A SUPPLEMENT, STRESSING THE SANITARY CONDITIONS OF THE HOME AND ITS SURROUNDINGS, TO THE HEALTH PROGRAM OF THE RILEY TOWNSHIP SCHOOLS IN THE SEVENTH, EIGHTH, AND NINTH GRADES

By

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Contributions of the Graduate School
Indiana State Teachers College
Number 65

Submitted in Partial Fulfillment of the Requirements for the Master of Science Degree in Education

1932
ACKNOWLEDGMENTS

I wish to take this opportunity to express my sincere appreciation to Dr. Fred Donaghy, Dr. J. R. Shannon, and Professor E. E. Ramsey, of Indiana State Teachers College, for suggestions and criticisms; and to Dr. Donaghy, Mr. William Hall, and Mr. Ross Graham for their kind assistance in the survey.

V. D. Mutchler
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*These pictures are original photographs taken during the survey and in Vigo County.
INTRODUCTION

Many of the elementary principles of sanitation were undoubtedly quite well known to the ancients although it is not probable that they had anything more than experience to guide them in their judgments on disease prevention. They knew that sickness was spread by human contacts and by failure to dispose properly of human wastes, but the nature of disease-producing bacteria, how they grew in the body, and how they were carried from person to person, was not, then, a part of human knowledge.

In recent years there has been a general awakening of communities to the importance of sanitation. This has been accelerated by the rapid growth of cities and the new problems of urban life, and through campaigns by health organizations. In this remarkable growth in knowledge of sanitation and disease prevention, sanitary engineers and public hygienists have found that the larger cities afford such excellent opportunities for productive work that they have greatly neglected the small towns and rural communities. It is probable that nearly half of the population of the United States live in rural communities without a municipal water supply and in homes without sewer connections.

The rural problem of sanitation is quite as large and important as the urban problem. In fact, as stated by H. W. Foght of Municipal University, Wichata, Kansas, when he was a specialist in rural school practice in the United States Bureau of
Education, "The one outstanding fact in the development of public health in the United States is that the rural half of the nation does not keep pace with the urban half. Rural people have presumed too much on the natural healthfulness of their environment, and have neglected to make the most of the advantages they have over the city. Modern sanitary science has wrought wonders in some of the largest cities, which now show lower death rates than neighboring towns and open country districts."\(^1\)

Summarizing a chart,\(^2\) given by the same author, of school children in twenty-five cities of the United States versus children in rural schools of Massachusetts, Idaho, Virginia, New Jersey, and Pennsylvania, it was found that country children had more than twice the per cent of defects in a total of eleven out of thirteen common physical ailments as did the city children.

Every child has a right to be born into the world of clean parentage and sound of body and mind. He has a similar right to grow to maturity in wholesome physical surroundings where nature can have full sway.

The average citizen needs to be enlightened on the conditions of community health, and of his own health in its individual and community relations. The surprising amount of disregard for this individual and community health is due largely to the indifferent methods of teaching hygiene; and many farm homes are what they are

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\(^2\) Ibid., p. 295.
today because the schools have failed to influence the people to better living.

Reading, writing, and arithmetic have always been considered as essentials in every educational program, but these are really of secondary importance. Of what use are these tools if one is incapacitated through ill-health from using them? Mental efficiency depends on normal bodily conditions. Since health is not only the foundation of skill, but also of happiness and success and other virtues that belong to good citizenship, it should be the first aim of the school. Any school that neglects the instruction and training of its pupils in the getting and maintaining of health has no true vision of its real function in society.

But it is not all each local school's fault that the teaching of facts concerning the sanitation of the rural home and its surroundings is a failure. The Indiana State Department of Public Instruction is beginning to stress the teaching of health, but it concerns the individual and is limited, to a great extent, to physical education. The greater part of community health that is taught in the seventh, eighth, and ninth grades of a six-six plan school is taught in civics, biology, and general science. The regularly adopted texts in these subjects treat points and facts that are of a general nature. These texts must be used in both urban and rural schools and they must be sold. A specific community should have a specific survey or at least a school that serves a rural community should have the subject matter and material necessary for the teaching of facts that concern the sanitation
of the rural home and its surroundings. Because Riley Township
does not have this subject matter and because rural communities
have been neglected this survey has been taken and this treatise
written. It is hoped that it may contribute a small part to the
success of health education.
I. THE PROBLEM -- STATEMENT
AND DEFINITION

Good health is one of the major objectives of education. Our country maintains its schools at much expense, partly for the sake of the individual, but chiefly for the purpose of making good citizens. By good citizens we mean not only faithful and intelligent voters but also good neighbors—people who try to do unto others as they would have others do unto them. Good health is not solely an individual matter; it is a community matter as well. The good health of our neighbors concerns us because an individual's unhealthfulness may spread to the entire neighborhood or the unhealthy individual may become a community burden. The program of public education, therefore, rightly includes training for healthful living. But this training centers around the individual himself and leaves far behind his environment, the home and its surroundings.

The purpose of this study is to discover, by the survey of a specific community, the sanitary conditions of a rural or village home and its surroundings that are not sufficiently stressed in the schools of today. Riley Township, Vigo County was selected as a typical Indiana community in which to make this survey. Of course there are specific facts to be stressed in specific communities but, in general, rural communities are much the same and the material that will help one will also help the others.
Profiting by the knowledge gained, a supplement has been prepared which is hoped will be used to an advantage in the seventh, eighth, and ninth grades of the Riley Township schools.

A copy of this thesis will be presented to the above mentioned school and information will be given any resident of that township upon request.

"Health Education is the sum of the experiences in school and elsewhere which favorably influence habits, attitudes, and knowledge pertaining to individual, community and racial health."¹

"Sanitation is the science of public health, concerning not only the health of the individual but his health in relation to other individuals. It concerns itself chiefly with the prevention of the spread of communicable diseases through the supervision of certain activities and conditions, such as housing, food and water supply, sewage and garbage disposal, and other aspects of community hygiene."²

Rural -- "Pertaining to land areas in which public water supplies are not available."³

The failure lies in the fact that health education of the country districts is meager and does not compare favorably with that type of instruction in the cities. Further more, modern sanitary science is not practiced to a sufficient extent in rural communities.


A. Correspondence From State Boards of Health

The Public Health Departments of the forty-eight (48) states of the United States were written asking them for any literature or material that they might have available concerning sanitary or health surveys in rural communities. Returns from twenty-two (22) states were received as shown in the following table.

**TABLE I**

RETURNS FROM TWENTY-TWO STATES CONCERNING SANITARY OR HEALTH SURVEYS IN RURAL COMMUNITIES

<table>
<thead>
<tr>
<th>Description</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>No literature on sanitary or health surveys of rural communities available</td>
<td>12</td>
</tr>
<tr>
<td>Literature on sanitary or health surveys of rural communities sent</td>
<td>6</td>
</tr>
<tr>
<td>A copy of their annual report or publication sent</td>
<td>4</td>
</tr>
</tbody>
</table>

*Indiana sent twenty (20) pamphlets on health topics but no reports of sanitary surveys.

The following figure gives one a visual idea of the results.
Figure 1. Correspondence from twenty-two (22) states of available literature on sanitary or health surveys of rural communities.
Conclusion:-- The conclusion to be reached is quite evident. Of the twenty-two (22) states twelve (12) or more than one-half had no literature on sanitary or health surveys of rural communities available, while six (6) or less than one-third sent literature. Does this seem to show that the sanitation of the rural home and its surroundings is getting the help necessary to make a success of healthful living?

B. Correspondence From State Departments of Public Instruction

The Departments of Public Instruction of the forty-eight (48) states of the United States were written asking them for health manuals or any other available literature used in the teaching of health, especially that material used concerning the sanitation of the rural home and its surroundings. Returns were received from twenty-eight (28) states. A summary is given in the following table.
<table>
<thead>
<tr>
<th>Item</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>No uniform state health program</td>
<td>10</td>
</tr>
<tr>
<td>Health manuals being prepared or gone to press</td>
<td>7</td>
</tr>
<tr>
<td>Health manuals for elementary schools</td>
<td>4</td>
</tr>
<tr>
<td>Physical education bulletins</td>
<td>3</td>
</tr>
<tr>
<td>Courses of study for elementary schools</td>
<td>2</td>
</tr>
<tr>
<td>General school health program*</td>
<td>2</td>
</tr>
<tr>
<td>Health manuals for high school</td>
<td>2</td>
</tr>
<tr>
<td>Health manuals for junior high school</td>
<td>1</td>
</tr>
<tr>
<td>Not allowed to distribute state courses of study outside of own state</td>
<td>1</td>
</tr>
<tr>
<td>Departments stressing sanitary conditions of rural home and community</td>
<td>0</td>
</tr>
</tbody>
</table>

*Indiana sent a tentative course of study in elementary science and health, and also a tentative course of study in health education for secondary schools. A small part of these are suitable for use in rural community sanitation.
<table>
<thead>
<tr>
<th>DEPARTMENTS OF PUBLIC INSTRUCTION CORRESPONDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td><strong>No uniform health program</strong></td>
</tr>
<tr>
<td><strong>Health manuals being prepared</strong></td>
</tr>
<tr>
<td><strong>Elementary health manuals</strong></td>
</tr>
<tr>
<td><strong>Phys. Ed. bulletins</strong></td>
</tr>
<tr>
<td><strong>Elementary Courses of Study</strong></td>
</tr>
<tr>
<td><strong>General health Program</strong></td>
</tr>
<tr>
<td><strong>High School health manuals</strong></td>
</tr>
<tr>
<td><strong>Jr. High health manuals</strong></td>
</tr>
<tr>
<td><strong>Not allowed to distribute</strong></td>
</tr>
<tr>
<td><strong>Stressing sanitation of rural home and community</strong></td>
</tr>
</tbody>
</table>

Figure 2. Correspondence from twenty-eight (28) states of available literature used in the teaching of health, especially concerning the sanitary conditions of the rural home and its surroundings.
Conclusion:— Seventeen (17) states, or more than half of those replying, had no uniform health programs, while nine (9) states, or one-third, had some type of health manuals. However, the astounding fact is that no state had any special material for the schools to use in stressing the sanitation of the rural home and community.

C. Reports on Bulletins From State Boards of Health and State Boards of Public Instruction

1. State Boards of Health. Through various sources bulletins, pamphlets, and publications were obtained from twenty-one (21) state boards of health. After examining and classifying this material, it was found that many of the state boards have very good literature that might be used to advantage in the schools for the teaching of community sanitation. The publications from California, Virginia, and Indiana are especially good. A summary is given in the following table.

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4 The United States Public Health Service (Treasury Department) sent eight (8) pamphlets on immunization, control, and protection against communicable diseases which contained very good discussions.
<table>
<thead>
<tr>
<th>Topic</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control of communicable diseases</td>
<td>8</td>
</tr>
<tr>
<td>Water supplies and sewage systems for country homes</td>
<td>5</td>
</tr>
<tr>
<td>Toilets, types and care</td>
<td>3</td>
</tr>
<tr>
<td>Water supplies, sewage and garbage systems for cities</td>
<td>2</td>
</tr>
<tr>
<td>Sanitary codes, laws, and regulations</td>
<td>6</td>
</tr>
<tr>
<td>Statistical reports and reviews</td>
<td>4</td>
</tr>
<tr>
<td>Methods of teaching hygiene (Virginia)</td>
<td>1</td>
</tr>
</tbody>
</table>
### BULLETINS, PAMPHLETS, AND PUBLICATIONS FROM STATE BOARDS OF HEALTH

<table>
<thead>
<tr>
<th>Topic</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control of communicable diseases</td>
<td>8</td>
</tr>
<tr>
<td>Water supplies and sewage systems for country homes</td>
<td>5</td>
</tr>
<tr>
<td>Toilets, types and care</td>
<td>3</td>
</tr>
<tr>
<td>Water supplies, sewage, and garbage systems for cities</td>
<td>2</td>
</tr>
<tr>
<td>Sanitary codes, laws, and regulations</td>
<td>6</td>
</tr>
<tr>
<td>Statistical reports and reviews</td>
<td>4</td>
</tr>
<tr>
<td>Methods of teaching hygiene (Virginia)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Figure 3.** A graph showing the content of bulletins, pamphlets, and publications from twenty-one state boards of health.
Conclusion: It is quite evident from the table and figure that many of the state health boards, including that of the United States board, have valuable information that could be used in the schools in the teaching of the sanitary conditions of the rural home and its surroundings.

