference is sufficient, medicine will be fairly certain that the vaccine did some good by providing artificial immunity.

If the number of cases is about the same for the two groups, then the positive beneficial effect of the vaccine will be in doubt. Then medicine will be back where it is at present with regard to the use of convalescent blood serum in treating polio.

It has been believed that the blood of people who have recently had infantile paralysis contained properties which protected the individual against a second infection from the disease. The theory was that if this blood were injected in other people the chance of getting polio would be lessened.

The idea is good but not too well substantiated by actual test. The present accepted status of the use of convalescent blood is that it is harmless but not very helpful.

That is what medicine hopes it won't find for the Park-Brodie vaccine after the Greensboro test is complete.

Although not one of the H Men, another outsider is undertaking a supplementary experiment in connection with the Greensboro test of Dr. Gilliam. He is Dr. W. Lloyd Aycock, of Harvard's Infantile Paralysis Commission.

Dr. Aycock is particularly interested in tracing the influence of one's hereditary background on the incidence of the disease.

North Carolina, where there is less inter-marriage among racial types than in the more northern populous states and cities, offers a golden opportunity for this investigation.

In addition, Dr. Aycock wishes to trace, if possible, the growth in immunity in a community during the actual progress of an epidemic.

Each child in Dr. Gilliam's test therefore, either a control or a vaccinated child, has a blood sample drawn before and after the six weeks experiment.

Immunity Test

With this blood a neutralization test is performed. That sounds complicated but isn't so difficult to understtand. A blood sample from the subject is mixed in certain proportions with a known virus of infantile paralysis. The mixture is injected in Rhesus monkeys in the laboratory. If the monkey finally dies, it is indicated that the original blood sample did not have the immunity properties which were capable of neutralizing the virus.

If the monkey remains healthy, it means the immunity property of the blood sample neutralized the virus and made it harmless.

By making this test before and after giving the vaccine, and by doing it also on the controls, the scientists are able to obtain additional evidence of the possible immunity provided by the vaccine. And for the control group, which received no vaccine, they are able to trace the possible growth in natural immunity during an epidemic.

If the vaccinated group shows no more immunity increase than the control group, the value of injecting the vaccine will be questionable.

Out of it all, whether individual patients suffer or not, medicine is going to learn the truth about the value of the infantile paralysis vaccines so that in future epidemics better methods of control can be used. That's what the hard-boiled H Men have to find out.

"All Men Are Equal"

Infantile paralysis is one disease which is no respecter of a person's status in life. Its history discloses that it strikes rich and poor alike and disregards race, creed and color. Sir Walter Scott from the past and President Roosevelt from the present are but two names of famous victims of the disease which might be picked from many.

As examples, Sir Walter and the President illustrate also two different ages when the disease came. Scott was stricken at eighteen months, while still teething. Infantile paralysis, in fact, was once known as teething paralysis because it mainly attacks children while cutting their baby teeth.

President Roosevelt was a mature man in the prime of life, a much rarer sort of case.

That both men achieved their greatest success in life after the onslaught of the disease shows what careful care and treatment can do to remove the complete hopelessness sometimes erroneously associated with the affliction.

Epidemics have a way of creeping up on physicians and laymen alike, but the North Carolina case is the exception. Of all the people and children in Raleigh who might have been the first to be stricken with the disease, the polio scourge picked out the child of C. J. Parker, city editor of the Raleigh *News Observer,* whose publisher is Josephus Daniels, former Secretary of the Navy under President Wilson and now Ambassador to Mexico.

This combination worked for good and bad. North Carolina's epidemic was publicized from the time it really came into being in Raleigh. Some will say it was over-publicized.

Good or bad, the publicity did two things. It awakened doctors and parents to the danger, spurred the prompt reporting of cases and speeded isolation measures; but from the economic standpoint it has proved worrisome to the popular vacation regions of the North Carolina mountains and the North Carolina seashore.

Safety vs. Trade

Telegrams and 'phone calls from worried parents about to take children on summer vacations can be answered honestly by telling the truth: that in time of polio epidemics safety demands children should not be exposed any more than is absolutely necessary. Complete isolation, remember, is the only sure preventive measure. The truth, therefore, has decreased North Carolina's vacation trade.

Dr. Carl V. Reynolds, State Health Officer, and Dr. J. C. Knox, State Epidemiologist, have been the men caught in the cross-fire between medicine and commerce. The truth and medicine came first.

But the truth, while discouraging during the peak of the epidemic, was not all scare-headline material. Even in the worst epidemics of history—as in that in New York City in 1916—only one person out of 500 contracts the disease.

More than that, the true picture can not be obtained by simply counting the total number of cases during the entire epidemic. What really matters is the number of cases in the infectious stage. Using North Carolina as an example, there is the mass picture of over 300 cases since the first of the year; and the much more encouraging picture represented by the greatly smaller number of cases still in the crucial infectious stage, numbering about one-third as many. For a typical day, say July 10, the total cases stood at 338, while only 108 at that time were infectious.

Three Dangerous Weeks

Three weeks is the key period during which health officers consider an infantile paralysis case infectious. The first ten or twelve days of this period are a time of growth of the virus, its incubation period. The remaining time is allowed for to cover what an engineer would call the "factor of safety."

A study of the age distribution of the

infantile paralysis cases in North Carolina discloses that the name is in many ways a misnomer. The disease is not wholely a children's disease although the greatest incidence is among those under five years of age.

In North Carolina's current epidemic 62 persons over thirty-five years old, had contracted the disease (up to the middle of July). Children under five, however, accounted for over half the cases.

Cases broken down into their classification as urban or rural, male or female, and White, Negro or Indian, follow closely the population distribution as given by the state census. Thus, the oncoming of the disease seems not to be explained by the place of living, sanitary conditions or other factors which account for the spread of other infectious diseases.

Whether or not the potential victims have been fortunate enough to have built up some natural immunity in the past, seems to be the biggest factor.

Either you have such natural immunity or you don't. What medicine hopes will come from its vaccine experiments in North Carolina is some definite proof that at least artificial immunity can be provided. Parents of children in the path of the epidemic and everywhere else share that hope.

Science News Letter, August 3, 1935

AERONAUTICS

Zeppelin Models Whirled At 200 Miles per Hour in Tests

See Front Cover

A TWO - TON revolving arm which hurls twelve-foot zeppelin models through space at 200 miles an hour was exhibited to the experts attending the lighter-than-air craft forum at the Daniel Guggenheim Airship Institute.

The giant whirling arm—as long as the average city block is wide—is designed to make accurate tests on zeppelin models to check where the greatest strains occur in time of severe storms; times of disasters like that which caused the crash of the Akron off New Jersey.

The twelve-foot-long model zeppelins, whirled round and round by the device, have sixty small holes drilled in them from the extreme nose to the tail. Separate rubber tubes are connected to each hole and the sixty tubes run through the hollow whirling arm back to three score manometers, which indicate the air pressure at each given hole in the hull.

The long glass tubes of the manometers contain red fluids whose relative heights give an accurate picture to the research scientists of the pressure forces distributed along the model's hull. As a final automatic touch, a photographic film passes behind the tubes and makes a permanent record of the heights at one minute intervals for each one-sixtieth of the model's length.

Knowledge gained from the tests will be applied to the construction of future airships to make them more sturdy at the points where they experience the greatest strains.

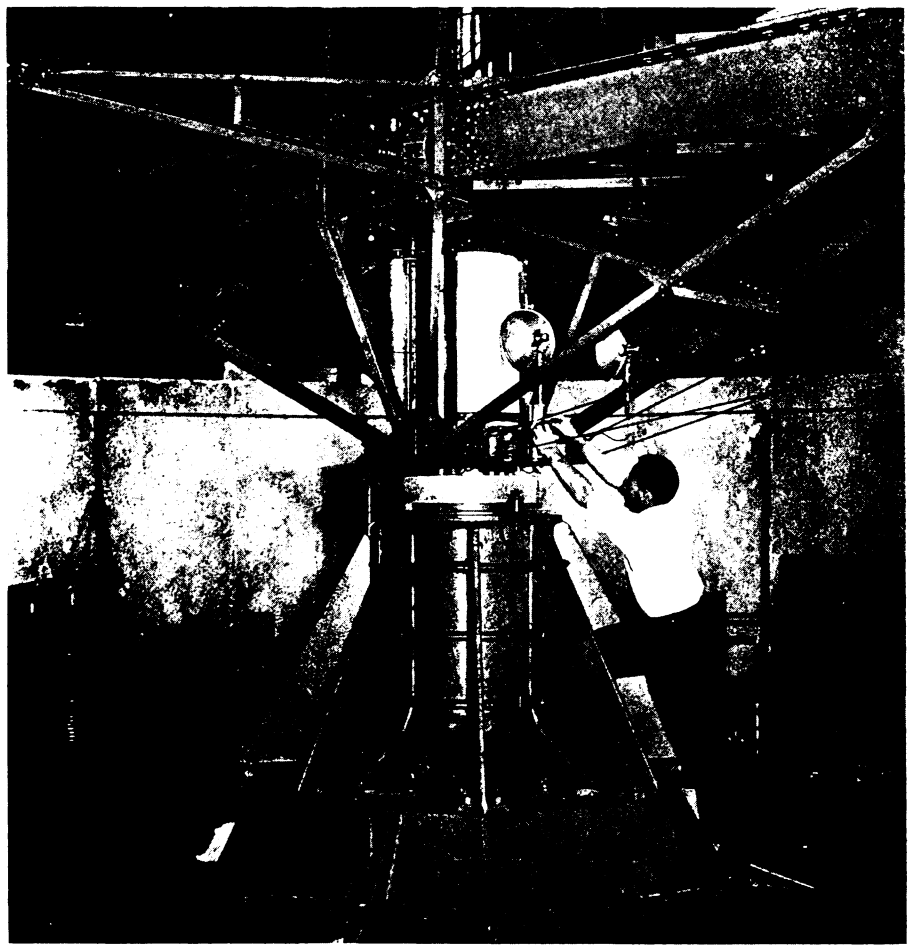
The two-ton whirling arm which makes 200-mile an hour model speeds possible is mounted ten feet off the floor of the laboratory on a huge concrete and steel base weighing four tons.

The arm resembles nothing so much as the old-fashioned horse-powered feed mill, which applied the elementary principle of hitching a horse to a long pole made fast to the upright drive shaft of the mill and walking the horse round in a circle.

The lighter-than-air craft forum was the first of its kind ever held in America. Its object was to review the present status of the airship from the engineering and scientific viewpoint, according to Dr. Theo. Troller, director of the Guggenheim Airship Institute, where meetings were held.

Outstanding airship experts of America were in attendance at the technical sessions, whose chairman is Dr. G. W. Lewis, Director of Aeronautical Research, National Advisory Committee for Aeronautics.

Science News Letter, August 3, 1935



WHIRLING ARM FOR AIRSHIP TESTS

This spinning device whirls 12-foot zeppelin models about in synthetic storms to test their weathering ability. Dr. Theodore Troller, director of the Guggenheim Airship Institute, is here shown adjusting the automatic photography unit which records the readings of the instruments.