2. State Boards of Public Instruction. Programs and courses of study were obtained from sixteen (16) state departments of public instruction. Fourteen (14) courses of study were for elementary schools, while three (3) were for high schools. After classifying the material, it was found that the high schools paid practically no attention to community health, while the elementary schools gave more time but fell far short of giving it the consideration in the curriculum necessary to make successful teaching assured. One state, Wyoming, stresses community health in the elementary schools.

The United States Bureau of Education (Department of Interior) sent five (5) reports and bulletins. There was very little material in them that would be of use in teaching community sanitation.
<table>
<thead>
<tr>
<th>Elementary Schools - 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal hygiene and organs of the body: ........................</td>
</tr>
<tr>
<td>Physical education: ..................................................</td>
</tr>
<tr>
<td>Community health (stressed): .......................................</td>
</tr>
<tr>
<td>Community health (fair discussion): ................................</td>
</tr>
<tr>
<td>Community health (meager discussion): ................................</td>
</tr>
<tr>
<td>No community health: ..................................................</td>
</tr>
<tr>
<td>High Schools - 3</td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Personal hygiene and organs of the body: ........................</td>
</tr>
<tr>
<td>Physical education: ..................................................</td>
</tr>
<tr>
<td>Community health (meager discussion): ................................</td>
</tr>
</tbody>
</table>
**Figure 4.** A graph showing the content of programs and courses of study of fourteen (14) elementary schools and three (3) high schools from sixteen (16) state boards of public instruction.
Conclusion: The table and figure shows that community health is not being given much consideration in the schools, while the preceding table showed that many of the state boards of health had valuable information that could be used in the schools in the teaching of this topic. It seems that the state boards of health and the state boards of public instruction are not cooperating and material that might be used to advantage in the schools is omitted - the schools and communities being the losers.

D. Teachers College Catalogues Summary

Teachers College catalogues were obtained from colleges in twenty-eight (28) states. The catalogue courses were checked in physical education, health, biology, and physiology for health education and community sanitation. The following table shows a summary of results.

<table>
<thead>
<tr>
<th>Health education - no community sanitation</th>
<th>13 Colleges</th>
</tr>
</thead>
<tbody>
<tr>
<td>No health education</td>
<td>8 Colleges</td>
</tr>
<tr>
<td>Part of one course on community sanitation</td>
<td>5 Colleges</td>
</tr>
<tr>
<td>At least one course stressing community hygiene and rural sanitation*</td>
<td>2 Colleges</td>
</tr>
</tbody>
</table>

*Southeastern State Teachers College, Durant, Oklahoma; State Teachers College, Hattiesburg, Mississippi.
Figure 5. A graph showing the content of courses in physical education, health, biology, and physiology for health education and community sanitation in the Teachers Colleges in twenty-eight (28) states.
Conclusion:-- The table and figure shows that only two out of the twenty-eight state teachers colleges have as much as one course that stresses community hygiene and rural sanitation. These two are the Southeastern State Teachers College of Durant, Oklahoma, and the State Teachers College of Hattiesburg, Mississippi. The majority of teachers colleges are training physical education directors and teachers of biology and physiology and require their students to take one course in health. This course covers much material and is not definite with practically no stress on rural community sanitation.

Therefore, teachers are not adequately prepared to go out and teach facts that concern the sanitary condition of the rural home and its surroundings, unless satisfactory material is furnished by the school or state.

E. Authors' Opinions

Many of our present day authors of health books have realized and are stressing the fact that health and the sanitary conditions of the rural home and its surroundings does not compare favorably with that of the larger cities. Extracts, taken from their works, to prove this point are cited.

"The belief in the superior healthfulness of the country over the city is due in all probability to the natural advantages possessed by the country. The city being inferior to the country in these respects, the conclusion is that people in the country are healthier than in the city. The study of statistics shows that this common notion of the supreme healthfulness of the
country is not based on reliable information. A quarter of a century ago this belief would have been justified; but within the last decade or so the city has made wonderful strides in hygiene and sanitation. The country has lagged behind and its death-rate is practically the same that it was forty or fifty years ago. The death-rate in the city of New York was greater than that of rural New York up to 1910, but after that date it fell below that of rural New York. Today it is safer to live in the largest city in the United States than in the country surrounding it. As Dr. Briggs, the State Commissioner of Health for the state of New York says 'the rural districts have failed to realize the great importance of improved sanitation,' and 'the rural death-rate from general diseases, typhoid fever, malaria, diarrhoea, and enteritis, is greatly in excess of that in the urban districts.' What is true of the State of New York may be typical of the whole of the United States. There is a general consensus of opinion that the country has been touched but little by the great movement of health which has reached our large cities."

"During the summer and fall of 1915 the State Board of Health of Indiana conducted a survey of four counties in Indiana. No incorporated towns or cities were inspected because the survey was entirely rural. The rural population of

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these four counties according to the United States Census method was 24,650, or 69.5 per cent of the total population. The inspectors employed visited every farm house in the counties named, made a careful survey of each, and reported their findings.  

"In their general survey of Ohio County, the county having the highest average score, the investigators say: 'A review of the points considered shows that 86 per cent of the farm houses surveyed in Ohio County are unsanitary, that the death-rate is higher than the State rate by 0.2 in 1000; that the consumption rate is higher by 0.3 in the 100,000.'

"These figures speak for themselves. They show most deplorable conditions in the country, and the probability is that these conditions are fairly typical of what might be expected in any ordinary rural district in the United States. In fact, it is safe to assume that these counties are far superior in hygiene and sanitation to many counties in the southern part of the United States."  

"All of the wonderful discoveries about the cause and prevention of disease fail to help us much unless we do our part. This we can do, first, by learning about the facts which scientists have discovered; and, second, by applying proper sanitary measures in our homes. It is a fact that the health conditions in the country in recent years are not as satisfactory

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7 J. Mace Andress, op. cit., p. 16.
8 Ibid., pp. 18-19.
as those in our cities, where stringent laws require the proper
disposal of all wastes."9

"It has usually been assumed that the people in rural
districts are more healthy than those who live in cities; but it
has been found that there is as much physical unfitness there as
elsewhere. Studies have been made of the comparative health of
the city and rural school children, which show results in favor
of the former. Of 330,179 children examined in New York City 70
per cent were found defective, while of 294,427 examined in 1831
rural districts of Pennsylvania 75 per cent were defective."10

"We may well ask why ill health and physical defects seem
to be more prevalent in rural communities than in cities. The
answer probably is, simply, that in cities they are prevented
more effectively. The chart on page 313 shows that while the
death-rate in New York City was 20.6 per thousand in 1900, it
had declined to 14 per thousand in 1914; while that in the rural
districts of New York State remained practically the same during
these years (15.5 per thousand in 1900, 15.3 in 1914). This
indicates that health conditions in the city were originally
much worse than in the country. They were rapidly improved by
organization for health protection. There is not the occasion,
in rural communities for the elaborate health-protecting organi-
ization that is now found in all large cities, because the
people in rural communities are not so completely dependent upon
one another nor at the mercy of conditions over which, as indi-

---

viduals, they have no control. An yet even in rural communities physical well-being depends largely upon organized team work. Cities have used their school organization to combat physical defects and weaknesses of pupils, and that is why they make a better showing than rural communities."

"The school cannot and should not take the place of the home, but it will surely fail in its mission if it does not become an important factor in the making of the home. If every rural school teacher could and would set to work, wisely and courageously, to make the school environment completely wholesome and pure, and to teach the children the facts relating to personal and community hygiene, country life would soon make rapid strides toward health and salutary living."

"The economic losses from preventable diseases in our country is needlessly large, although modern medical science is making steady headway in the struggle, with a promise of ultimate victory when popular education shall have done its part by dispelling the ignorance and false modesty prevalent in regard to personal health. The one outstanding fact in the development of public health in the United States is that the rural half of the nation does not keep pace with the urban half.

"Rural people have presumed too much on the natural healthfulness of their environment, and have neglected to make the most of the advantages they have over the city. From time

immemorial writers have pointed out that country people are healthier, more robust, and of longer life than those of the city. In the latter place man has run greater risk of disease than in the rural village and open country. That this has been so, is fully substantiated by facts. But since the establishment of modern medical science and health inspection, conditions have changed materially.

"Modern sanitary science has wrought wonders in some of the largest cities, which now show lower death-rates than neighboring towns and open country districts. Our rural population has gradually filled the land; meanwhile this fallacious belief in beneficent nature's ability to care for those who live in her fold has done much to hinder the progress of sanitary science in the country."13

"Mr. Roosevelt's Commission on Country Life, in 1908, found that 'easily preventable diseases hold several million country people in the slavery of continuous ill-health.' Because they disregard simple hygienic laws of drainage, water supply, pure air, etc., country people die in large numbers from typhoid fever, pneumonia, malaria, hookworm, and pellagra, not to mention the enormous economic loss due to impaired health.

"What is said in the foregoing paragraph is fully corroborated in an investigation by the Joint Committee on Health Problems into comparative health defects of city children

and country children. School children in twenty-five cities of the United States and in rural Massachusetts, Idaho, Virginia, New Jersey, and Pennsylvania were compared and the country children showed a larger per cent of defects in a total of eleven out of thirteen common physical ailments. In pediculosis and skin disease only did the city children get a lower rating.¹⁴

**Conclusion:** It is quite evident that the authors mentioned believe that the country is far behind the city in health and sanitation. Granting that this is true, how can the rural home and community be informed and this condition remedied? There is only one successful way. Follow the example set by the cities and use the local school organization as a medium to combat physical defects of children and insanitary home conditions.¹⁴

F. Measurement of State Adopted Text Books

After the specific survey of Riley Township had been completed, the topics that did not receive sufficient stress were listed. Because the greater part of community health that is taught in the seventh, eighth, and ninth grades of a six-six plan school is taught in civics, biology, and general science, several state adopted texts in each of these subjects were measured. The measurement was made in square inches of subject matter and also diagrams concerning each insufficiently stressed topic. The average amount of material for each topic in each kind of text book is shown in Table VI.

The state approved texts that were analyzed are as follows:

1. *Biology for Beginners* by Moon
2. *New General Biology* by Smallwood, Reveley, and Bailey
3. *Problems in General Science* by Hunter and Whitmar
4. *Civic Science in Home and Community* by Hunter and Whitmar
5. *Community Civics and Rural Life* by Arthur W. Dunn

The word "mention" in the table means that the topic was not discussed in the texts, but in the discussion of some other topic the word itself was merely mentioned; i.e., in the discussion of "flies" it was remarked that they should not have access to toilets.
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>671</td>
<td>583</td>
<td>442</td>
<td></td>
<td>1696</td>
</tr>
<tr>
<td>Average no. sq. in. to page</td>
<td>21</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sewage and garbage disposal</td>
<td>21</td>
<td>144</td>
<td>6</td>
<td>171</td>
<td>8.5</td>
</tr>
<tr>
<td>2</td>
<td>Water</td>
<td>12</td>
<td>144</td>
<td>13</td>
<td>167</td>
<td>8.25</td>
</tr>
<tr>
<td>3</td>
<td>Mosquitoes</td>
<td>70</td>
<td>82</td>
<td>5</td>
<td>157</td>
<td>7.75</td>
</tr>
<tr>
<td>4</td>
<td>Flies</td>
<td>66</td>
<td>76</td>
<td>11</td>
<td>153</td>
<td>7.5</td>
</tr>
<tr>
<td>5</td>
<td>Toilet</td>
<td>Mention</td>
<td>0</td>
<td>0</td>
<td>Mention</td>
<td>Mention</td>
</tr>
<tr>
<td>6</td>
<td>Poisonous plants</td>
<td>Mention</td>
<td>0</td>
<td>0</td>
<td>Mention</td>
<td>Mention</td>
</tr>
<tr>
<td>7</td>
<td>Malaria</td>
<td>49</td>
<td>67</td>
<td>1</td>
<td>117</td>
<td>5.75</td>
</tr>
<tr>
<td>8</td>
<td>Diphtheria</td>
<td>38</td>
<td>21</td>
<td>0</td>
<td>59</td>
<td>2.9</td>
</tr>
<tr>
<td>9</td>
<td>Smallpox</td>
<td>17</td>
<td>32</td>
<td>2</td>
<td>51</td>
<td>2.5</td>
</tr>
<tr>
<td>10</td>
<td>Typhoid</td>
<td>12</td>
<td>14</td>
<td>2</td>
<td>28</td>
<td>1.4</td>
</tr>
<tr>
<td>11</td>
<td>Scarlet fever</td>
<td>1</td>
<td>0</td>
<td>Mention</td>
<td>1</td>
<td>0.05</td>
</tr>
<tr>
<td>12</td>
<td>Tularemia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>286</td>
<td>580</td>
<td>40</td>
<td>904</td>
<td>44.60</td>
</tr>
</tbody>
</table>
Conclusion:- All of the material that concerned the topics in any way is included in the totals. Parts of the discussion of sewage and also of water would come much nearer meeting city needs than those of the country. The first ten topics listed were found to be insufficiently stressed in the survey of Riley Township. Scarlet fever and tularemia were added, the former because it is a much dreaded childhood disease and the latter because it is a comparatively new disease and text books do not mention it. There was no discussion about either the proper construction or care of wells or of diseases that might occur from bad ones. Number one, sewage and garbage disposal, has the greatest amount of space devoted to it, but that is only eight and one-half pages of discussion for a student studying biology, general science, and civics, or the amount taught in the seventh, eighth, and ninth grades. Outdoor toilets and poisonous plants were not discussed at all, while typhoid received an average of approximately one-half page per year. The grand total shows that a rural student, while passing through the seventh, eighth, and ninth grades of his school life, studies forty-four and six-tenths pages of subject-matter concerning the sanitation of his surroundings plus six diseases. The same student studies one thousand six hundred ninety-six pages in biology, general science, and civics. This is not enough subject-matter necessary to cover thoroughly the sanitary conditions of the rural community, and yet health should be the greatest of all aims in school work.
G. Summary

Less than one-third of the state health departments had literature on sanitary or health surveys of rural communities while only one state department of public instruction had any special material for the schools to use in stressing the sanitation of the rural home.

While some of the state boards of health, including the Public Health Department of the United States, have valuable information that could be used in the schools in the teaching of the sanitation of the rural home and its surroundings, the state departments of public instruction have failed to give much consideration to this topic. Cooperation is necessary if the schools are to get the material they should have.

The majority of state teacher colleges are training physical education directors and teachers of biology and physiology and require their students to take one course in health. This course covers much material and is not definite with practically no stress on rural community sanitation. Therefore, teachers are not adequately prepared to go out and teach facts that concern the sanitary condition of the rural home and its surroundings, unless satisfactory material is supplied.

Present-day authors of health books have realized and are stressing the fact that the country is far behind the city in health and sanitation.
The greater part of the community health that is taught in the seventh, eighth, and ninth grades of a six-six plan school is taught in civics, biology, and general science. The measurement of the state approved texts shows that there is not sufficient subject-matter to cover thoroughly the sanitation of the rural community.

The many facts just stated prove that health education, concerning the sanitation of the rural home and its surroundings, is a failure. The remedy is to prepare and present to the rural school organizations the material necessary to combat and overcome this condition, and make health the greatest of all aims in school work.
II. A SURVEY OF RILEY TOWNSHIP

A. Purpose of Survey

To find what points have been neglected, up to the present time, in the teaching of the sanitation of the home and its surroundings in Riley Township.

B. Plan and Method of Survey

Personal visits to eighty-five (85) homes in Riley Township, including parts of the town of Riley, with questionnaire. The blanks in the questionnaire were filled in by the investigators and not by the residents. Also the obtaining of samples of water and milk which were tested in the laboratory of Indiana State Teachers College.

The following questionnaire was used.

SANITARY SURVEY OF RILEY TOWNSHIP

Case No.__________

1. Name________________________________________

2. Adults:
   a. Number_______
   b. Contagious diseases_______

3. Children:
   a. Number_______
   b. Contagious diseases_______

4. Diseases:
   a. Tuberculosis_______
   b. Typhoid________
   c. Malaria________
   d. Diphtheria________

28
5. Vaccination:
   a. Smallpox
   b. Typhoid

6. Immunization:
   a. Diphtheria

7. Location of house:
   a. As to barn
   b. As to toilet
   c. Topographical

8. Toilet:
   a. Type
   b. Condition

9. Sewage disposal:
   a. Type
   b. Condition of premises

10. Drainage:
    a. Natural
    b. Improved

11. Wells and cisterns:
    a. Kind
    b. Depth
    c. Covering
    d. Location
    e. Condition of water
    f. Tested for:

12. Barn:
    a. Condition
    b. Cleanliness

13. Cows:
    a. Number
    b. T. B. tested
    c. Milk tested for:

14. Flies and mosquitoes:
    a. Present or absent
    b. Breeding places

15. Poisonous plants:
    a. Kinds
    b. Nearness to residence

16. Miscellaneous:
Water samples were carefully collected from wells in sterile 200 c.c. wide-mouth, glass stoppered bottles. These samples were tested for Escherichia coli, since authorities consider the presence of this organism as direct evidence of sewage pollution. Therefore, whenever Escherichia coli were found, the water was considered bad or unsafe for domestic use without proper treatment.

The samples were first tested for nitrites. The presence of nitrites in water indicates that there is organic matter present which is undergoing the process of bacterial decomposition.

The samples were all plated on nutrient agar plates and in Smith's lactose broth fermentation tubes, 1 c.c. and .1 c.c. quantities of the sample being used in each medium. The cultures were incubated for twenty-four hours at 37° C. On the second day the bacterial count was determined from the agar plates and the per cent of gas formation was determined from the fermentation tubes. A gas formation of less than ten per cent was considered as a negative result (no Escherichia coli present) and no further work was done with the sample.

A gas formation of ten per cent or more was considered as a presumptive test for B. coli, and the culture was transferred to E. M. B. (eosin-methlyne-blue) plates and incubated in the usual manner.

Escherichia coli form slightly raised colonies which are dark and show a blackish-green metallic sheen upon E. M. B.
plates. Whenever typical colonies appeared they were stained by Gram's method and examined. If found to be small gram-negative, non-sporing, bacillus, a typical colony was fished and transferred to the media shown in the following table.

**TABLE VII**

**ESCHERICHIA COLI REACTION IN MEDIA**

<table>
<thead>
<tr>
<th>Medium</th>
<th>Typical Escherichia coli Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactose broth</td>
<td>Fermentation</td>
</tr>
<tr>
<td>Lactose bile</td>
<td>Fermentation</td>
</tr>
<tr>
<td>Gelatin</td>
<td>Not liquefied</td>
</tr>
<tr>
<td>Menthyl red</td>
<td>Positive</td>
</tr>
<tr>
<td>Litmus milk</td>
<td>Acid reaction</td>
</tr>
<tr>
<td>Triple sugar agar</td>
<td>Acid reaction</td>
</tr>
<tr>
<td>Voges-Proskauer medium</td>
<td>Negative</td>
</tr>
</tbody>
</table>

If the colony fished gave the typical *E. coli* reactions indicated above after twenty-four hours incubation at $37^\circ$ C, the presence of *Escherichia coli* was confirmed.
C. Results of the Survey

1. Number homes visited ........................................... 85
2. Adults:
   a. Number ........................................................................ 192
   b. Contagious diseases .................................................. average amount
3. Children:
   a. Number ......................................................................... 105
   b. Contagious diseases .................................................... average amount
4. Total number individuals .................................................. 297
5. Diseases (specific):
   a. Tuberculosis:
      (I). Deaths ....................................................................... 2
      (II). Present cases ......................................................... 1
      (III). Recovered cases .................................................... 1
   b. Typhoid:
      (I). Number past cases (none lately) .............................. 4
   c. Malaria:
      (I). Number past cases (none lately) .............................. 4
   d. Diphtheria:
      (I). Number past cases (all recovered) ............................ 5
6. Vaccination for:
   a. Smallpox (number) ..................................................... 136
   b. Typhoid (number) ....................................................... 17
7. Immunization for:
   a. Diphtheria (number) .................................................... 11
8. Location of house:
   a. As to barn:
      (I). 20 to 30 ft. .............................. 3
      (II). 50 to 100 ft. ............................ 6
      (III). 100 to 200 ft. .......................... 18
      (IV). 200 to 300 ft. .......................... 8
      (V). 300 to 500 ft. ............................ 4
      (VI). More than 500 ft. ........................ 1
   b. As to toilet:
      (I). 20 ft. ..................................... 1
      (II). 20 to 30 ft. ............................... 10
      (III). 30 to 50 ft. .............................. 9
      (IV). 50 to 100 ft. ............................. 21
      (V). 100 to 150 ft. ............................ 17
      (VI). 150 to 200 ft. ............................ 9
      (VII). 200 to 400 ft. ........................... 5
   c. Topographical:
      (I). Flat......................................... 42
      (II). Sloping..................................... 9
      (III). Rolling.................................... 16
      (IV). Hilly....................................... 5

9. Toilet:
   a. Type:
      (I). Outside...................................... 74
      (II). Inside with cess pool or septic tank..... 11
b. **Fly accessibility:**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>66</td>
</tr>
<tr>
<td>Closed</td>
<td>19</td>
</tr>
</tbody>
</table>

c. **Condition:**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>35</td>
</tr>
<tr>
<td>Fair</td>
<td>30</td>
</tr>
<tr>
<td>Poor</td>
<td>14</td>
</tr>
<tr>
<td>Very bad</td>
<td>6</td>
</tr>
</tbody>
</table>

10. **Sewage disposal:**

a. **Type:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>None or thrown to chickens</td>
<td>72</td>
</tr>
<tr>
<td>Cess pool or good drain</td>
<td>12</td>
</tr>
<tr>
<td>Burned</td>
<td>1</td>
</tr>
</tbody>
</table>

b. **Condition of premises:**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>27</td>
</tr>
<tr>
<td>Fair</td>
<td>36</td>
</tr>
<tr>
<td>Poor</td>
<td>20</td>
</tr>
</tbody>
</table>

11. **Drainage:**

a. **Natural:**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>25</td>
</tr>
<tr>
<td>Fair</td>
<td>26</td>
</tr>
<tr>
<td>Poor</td>
<td>19</td>
</tr>
</tbody>
</table>

b. **Improved**

| Count | 15 |

c. **From toilet and barn toward house**

| Count | 4   |
12. Wells and cisterns:

a. Kind:

(I). Dug. ........................................ 78
   (A). Average depth. .................. 20 ft.

(II). Drilled or driven. .................. 7
   (A). Average depth. ................. 145 ft.

b. Covering:

(I). Concrete. .............................. 45

(II). Board. ................................ 40
   (A). Bad condition. .................. 14

c. Location:

(I). Inside. ................................ 12

(II). 0 to 5 ft. ............................ 17

(III). 5 to 10 ft. ........................ 12

(IV). 10 to 20 ft. ........................ 10

(V). 20 to 50 ft. ........................ 13

(VI). More than 50 ft. .................... 7

d. Condition of water:

(I). Good. ................................. 53

(II). Questionable. ...................... 22

(III). Bad. ................................ 10

e. Water tested for:

(I). Gas, nitrites, and Escherichia coli

as explained in plan and method of

survey.
13. Barn:
   a. Condition:
      (I). Good................................. 19
      (II). Fair.............................. 17
      (III). Poor............................ 6
   b. Cleanliness:
      (I). Good................................. 16
      (II). Fair.............................. 13
      (III). Poor......................... 13

14. Cows:
   a. Number (22 homes).............................. 121
   b. T. B. tested.................................. 121
   c. Milk tested for:
      (I). Gas (10 per cent or more - bad)
      (II). Bacteria (50,000 or more per c.c. - bad)
   d. Condition of milk:
      (I). No samples.............................. 8
      (II). Good................................. 10
      (III). Questionable.......................... 4

15. Flies:
   a. Present...................................... 40
   b. Absent.................................... 19
   c. Not classified................................ 26
   d. Breeding places:
      (I). Barn, manure, or toilet............... 40
16. Mosquitoes:
   a. Present................................................................. 18
   b. Absent................................................................. 41
   c. Not classified....................................................... 26
   d. Breeding places:
      (I). Pond, swamp, or creek........................................ 10
      (II). Canal.......................................................... 3
      (III). Rain barrel.................................................. 2
      (IV). Coal pit....................................................... 1
      (V). Drain........................................................... 1
      (VI). Slop or feed barrel.......................................... 1

17. Poisonous plants:
   a. Kinds:
      (I). Poison ivy..................................................... 2
   b. Nearness to house................................................ 50 to 60 ft.

18. Miscellaneous:
   a. Riley town well water good.
   b. Old school house well in Riley - water good.
   c. Canal at Ray Park - contained organisms of fecal origin.
   d. Well at Ray Park - contained organisms of fecal origin.
   e. Well at mine north of Riley on pavement contained
      bacteria of fecal origin.
   f. Most of the farms have dairy cows in good condition.
   g. One case - pig pen fifty (50) feet from house.
   h. One case - unclean hen house one hundred (100) feet
      from house.
i. One case - unclean hen house one hundred fifty (150) feet from house.

j. One case - sewage and garbage dumped in alley.

k. One case - cess pool drains into pond fifty (50) feet from house.

l. One well supposed to be healthful mineral water - water in good condition.

m. Two well-screened outdoor toilets.

n. Practically all of the wells in the north part of Riley are dug to the same layer of rock (17 to 18 ft.) and, should typhoid fever appear under present knowledge conditions, it would be spread over the entire northern half of town.

o. The resulting facts of this survey were made possible because the people that were interviewed in Riley Township were exceptionally kind and considerate. They cooperated in every way possible and made it perfectly clear to the writer that any assistance that might be given them would be appreciated. Any community where the people are as open-minded as those in Riley Township should be given the material and knowledge necessary, by their schools, to make their home life more healthful and more enjoyable.
D. Conclusions

As was to be expected, the total number of inhabitants, two hundred ninety-seven (297), have had an average amount of contagious diseases. This was true because Riley Township is an average township as far as health matters are concerned. Certainly, it is not below average.

Tubercular conditions are good and need no further discussion.

Although there were only four (4) cases of typhoid reported, this disease needs stressing because of the abundance of flies, the lack of proper vaccination, improper sewage disposal, and the fact that practically all of the wells in the north part of the town of Riley are dug to the same stratum of rock.

The disease, malaria, should be discussed because of the frequency of the mosquito, and the fact that few people know the difference between the anophelines and culicenes. Too, the tourists from everywhere might carry the mosquito or the malarial organisms.

Although smallpox probably receives more stress than many of the contagious diseases, no discussion is complete without emphasis being placed upon this terrible disease.

Not many people are familiar with the Schick test and the prevention of diphtheria. In fact, only eleven (11) of the two hundred ninety-seven (297) individuals had been immunized for diphtheria.
The average location of the house was fair, the greater per cent being from one to two hundred feet from the barn and from fifty to one hundred feet from the toilet.

The land around forty-two (42), or practically one-half the homes, is flat and only fifteen (15) have improved drainage. Four (4) of the homes have the water and refuse running from the barns and toilets toward the house. Therefore, to facilitate the removal of sewage and to improve the general living conditions, improved drainage is necessary.

The toilets, on the average, are in a deplorable condition. Seventy-four (74) are outside; sixty-six (66) are open to flies; twenty (20) are in poor condition; and only two are well screened, thereby giving proper ventilation and also being free from flies and rodents.

Seventy-two (72) of the eighty-five (85) homes have no means of sewage and garbage disposal other than throwing it to the chickens, while twenty (20) or one-fourth of the premises are strewn with garbage and are in poor condition.

Seventy-eight (78) of the walls were dug to an average depth of twenty feet, while the covering of forty (40) was made of boards and fourteen (14) of these covering were in very bad condition. Many of the walls received drainage from the house or barn and, although the water in fifty-three (53) of them showed a negative Escherichia coli test, twenty-two (22) were questionable and ten (10) were polluted with decomposed matter. Because of decayed board coverings and
improper drainage, many more of them might easily become polluted at any time.

The barn buildings were commendable, but at least one-half of them were unclean and littered with manure, thus becoming potential breeding places for flies, the carrier of disease.

The cows were all T. B. tested and the milk generally good.

As in most rural communities, due to the unclean toilets and barns, flies were numerous. Forty (40) of the fifty-nine (59) home owners when questioned admitted the presence of flies, and it is quite likely that they were around the other homes as well. Most strenuous campaigns should be inaugurated for the elimination of this common pest.

Due to the presence of ponds, creeks, swamps, and the canal in Riley Township, mosquitoes were reported at eighteen (18) homes. One type of these insects carries malaria fever and of course they should be exterminated. Anophelens are present in this community but none were identified. Culicenes were very prevalent.

Poison ivy, poison sumac, and white snake root are three plants that are detrimental to rural land owners. Although they were not mentioned often in the survey, it is known that they grow in this section of the country and for this reason they are to be included in the discussion.
In conclusion, the fact is again stressed that practically all of the wells in the north part of the town of Riley are dug to the same stratum of rock (17 to 18 ft.) and, should typhoid germs enter one of those wells, the disease would spread over that entire part of town unless the water were properly treated.

The preceding results and conclusions, of the sanitary survey of the eighty-five (85) typical farm and town homes, prove that health education, concerning the sanitation of the rural home and its surroundings, is a failure in Riley Township.

E. A Summary of Topics That Do Not Receive Sufficient Stress in Riley Township

A summary, prepared from the results and conclusions of the sanitary survey of Riley Township, of the topics that do not receive sufficient stress follows:

1. Toilet
2. Sewage disposal
3. Wells
4. Drainage
5. Poisonous plants
6. Flies
7. Mosquitoes
8. Smallpox
9. Diphtheria
10. Typhoid
11. Malaria
12. Scarlet fever
13. Tularemia - no cases reported, but a new disease that is not discussed in present day textbooks. Several persons asked about this disease during the survey indicating the desire for some real knowledge on the subject.
III. A SUPPLEMENT TO BE USED IN RELATION TO THE EXISTING COURSE OF STUDY IN THE SEVENTH, EIGHTH, AND NINTH GRADES OF THE RILEY TOWNSHIP SCHOOLS

A. Introduction

Because health education, concerning the sanitary conditions of the rural home and its surroundings, is a failure in our country as a whole and in Riley Township in particular, this supplement has been prepared and will be presented to the Riley Township Schools.

The Public Health Association of Vigo County, the Terre Haute City Board of Health, the Terre Haute Nursing Association, and the Vigo County Child Welfare League have not remedied this situation. This is only natural because the local school organization is the only medium that can be successful in this type of campaign.

The material used has been taken from text books, government and state health bulletins, state school programs and courses of study, health books, and other sources.

Riley Township has only one school and it is organized on the six-six plan. The subject matter for the insufficiently stressed topics is worked out in discussion form and the courses (general science, biology, or civics) suggested wherein it may be used. Of course the teacher should use his own discretion as to when and how to use it.
B. Toilets and Sewerage Systems
(Suggested course - General Science)

The proper disposal of human excreta is recognized by sanitarians as the most important means needed to prevent the spread of typhoid fever, hookworm disease, dysenteries, cholera, and certain other widely prevalent diseases. Some of these are caused by pathogenic bacteria, while others are produced by animal parasites.

Every person who contracts typhoid fever does so because he has recently swallowed some typhoid bacilli that have been passed in the stools or urine of some other person who, either as a carrier, was carrying the germs without showing symptoms, or as a patient, was suffering from typhoid fever.

After being discharged in the excreta from the bodies of persons, typhoid organisms gradually die but the length of time during which they will survive in the excreta is affected by a number of conditions; in some instances they have been found to live for over a year in the contents of privies and privy vaults, and in excreta mixed with earth. Therefore, excreta which has been stored for many months in a privy vault or which has passed through a septic tank should not be regarded as free from the possibility of containing typhoid germs.

\[\text{U. S. Farmers' Bulletin No. 463, Pub. 1911.}\]
If the excreta is not properly disposed of, it is readily understood that the germs may be carried in a number of ways to the water or food supplies, and then be swallowed and cause infection in susceptible persons. They may be carried by drainage or seepage, or tracked on the feet of humans, livestock, and poultry to the well or spring. They may be carried directly by flies or rats and mice from the excreta to the foods in the kitchen or dining room. If spread about the place, they will from time to time get on the hands of persons, and into the water or be carried directly to the mouth.

The privy on the farm and in small communities possibly has not received the attention that its importance deserves. Some farms have no privy at all, and a very large percentage of those in small communities are in a deplorable condition. In the minds of most people modesty and privacy are the chief considerations which lead to the construction of a privy. Modesty and privacy are laudable objects, but all will agree that they are infinitely less important than the great object of saving human life by preventing the spread of disease.

The disposal of excreta, in the absence of conditions affecting nuisance and menace to public health, is perhaps the most serious question now occupying the attention of sanitarians. Savage tribes and nomadic races simply move away from their excreta, but civilization requires that the wastes of the human body be removed from habitations promptly and safely. The accumulation of wastes in privy vaults, cesspools, etc. represents a potential danger that is constantly being written in the
statistics of communicable diseases. Much is now being done by health authorities in educating enormous populations served only by privies, and by insisting upon standard methods of construction for these appurtenances which will prevent serious pollution of water supplies and contact infections through access to flies.

1. The Sanitary Privy. "A sanitary privy is one so constructed and maintained:

(1) that flies, insects, rats or small domestic animals cannot gain access to the waste material;
(2) that surface or ground water cannot enter the pit or vault; and
(3) so located that the waste material in the privy cannot contaminate a water supply by underground or surface drainage."

The ancient pitless surface privy, which is in common use in Indiana, fails in every respect to meet these requirements for the sanitary privy. The pitless privy, regardless of its location with respect to a water supply, is condemned because flies and other carriers have ready access to the waste, and because the exposed waste creates very disagreeable odors.

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2Indiana State Board of Health, Department of Sanitary Engineering, Construction and Maintenance of Sanitary Privies, (Indianapolis: 1931), Bulletin No. 4, p. 2.
Depending upon the conditions at the site of the privy, two types of construction are common. These are designated as the earth-pit, and the concrete-vault privy.

a. Earth-pit Privies. This type of privy, if properly constructed and maintained, is satisfactory when it is possible to locate the structure so that no water supply is endangered by underground drainage and where the soil is of such a type that moisture will leach through the walls and bottom of the pit. The unavoidable pollution of the soil surrounding a pit privy is liable to endanger any ground water supplies in the vicinity of the privy. The area in which this contamination will have a dangerous effect cannot be definitely predetermined. Distances beyond 100 feet are, as a rule, sufficient to eliminate the privy as a source of danger. However, when the ground is closely underlain with fissured stone, pollution may travel underground without purification for great distances.

Special construction of the earth-pit privy is necessary when stone, shale, coarse gravel, or ground water lies close to the ground surface. In such cases, it is suggested that the natural ground level be raised by filling with earth to such a point that a pit of sufficient depth can be dug without encountering soil formations such as are listed above.

b. Concrete-vault Privies. The vault privy need only be used when the construction of an earth-pit privy is impractical or would endanger a water supply. With concrete-vaults as earth-pits it may, at times, be necessary to raise the natural ground level to avoid excessive stone excavation.
Despite the relative water-tightness of the concrete vault, this type of privy should be located, with respect to a well or spring, with the same limitations as given for earth-pit privies. If carefully constructed, however, it affords some protection not secured from a pit privy.

c. Privy Maintenance. Maintenance of the privy is a very important item. Factors applying to the maintenance of any frame building, apply as well to the privy house. This involves periodic painting, roof repair, screen repair, soap scrubbing of floors and seats, etc.

No disinfectants, lime, deodorants, or other chemicals should be used in the pit. These will generally hinder decomposition in the pit, and are unnecessary for control of odor if the privy is properly built and maintained.

Toilet paper only should be used, inasmuch as other types of paper do not readily dissolve.

In the case of concrete vault privies, at frequent intervals, a small amount of dry earth should be sprinkled over the waste material.

It is absolutely imperative that no surface or ground water be allowed to enter the pit or vault. The cover over the clean-out opening of the vault-privy, in addition to being fly-tight and water-tight, must be so constructed as to not warp under weathering.

A concrete vault should be cleaned when the deposited material reaches a point twelve (12) inches below the ground surface. When the waste in a pit privy reaches this height, the
privy building should be placed over a new pit. The old pit should be filled with the earth which formed the mound around it.

d. Construction Details.

(I). Location. A privy may endanger a small water supply if located closer than one hundred (100) feet to the well or spring from which the water supply is drawn. This distance must be increased if the drinking water supply is for public use. It is also important that the privy be so located that surface drainage flows away from the source of water supply.

Privies should never be built over-hanging a stream or lake. In the case of lakes, the privy under no circumstances should be located closer to the bank than fifty (50) feet, while a distance of one hundred (100) feet is preferred.

(II). Exclusion of Surface Water. Either type of privy must be constructed so that no surface drainage can enter the pit. Excavated earth should be used to raise the normal ground level around the building, thus affording surface drainage away from the building and assisting in preventing surface water from entering the vault or pit. This mound should be built up in layers, each layer being thoroughly tamped before the succeeding layer is placed.

(III). Fly-tightness. The only accessible opening to the pit should be the seat hole, and in the case of the concrete-vault, the clean-out opening. The building sills should be so assembled as to preclude the entrance of rats, chickens, or other small animals. Seat lids should be hinged back of the hole and prevented, by a stop-block, from remaining in the open position when not in use. All vents should be screened.
(IV). **Light and Ventilation.** The standard privy house is built to provide ventilation by leaving a four (4) inch opening in each side of the building, and an open space, the depth of the rafters, in front and back. These should be screened. This will furnish sufficient ventilation, but will not provide light inside the building. If light is desired, windows may be used, although for proper ventilation the spaces under the roof should be left open. If desired, provision may be made for shielding these vent spaces during the winter season.

(V). **Ventilation of Pit or Vault.** The pit or vault should be vented to allow for the escape of vapor caused by evaporation of the liquids. Care must be taken to construct this vent so that flies cannot enter at the opening above the roof or at the point where the vent taps the seat box.

(VI). **Earth-pit Details.** The construction of earth-pit privies can easily be subdivided into three operations. The first is the preparation of the pit and includes digging the pit, mounding and tamping the excavated earth around the pit, and building the curb. The pit should be five (5) feet deep, three (3) feet wide at the top, and two (2) feet eight (8) inches wide at the bottom. The curb should extend to the bottom of the pit in loose soil. In soils not subject to caving, it need only extend about two (2) feet below the top of the mounds.

The second step is the complete construction of the privy-house near the pit.

The third step consists of placing the completed privy-house over the pit, and shoving the building forward until the back sill just clears the curb. It is not necessary or desirable
to bank earth against the sides of the building.

(VII). Concrete-vault Details. The walls of the vault should be carried well above the ground level to form a curb against the entrance of surface water. The clean-out opening itself must be covered so that water will not find entrance to the pit. The cover for this opening should be constructed of tongue and groove lumber, securely braced to prevent warping.

If the location of the privy makes advisable the use of the concrete vault, it follows naturally, that the vault must be watertight. Concrete is the only practical material and, if enough water has been used in the mixture as to allow separation of the gravel, the vault will not be watertight.

(VIII). Reconstruction of Old Privies. Ordinarily, an existing privy may be most economically utilized by tearing it down and salvaging and using the lumber in building a new privy. There are exceptional cases when existing privies are substantial and can be readily rebuilt. Such a privy can be made fly and animal tight and the vault or pit protected against surface water by rebuilding the seat-box and floor, replacing the sills, and filling around and curbing the pit.

(IX). Estimated Cost. In general, the material required to erect a privy will range in cost between twelve ($12.00) and eighteen ($18.00) dollars. Material for concrete-vault privies probably will not cost over five ($5.00) dollars more than for earth-pit privies. Labor costs are not included in these estimates.  

3Indiana State Board of Health, Department of Sanitary Engineering, Construction and Maintenance of Sanitary Privies, (Indianapolis: 1931), Bulletin No. 4.
e. Disposition of Abandoned Privies. Obviously all the care and expense involved in building a new sanitary privy will become a total loss if the old privy is allowed to remain on the property. After the new privy is constructed, the old building should be dismantled and the pit filled with earth. In the case of a surface privy, the waste material must be buried.

2. Chemical Toilets. Quite a number of chemical toilets have been patented and are on the market, some of which are efficient. The results from these installations depend largely upon the arrangement and operation attention given. The chemical toilet has the advantage of destroying, through the chemicals employed, all or nearly all of the pathogenic organisms present in the excreta.

Chemicals usually employed in the operation of these toilets are of two general types, namely, those that have a dissolving effect upon the solid deposits in the tank, the solution being strong enough to kill all bacterial life, and those that sterilize by killing all bacteria with which they come in contact but do not liquefy the solids. The first type usually goes under the name of "caustics" and is perhaps the more satisfactory and effective.

Chemical toilets must be emptied periodically and refilled with fresh chemicals and water. Waste from the tank should be buried in a shallow trench at a safe distance from any water supply.

3. The Dry-earth System. In this method of sewage disposal dry earth is used to cover the contents. This may be done by a
mechanically adjusted hopper, which automatically showers earth into the vault below, or, more simply, by adding shovelfuls of earth from a bucket or box kept in the closet. The disadvantages of this method are that it necessitates keeping on hand, protected from rain and freezing, a large amount of earth, ashes, etc. suitable for this purpose; filling the hopper or bucket with fresh earth or ashes is a daily chore at least, and must be attended to in all kinds of weather; because of these earth additions the bulk in the receiving vault increases rapidly, necessitating frequent emptying of the accumulations.

4. The Pail System. The pail closet has little to recommend it if other methods are possible. The pail should be removed at least daily and the contents buried. This makes it really a dry-earth method. The pail closet has all the disadvantages of the dry-earth privy plus the disadvantage of splashing and the more unpleasant task of emptying and properly cleaning the pail. Splashers in the containers are impossible to keep clean, though the slight fall in such closets makes such a device desirable. The person upon whom the task of emptying and cleaning the containers is forced is usually more concerned in doing it the quickest way than in doing it the right way. Pail-closets should not be constructed unless care can be assured.

5. The Cesspool. Heretofore, the discussion has concerned the disposal of excreta by means of the privy, but it is no longer adequate when running water has been installed in the
house, and bath, toilet, kitchen sink, and other connections are contributing to the wastes from the household. These wastes now consist of a mixture of a large amount of water and a small amount of fecal and other organic matter. This relatively small amount of organic and fecal matter is sufficient, however, to render the entire mixture objectionable and subject to putrefaction. The sewage is also likely to contain disease germs. Some treatment must be given to prevent nuisance and the spread of disease.

One of these is the cesspool. It is a basin or pit in the earth that is from seven (7) to ten (10) feet deep and approximately the same in diameter, and is built of brick or stone laid without mortar. No bottom is laid in it and perforations are sometimes left in the sides to allow the liquid to soak away readily. It is necessary to provide a cesspool with a cover which fits tightly enough to exclude flies and mosquitoes, but it is not necessary that this cover be perforated for the escape of gas.

The subsoil in the vicinity of such a cesspool becomes heavily polluted, the distance of travel of such pollution depending upon the type of soil and the depth of ground water. The depth is usually great enough to place dangerous contamination within reach of the ground water, thus increasing the danger. The better the cesspool works as a distributor of sewage, the more dangerous it becomes as a possible source of pollution to water supplies. The fact, that sewage can be discharged to a deep cesspool where it will easily seep into the
surrounding soil, appeals to many as a satisfactory method of sewage disposal. However, this method furnishes little or no treatment to the sewage thus disposed of and is undesirable.

6. The Septic Tank. The plain sedimentation, or septic tank, as it is commonly called, discharging to a shallow leaching bed or subsurface irrigation system, is the most inexpensive and satisfactory method of disposing of small flows of sewage.

The action which takes place within a septic tank is both mechanical and biological. As the sewage enters the tank, its velocity is considerably reduced and its flow is distributed throughout the width of the tank. With this sudden reduction in velocity, the transporting power of the liquid is lost and the heavier solids settle to the bottom while the lighter solids rise to the surface. This material which settles on the bottom is acted upon by anaerobic bacteria, (which can not grow if free oxygen is present). These bacteria break down the sewage solids into more stable compounds, part of which are liquid and part of which are gaseous. Gas, entrapped in this solid matter, lightens it considerably, with the result that small pieces break away from the bottom and float to the surface. At the surface, the gas escapes, part of the solid material remains to form a scum and part returns to the bottom for further digestion. This material which settles on the bottom is spoken of as sludge.

The pathogenic (disease producing) bacteria present in the incoming sewage are not destroyed while in the septic tank, nor is their number reduced by this treatment. The effluent (dis-
charge) from the tank is as highly dangerous as the raw sewage. The only important change in the sewage has been the reduction in the amount of solids.

The septic tank and the sewers leading to and from it should be located at least fifty (50) feet from the drinking water supply, and a distance of one hundred (100) feet is to be desired. It is desirable to keep the sewer lines and tank close to the ground surface, both in order to reduce construction costs and to facilitate the final disposition of the sewage.

The tank walls, bottom, and cover should be made of concrete reinforced with steel. The tank should be approximately forty-two (42) inches deep, thirty-six (36) inches wide, and four and five-tenths (4.5) feet long. The volume of such a tank would be about three hundred (300) gallons and would serve a family of six (6).  

But a septic tank can be considered only as one step in the treatment of sewage. The material discharged will be practically free from visible solids and relatively clear if the tank has been properly constructed and operated. This sewage, however, contains countless bacteria, many of which may be quite harmful. Moreover, the sewage is completely devoid of all oxygen, and if allowed to discharge into a dry run or a stream furnishing little dilution, will decompose and produce an unsightly and very odorous nuisance.  

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4Indiana State Board of Health, Department of Sanitary Engineering, Sewage Treatment for the Rural Residence, (Indianapolis: 1930), Bulletin No. 8.
The upper layers of the soil contain innumerable bacteria which, if brought into contact with the discharge from the septic tank, will tend to purify it. These bacteria are found in great numbers at the surface of the ground and in decreasing numbers at greater depths. It follows that, if these purifying bacteria are to be utilized for further treatment of the discharge from the septic tank, this treatment must take place in the upper layer of soil.

Because the final treatment of the septic tank discharge should take place in the upper layer of soil, the leaching cesspool is not very successful. A better method is that of absorption or leaching beds (trenches filled with gravel through which the drain tile run and distribute the septic tank sewage to the soil). Underground sand-filters or artificial absorption beds are also good.

Roof drainage must not pass through the tank. The great amount of water running off the roof surface after a rain would scour the interior of the tank and ruin the absorption bed or filter.

Chemicals of any kind must not be introduced into the septic tank. This act would, in all probability, destroy the bacterial action in the tank and greatly reduce the efficiency. A careful use of cleaning compounds used in cleaning the house fixtures will have no harmful effect on the action of a septic tank.
If the septic tank and treatment leaching bed or underground filter have been properly constructed, operation should be able to confine itself to the annual removal of sludge and scum, and the immediate repair of any accidentally broken tile joints.\(^5\)

7. **Final Disposal.** The method of the final disposal of any privy contents and of cesspool and septic tank cleanings is of great importance. One method is to use them as fertilizers. This may be dangerous if they are used for growing vegetables, which are to be eaten raw, or crops such as potatoes, which require workmen to handle the soil with their bare hands. It may be *safe* when they are used on such crops as wheat and hay, in which the part that is harvested does not come in contact with the soil. If the privy contents are used as fertilizer, they must be plowed under promptly in order to remove the danger of disease germs as soon as possible.

The treatment of privy contents with chemicals, such as chlorid of lime, in order to kill the disease germs, is too costly and uncertain for practical use.

Another method is to bury the privy contents, cesspool scrapings, or septic tank sludge. Disease germs usually die soon, when they are buried, for the conditions under the soil are unfavorable for their survival. House-flies that were breeding in the buried matter, when it was buried, may burrow

\(^5\)If a septic tank is to be installed, the Indiana State Board of Health, Department of Sanitary Engineering, should be written asking for Bulletin, No. 8, *Sewage Treatment for the Rural Residence.*
to the surface through a foot of soil. The eggs of hookworms and tapeworms may survive for months in the soil. Still, the burial of the contents is a reasonably safe method if they are covered out of reach of chickens and dogs. This is the most practical method of final disposal.

C. Water and Wells
(Suggested courses-- general science and civics)

1. Water. Next to air, water is generally conceded to be the most important factor in sustaining life. The physical comfort and health of every individual depends, to a very great extent, upon having an adequate, suitable, and safe supply of water. To be satisfactory for drinking purposes, water should be pleasant to the sight and taste, free from disagreeable odor, and incapable of causing discomfort and disease.

Because water is discussed rather thoroughly in general science and civics, this discussion is limited to types and care of wells, bacterial entrance and diseases they cause.

2. Wells.
   a. Dug Wells. The dug well is probably the oldest type of underground water supply. It consists of a round or square excavation several feet in area, the depth usually depending upon the distance to the water-bearing formations. They should be so constructed as to insure that water can enter the well only from the water-bearing stratum selected as a source of water, and not from the surface or from contaminated shallow ground water sources.
A water-tight wall should extend from a point a foot above the surrounding ground level to a depth of at least ten (10) feet below the ground level. The walls should be of, either double brick laid up with all joints filled with cement mortar, or reinforced cement from six (6) to nine (9) inches thick. The space between the excavation line and the outside of the curbing should be filled in such a manner as to prevent surface or shallow ground water from running down the outside of the curbing and thence into the well or into the water-bearing stratum. The well top should be a water-tight, reinforced cement concrete slab at least six (6) inches thick, with all openings constructed with raised shoulders to exclude all waste water or other pollution.

b. Cisterns. The walls, bottom, and cover of a cistern must be water-tight. Surface and ground water must be kept out in the same manner as prescribed for dug wells. Downspout lines should be laid of cast-iron soil pipe with leaded joints when laid underground. Care must be taken where this line enters the cistern, and where the pump suction line passes through the wall. A wall-sleeve, with the necessary seal fitting, is the most satisfactory solution to the problem.

The first run-off from each rain should be wasted, allowing the dust and filth accumulated on the roof and in the gutters to be washed away. A sand filter, which accomplishes no bacterial removal, is sometimes used for clarifying the water and improving its physical appearance. Such a filter can be built in a box with a grill bottom, filled with graded gravel and sand.
q. Drilled Wells. A drilled well is preferable to any other type of well except where the ground water is found in such small amounts as to make necessary the use of dug wells. The casing is invariably of wrought iron or steel pipe which in some wells extends throughout the entire depth and in others only to the water-bearing rock formation. Sometimes the casing is brought to the surface of the ground and is attached to the base of the pump, but often only to the bottom of a well pit. Frequently, these pits are factors in the pollution of the well, since they act as catch basins for surface or ground water. These well pits are of no use after the drilling of the well has been completed and should be filled with compact earth as soon as the drilling is finished. The well casing should be brought up to a point slightly above the surface of the ground and a water-tight screw or flanged connection made with the base of the pump.

Another way in which surface water may get into this type of well is that of following down the outside of the casing. This is made possible by the fact that the process of drilling in certain formations has a tendency to loosen the material immediately around the casing. This can be remedied by pouring sand around the casing at the surface.

d. Driven Wells. The driven well is installed by driving directly into the earth successive lengths of iron pipe, the first of which is armed with a sharp perforated metallic well point. This type of well is used where water is reached
relatively near the surface and the earth formations are comparatively soft. They are frequently constructed with a single pipe, for drawing the water to the surface, without a separate outside casing. This arrangement is dangerous because there is a possibility of leaks occurring in the piping near the surface and waste water or surface water getting into the well. The piping in driven wells should be provided with an outside casing large enough to receive the pump cylinder, and the well constructed at the surface in a manner that will exclude surface water.

3. Location. A well should be located as far as possible from sources of gross pollution such as privies, cesspools, sewers, septic tanks, etc. Between fifty (50) and one hundred (100) feet is considered a safe distance under most conditions. Surface slopes should be such that natural or artificial drainage is established away from the well in all directions. The earth should be protected, where necessary, against erosion. The convenience of the location should also be carefully considered so as to lessen the labor of distributing the water and to promote its more general use.

4. Care. Careless management is the cause of many a good water supply becoming contaminated. The casing of the well may become leaky or the pumping apparatus may get out of repair. A very common fault is "priming" which is dangerous from a sanitary point of view as the priming water may be polluted and thus contaminate the whole supply. The pump cylinder should be placed near or below the level of the water in the well so that
priming will not be required. Waste materials should never be thrown on the surface of the ground near the supply. Waste water should not be allowed to stand around the well. For that reason, a trough or pipe should be provided for carrying waste water to a point at least ten (10) feet from the well. No connection, however, should be made to a sewer or sink drain, because of the possibility that contaminated water might back up in this drain and leak out into the ground in the vicinity of the well.

5. Disease Bacteria Conveyed by Water. The diseases which are most likely to be conveyed by water are typhoid fever, cholera, hookworm, and dysentery. In most of these diseases, the disease bacteria leave the body in the discharges from the bowel and bladder. If the safety of water supplies used for drinking purposes is to be preserved, it is necessary to prevent such discharges from getting into the water. It is known that under ordinary circumstances these disease-producing bacteria do not live for any great length of time outside of the body. Therefore, if a person gets typhoid fever, it means that bacteria from discharges comparatively fresh have gained access to his body from that of a person who harbors the bacteria causing the disease. These discharges contain such enormous numbers of bacteria that only a very small amount of it, so small as to escape ordinary notice, may be sufficient to cause a very serious pollution in water.
6. Means of Bacterial Entrance Into Water. Water supplies may be polluted by these discharges being dumped directly into the water or by being placed in or on the ground and subsequently washed or carried into the supply. Sometimes water from a safe source is polluted after it is drawn by coming in contact with hands or fingers which have been contaminated with disease-producing bacteria, or by no other means. The preceding topics, "location" and "care", discuss many possible ways of water pollution and thus, bacteria entrance. 6

D. Poisonous Plants
(Suggested course - biology)

The subject of poisonous plants is, at all times, naturally one of very great importance in every agricultural country. Particularly, where there is farming and stock-raising in Indiana, there is the danger of pasturage being restricted and overstocked and animals forced to eat plants they would otherwise avoid. A knowledge of a few of the most harmful species and the ability to distinguish them is highly essential to every rural individual and every owner of live stock. A few suggestions of remedies are given in the following discussion, but in every case of severe poisoning, whether of human beings or animals, professional advice should be promptly summoned.

6 If a well is to be dug, drilled, or driven, the Indiana State Board of Health, Department of Sanitary Engineering, should be written asking for Bulletin No. 7, Proper Construction and Protection of the Small Water Supply.
1. Poison Ivy. Poison ivy (Rhus Radicans) is also known by the common names poison oak, poison vine, or three-leaved ivy. It is a perennial, native plant with a woody stem and the leaves are three-parted. The leaflets are ovate, pointed, entire or toothed. The flowers are green in loose axillary panicles and the fruit is grayish-white, smooth, globular and about one-sixth of an inch in diameter. This plant is common along fence-rows and along borders of fields and thickets.

Two well known varieties occur in Indiana. One is a bushy shrub two (2) to six (6) feet high; the other is a vine thirty (30) to one hundred fifty (150) feet in length that climbs by means of aerial rootlets to some height up fence posts and the trunks of trees. The foliage of both plants is poisonous to most persons, though some can handle it with impunity.

Cattle can eat poison ivy, but dogs are poisoned by it.

The poison oil is found in all parts of the plant; is insoluble in water and cannot be washed from the skin with it alone. A good remedy is an alcoholic solution of sugar of lead. This is made by taking a small bottle of alcohol and putting in it as much of the powdered sugar of lead as it will dissolve. The milky fluid should then be rubbed into the affected skin three or four times daily.

Cases of poisoning are often reported where the individual has passed the plant without coming in contact with it. This is due to the fact that pollen grains, minute hairs, and even exhalations are sufficient to cause eruptions on the skin of a susceptible person. These eruptions are characterized by
intense irritation and burning, swelling and redness, followed by blisters and pain. Symptoms of internal poisoning are burning thirst, nausea, faintness, delirium, and convulsions.

To properly eradicate this pest the underground root stocks must be destroyed as well as the flowering tops. Grubbing out and burning it, handling the parts only with hoe or fork, or employing men who are immune to the poison is the surest means. Spraying with hot brine or caustic soda will also kill it.

Because the poison ivy is a vine of handsome foliage, it is sometimes allowed to grow or is even transplanted about dwellings or parks. From the woodbine or virginia creeper, also an ornamental vine with five (5) leaflets, it can be at once told by having only three (3) leaflets. Any woody vine or low climbing shrub with three (3) leaflets should be immediately destroyed.
Illustration 1. The poison ivy plant, showing natural habitat and climbing tendencies.

It is poisonous to most people who touch it, and the best known remedy is extract of Grindelia robusta administered both as an internal remedy (one drop every two hours) and as a topical applicant.
2. **Poison sumac.** The poison sumac (Rhus Vernix) is also well known as the swamp-sumac. It is a native of Indiana and grows in swamps and along the low miry banks of streams. Occasionally it is found skirting the banks of ponds.

This poison plant sometimes attains a height of from twenty (20) to thirty (30) feet, but is much more common as a large shrub. It forks near the ground and sends up a few large branches which form a wide, open top. The wood is light in weight, tough, and of a golden yellow color streaked with tints of brown and green.

The leaves are from seven (7) to fourteen (14) inches long and are made up of from seven (7) to thirteen (13) short petiolate, ovate-oblong or obovate entire leaflets. The leaflets are obtuse or acute, unequal at the base, mostly acuminate at the apex, dark green above, and more pale and prominently veined beneath.

The flowers appear in June and are small, green, in long, loose, open, slender panicles.

The fruit ripens in September and often hangs from leafless branches, in long, loose panicles, in winter. It is shining white or grayish-green and stone striated.

The shrub is very attractive in autumn, when the leaves change to very brilliant shades of scarlet and orange.

It is poisonous to most people who touch it, and the best known remedy is extract of Grindelia robusta administered both as an internal remedy (one drop every two hours) and as a topical applicant.
Poison sumac can be eradicated in the same manner as poison ivy.

The harmless sumacs may be readily distinguished by their red fruits.

Illustration 2. A close-up view of poison sumac, showing leaflets and fruit.
Illustration 3. The poison sumac shrub, showing natural habitat and growth.
3. **White Snakeroot.** The white snakeroot (*Eupatorium ageratoides*) is a native, perennial weed that is sometimes called white sanicle or squaw-weed. This attractive plant, common in dense woods and thickets and along roadsides in shaded, rich, moist soil, grows from one (1) to four (4) feet high and affords a supply of rich green herbage in the late summer and autumn. The leaves are placed opposite one another on slender stalks. They are from three (3) to six (6) inches long and from one (1) to three (3) inches wide, ovate, thin, sharply pointed at the apex; rounded, straight, or sometimes heart-shaped at the base. Their margins are coarsely and usually sharply toothed, sometimes varying to round-toothed. The inflorescence is rather loose and open. Each flowering head consists of from ten (10) to thirty (30) bright white flowers which are about a quarter of an inch wide and slightly longer, somewhat bell-shaped.

This weed is supposed to be the cause of the "trembles" in sheep, cattle, and horses and of milk sickness in humans. Cattle and sheep will not touch the weed when other forage is plentiful, but when turned into a closely cropped pasture or one covered with snow, they will eat it. The disease is frequently fatal in domestic animals while the sequel of milk sickness in man, in case of recovery, is lasting feebleness. Furthermore, animals having access to white snakeroot may be apparently normal yet are capable of transmitting milk sickness through their milk.
The following is taken from the Terre Haute Star for May 28, 1930.

"WHITE SNAKE ROOT BLAMED FOR DEATH IN PRINCETON FAMILY"

By United Press

Princeton, Ind., May 28.- A poison weed -- white snake root -- was held responsible by Pike County health authorities today for the mysterious malady that has hit the family of Mr. and Mrs. Calvin Selby, east of Oakland City.

An investigation was started after one of the family, Leroy, 15, died Sunday from an unknown cause, and Mr. and Mrs. Selby and a younger son, Lloyd, were taken ill.

Authorities reported finding the weed in a pasture and explained that, although the cattle were not seriously affected, the milk they gave was of a poisonous nature, which resulted in a lingering illness and finally death.

A representative of the State Health Board at Indianapolis will visit the farm tomorrow, Pike County officials said."

Do not take chances. Get rid of the white snake root if it is in your pastures or on your farm. As the plant produces an enormous quantity of small seeds, it should not be allowed to reach maturity. Drainage, grubbing out or repeated cutting is the only effectual means of getting rid of this weed.
Illustration 4. White snakeroot, showing root system, leaves, and flowers.
E. Vaccination and Prevention Of:

1. **Smallpox.** (Suggested course -- General science).

Smallpox is an eruptive disease occurring in epidemics which are subject to great variation in severity. At times, the disease may be most severe causing many deaths, while in other epidemics hundreds of cases may occur without a single death.

The disease is transmitted by droplet infection or by contact with the scabs of a patient. The incubation period is almost invariably limited to between ten (10) and twelve (12) days. The preliminary illness is abrupt, very severe, and lasts usually for two (2) or three (3) days; usually the eruption does not appear until this first illness has subsided. Many of the following symptoms may be found to occur, a chill, feeling of sudden illness, high fever, nausea, vomiting, prostration, sore throat, aches and pains in bones and joints, severe backache, and severe headache. The patient and the people with whom he is in contact should be quarantined until all scabs have disappeared.

a. **Vaccination.** Probably the best known method of vaccination for smallpox is the "multiple pressure method."

This method consists essentially of a shallow pricking of the cleansed skin with a sterile needle through a drop of vaccine covering an area not greater than one-eighth of an inch in diameter. The needle is not thrust into the skin but is held parallel to the arm, or crosswise of the arm, and the side of the needle point is pressed firmly and rapidly into the drop
of vaccine about thirty (30) times without the needle being lifted clear of the skin each time. By this method the vaccine is carried into the deeper layers of the skin without injury or bleeding and all evidence of the vaccination will fade away within a few hours. When the pressures have been made, the remaining vaccine is wiped off the skin with sterile gauze and the vaccination is complete.

It is best to apply no dressing but to keep the site clear and dry. Vaccination shields are dangerous. If the vaccination takes, great care should be used to keep it from coming in contact with water.

The best age for vaccination is as soon after birth as practicable. Vaccination of infants is attended with less general reaction than vaccination of older children. Infantile vaccination usually gives rise to no inconvenience whatever and the scar fades more completely than scars of primary vaccination performed later. After the first vaccination one should be revaccinated once in every five (5) to ten (10) years in order to maintain a maximum protection without any greater inconvenience than an immunity reaction. If a person is vaccinated within a day or so after exposure, he will become immune in time either to prevent the disease or make it much less severe.

b. Prevention. Nearly every person is vaccinated against smallpox or else contracts the disease. This disease may be so mild that many people state they would rather have smallpox than be vaccinated. Vaccination properly done rarely
causes more than a slightly sore arm and sometimes a little fever, while smallpox is a necrotic contagious disease causing sores on the skin which discharge pus with a bad odor. It not only makes the patient sick and may cause his death, but makes him repulsive to everyone with whom he is in contact. He not only suffers with it himself but spreads it to others about him. We all know people who show by their personal appearance that they would rather be dirty than use soap and water to keep clean. We know of people who would rather have bed bugs and body lice than keep clean and get rid of the vermin. In this country an individual may be dirty about his person if he chooses and no one can say him nay until his stench is so bad that he becomes an offense to his neighbors. We tolerate dirty people, but we do not respect them. A person may choose to have a "dirty" disease like smallpox, which can easily be prevented by vaccination, but the average individual has no respect for his choice.

Quarantine alone does not and cannot protect either a community or an individual. Vaccination is the only sure reliance. An infant can be vaccinated as safely as an adult. Protection should start early and be continued throughout life. Modern vaccination gives a minimum of discomfort but, if properly administered, assures safety. There is no excuse for a single case of smallpox. It is not a misfortune to have the disease; it is a disgrace.

2. Diphtheria. (Suggested course -- biology). Diphtheria is a severe, communicable disease to which children are pe-
culliarly susceptible. It attacks the mucous membranes of the
nose, the throat, and the windpipe. The symptoms are sore
throat, chilliness, fever, lassitude, and "spots" on the throat
and tonsils. Sometimes it occurs in a mild form and is mistaken
for croup or even for sore throat.

The period of incubation is generally from two (2) to five
(5) days.

The germs of diphtheria are carried in the secretions of
the nose and throat of persons having the disease and are
usually transmitted by the use of a common drinking cup, by the
trading of bites of fruits, candies, or other foods, and by
putting into the mouth pencils which may have been touched by
a person having the germs on his hand. Diphtheria does not,
generally, cause coughing or sneezing, so it is not frequently
transmitted from a patient to a well person in this manner.

However, many people have the germs in their nose and
throat although they may be well themselves. Such people are
called "carriers", and they can give diphtheria to others.
They are particularly dangerous, because people do not take
precautions against them. Such people may spread the germs by
coughing or sneezing. Therefore, everyone should obey the
health rule which says that you should cover your "cough or
sneeze" with a handkerchief or when coughing or sneezing you
should bend your head toward the ground.

Quarantine is necessary to protect others. Anyone having
had the disease should not mingle with other people until the
physician is satisfied that there is no longer any diphtheria
germs in the throat or nose of the patient, and under no con-
dition within fourteen (14) days after recovery.

After the patient has recovered, the room should be thoroughly cleaned and disinfected.

If a child is so unfortunate as to get diphtheria, there is an agent that will always cure if given soon enough. It is known as diphtherial antitoxin. The toxins resulting from the poison of the disease, unless counteracted, may cause death.

a. Immunization and Prevention. Some people seem to be protected by nature from attacks of diphtheria. Children are particularly susceptible, and most deaths from this disease occur in early childhood. But we have a means of preventing diphtheria entirely and it is available to everyone that wants it. A simple method has been developed to tell whether an individual will take the disease if exposed to the germs. This is known as the Schicktest.

It consists in injecting one drop of a special solution, toxin-antitoxin, of known strength, into the arm of the person to be tested. If the person is liable to have diphtheria, a red spot will appear at the point of injection; if he is already immune, no spot appears. In either case no sickness follows and the test does not hurt as much as a mosquito bite.

If the person is susceptible to the disease, the doctor can inject a specially prepared solution of diphtheria toxin and antitoxin, called toxin-antitoxin, which will cause the individual to build up an antitoxin in his own body that will absolutely protect him from taking diphtheria. This method is
simple and effectual, consists of three injections, and the
immunity so acquired is believed to last for life. This
immunity is not acquired immediately, but requires from about
dfour (4) to six (6) months to develop. After this period has
elapsed, the Schick test should be given again and those who
have not developed antitoxin should repeat the treatment.
Only a very few will need a third set of toxin-antitoxin
injections. Thus, by careful and thorough treatment every child
can be made immune to diphtheria. At the commencement of this
immunization, if the child is susceptible, a quantity of
diphtherial antitoxin is effective.

Because diphtheria is most prevalent in the fall, while
children are mingling at school, parents should see their
doctor during the summer vacation and have all their children
tested for susceptibility to diphtheria. All that are not
immune should be immunized at once, and then from four (4) to
six (6) months later they should be tested again to make sure
they are safe from the disease. Babies up to six (6) months
of age are naturally immune but after this period they lose
their immunity and become very susceptible. To make all
children safe from this death-dealing disease, diphtheria,
they should be Schick tested and the susceptible ones immunized
as soon as possible after six (6) months of age.

fever, one of the common communicable diseases, is regarded
as one of the most terrible diseases of childhood, not only
because an attack may be so malignant as to cause death in a short time, but also because of the many and grave complications with which it may be attended. Even when the disease is mild, it frequently leaves the patient with some severe after-effect, such as, running ears and deafness, weakened eyes and impaired sight, and badly injured and weakened kidneys.

Scarlet fever is especially a disease of temperate climates. The symptoms are sore throat, fever, rapid pulse, the breaking out of a bright-red rash over the body, and usually swelling and tenderness of the glands of the neck. The rash generally appears on the second day, breaking out first on the neck and chest in fine, scattered, bright points implanted on a scarlet flush. It spreads rapidly, so that by the evening of the second day the entire body may be covered. A cough and a discharging nose are usual. These symptoms are followed by a stage known as the period of desquamation, or peeling, during which the outer layers of the skin are shed in scales, flakes, or patches.

The period of incubation is usually from three (3) days to one (1) week.

Many cases of this disease are extremely mild and show only a faint redness. Some doctors are unwilling to consider these cases to be true scarlet fever, and so they call them scarlatina, scarlet rash, rose fever, or rose rash. Scarlatina is the scientific name for scarlet fever, and means any case of scarlet fever, whether it is mild or severe. The other names are used only to deceive the public.
a. Immunization and Prevention. Within recent years the Doctors Dick of Chicago, husband and wife, have convincingly demonstrated that scarlet fever is due to hemolytic streptococci, and have developed a test to determine susceptibility to the disease. It is called the Dick test and is similar to the Schick test for determining susceptibility to diphtheria. It consists of injecting a minute amount of the scarlet fever toxin into the skin of the forearm. If the child is susceptible, a red area about the size of a dime will appear at the site of injection in about twenty-four (24) hours.

In addition to using this toxin to test susceptibility to scarlet fever, larger amounts of the same toxin, with the proper antitoxin, may be given to susceptible individuals to render them non-susceptible. Five injections are given at weekly intervals, and immunization is developed within a few weeks. The immunizing fluid has been used too short a time to warrant a statement as to the permanence of the immunity so produced, but it seems there is no doubt as to its permanent protecting power.

Scarlet fever is caused by a haemolytic streptococci contained in the secretions from the nose, throat, and respiratory passages, and possibly in the discharges from the body. The disease may be communicated by personal contact, by infected clothing, toys, cups, spoons, dishes or any object contaminated by the discharges from the sick person. The organism is probably not contained in the scales or flakes from the body. Persons
recovering from the disease may be a source of danger to others after scaling has ceased, because of throat trouble, discharge from the nose, throat or ears, or discharging abscesses. Such cases should receive special care to prevent the disease being communicated to others.

Many cases of scarlet fever are very mild and present little evidence of the disease aside from a slight sore throat. Such cases are as much to be feared as severe attacks, so far as communication to others is concerned. Third persons may carry scarlet fever on their clothing after direct contact with the infectious discharges. The disease, except by droplet infection, is not carried by the air.

Persons sick with scarlet fever should be isolated in a large, light, airy room.

A rigid quarantine of all who have been exposed should be maintained. Those who have the disease should be quarantined for at least twenty-one days or even longer. This would be maintained at the discretion of the physician and the legal limit of quarantine for this disease.

After the patient is well, the room in which he had been isolated, should be thoroughly aired, all the sunlight possible admitted, and the walls, floors, and everything with which he came in contact thoroughly disinfected.

4. Typhoid Fever. (Suggested courses - General science and civics). Typhoid fever is an acute infection caused by a specific germ, typhoid bacillus. It is not caused by any other thing. The germ enters the body along with the food or drink,
is carried through the stomach into the intestines where it enters the tissues of the intestinal wall, and, if the person is susceptible to the disease, he develops typhoid fever. The period of incubation is usually from ten (10) days to three (3) weeks. The disease starts with a headache, which increases in degree, accompanied usually with fever becoming gradually worse and reaching its height about the second or third week of illness. Then the fever falls until the recovery or death of the patient. If the disease proves fatal, the person may die of poisoning from the bacteria present in his system, if the intestinal wall becomes ulcerated, a blood vessel may be opened and he may die of hemorrhage, or, if the ulcer perforates the wall of the intestine, he may die of peritonitis.

The period of infectivity includes the whole period of the disease, from the development of the first symptoms until the time when all the discharges are free from the typhoid bacillus. This period may continue long after the disappearance of all clinical evidence of the disease.

a. Vaccination and Prevention. Typhoid fever is preventable. A person may be rendered comparatively safe from this disease by inoculation. The duration of this immunity is not exactly known, but it is certainly safest to be inoculated at least once in three (3) years. The slight inconvenience attending the inoculation is a small price to pay for protection against so prolonged and so dangerous an illness as typhoid fever.
The injections of typhoid vaccine are usually given in the arm, under the skin, at intervals of a week for three (3) doses. After receiving the vaccine following a lapse of several hours, a local and general reaction of varying intensity may develop. This reaction consists of a red and tender area several inches in diameter, though in some instances it may be more extensive and marked. The general reaction consists of discomfort, headache, and a rise in temperature. There is no cause for alarm in regard to the reactions, either local or general, as they cause the patient no other distress than the discomfort. Severe reactions are very rare. An advantageous time for the injection is about four P. M., so that, if a reaction occurs, it will be while the patient is in bed. For those employed in business, successive Saturdays are convenient.

The organisms causing this disease are chiefly contained in intestinal discharges and these must always be introduced through the mouth into the intestinal tract in order to cause infection of other persons. It is evident that actual contact is not as important a factor in the transmission of the disease as is indirect contact.

The greatest sources of typhoid fever in Indiana are wells in the country and smaller towns and the home privy. These two are usually built too close to each other and the privy contents leak into the well. If the privy contents contain typhoid fever germs, the water will be contaminated and persons using the water for drinking or household purposes are apt to contract the disease. If such contaminated water is used to wash milk utensils, the milk will be contaminated.
Flies are always a menace to health, but they are particularly dangerous where there are typhoid germs. Toilets that are accessible to flies, as well as improperly screened openings to a typhoid patient's room, lets this insect become a very dangerous carrier of the germs.

During the illness the germs of typhoid fever infect the gall bladder. When the patient recovers, these germs usually disappear but a chronic gall bladder infection may persist for an indefinite period, perhaps for the rest of the person's life. During this period, germs will escape from the gall bladder, enter the intestine and be discharged with the intestinal contents. The person may remain apparently well and be unaware of his condition, yet these germs escaping from his intestines are apt and often do get into food, milk, or water that the person may be handling. In that way they are carried to other people and they may become infected with typhoid fever. Such a person is called a "typhoid carrier."

Although typhoid cases are not quarantined, the patient should be isolated in a flyproof room and all persons, except the necessary attendants, should be excluded. To be sure that a recovered patient is not carrying typhoid germs, he should have his discharges examined every two (2) weeks until two (2) successive examinations show that no bacilli are present.

All linen, clothing, glasses, cups, plates, and everything with which the patient comes in contact, as well as the body discharges, should be thoroughly sterilized or disinfected. Thus, we may prevent this preventable disease.
F. Malaria and Mosquito Control

(Suggested courses - General science and biology)

Although mosquitoes and malaria fever are discussed rather thoroughly in general science and biology, a re-discussion is warranted because of the importance of these topics.

1. Malaria. Malaria is a communicable disease whose control and prevention is a public health problem. It is caused by a protozoan called Plasmodium of which there are three species. This is a microscopic parasite which attacks and lives in the red corpuscles in the blood of human beings. Its beginning in all cases dates from the bite of an infected mosquito. In biting, the mosquito injects a small amount of saliva into the victim before sucking up its blood meal. With the saliva one or more of the malaria parasites are injected into the blood stream, where they immediately attack and enter the red corpuscles. The further development is then by division, each parasite growing and dividing into eight (8) to thirty-two (32) new parasites at intervals of 24, 48, or 72 hours, depending upon the organism causing the malaria. As each division takes place, rupturing and destroying the original red corpuscles, a quantity of toxin or poison is also released in the blood stream. After a period of from twelve (12) to fourteen (14) days, the symptoms of malaria usually appear.

These symptoms are intermittent attacks of fever followed by chills. The general condition of the body is bad, and there is an enlargement of the spleen, pigmentation of internal organs, and anaemia. The paroxysms may occur every other day or they
may skip two (2) days, depending upon the nature of the infection.

The patient need not be quarantined or isolated, only he must be kept where the Anopheles mosquito can not become infected by biting him.

The cure for persons suffering with malaria, as well as the disinfection of the malaria carrier, is quinine. The local doctor should be consulted for the correct treatment. Every person harboring malaria parasites is a potential danger to his family and neighbors, and owes to others, if not to himself, to take a sufficient amount of quinine to destroy all of the parasites, as far as possible, in his system. Too many people are prone to discontinue taking quinine or its derivatives as soon as the chills and fever, or aching caused by malaria, have ceased. The result is that they continue to harbor the parasites and cause pain and suffering in many others through the infection of mosquitoes and subsequent transmission of malaria to well persons. More than likely a relapse occurs and the patient himself must undergo more suffering and expense, all of which can be avoided. In all cases of treatment for malaria, it is necessary that calomel and salts be given before the quinine treatment is begun.

Well persons, who find it necessary to spend short periods in a malaria infected district, can make themselves immune by the use of quinine.

Anopheles mosquitoes bite during the evening, night, and early morning hours, seldom in the daytime, and almost never bite a person who is moving about. Living in screened houses
in a mosquito-infected district is therefore very essential. Fair malaria control can be secured by sitting behind the screens instead of on an open porch in the evening and catching or swatting all mosquitoes which have succeeded in getting into the house.

The transmission of malaria from one human being to another is absolutely dependent upon a cycle of man-to-mosquito-to-man. Parasites in the human being are of three types: male, female, and nonsexual. It is the last type which has powers of division in the human system and eventually produces the symptoms of malaria. All types may be taken up by the mosquito with his blood meal, but the nonsexual forms pass through the digestive organs of the mosquito and do no further harm. The male and female parasites (gametes) mate in the stomach on the Anopheles mosquito. The resulting body attaches itself to the stomach wall. After several days this body (oocyst) develops into the infective stage (sporozoites), some of which find their way into the salivary glands of the mosquito and are then ready for injection into the first victim from which a blood meal is taken. A minimum period of probably eight (8) days is required for a mosquito to become infective after biting a person harboring malaria parasites. After becoming infected, the mosquito remains so for life.

Only Anopheles mosquitoes transmit malaria. If the cycle man-to-mosquito-to-man can be broken, the spread of malaria may be absolutely controlled. This may be done by one or all of the following: by so treating people having malarial parasites
in their blood that they will not infect mosquitoes; by protecting healthy people so that even if bitten by infected mosquitoes they will not develop malaria; by not letting Anopheles mosquitoes get to well people to bite them; and by exterminating the Anopheles mosquito which carries malaria. The first three of these methods have been discussed briefly, but probably the most feasible line of attack and the most productive of desired results is the latter, exterminating the Anopheles mosquito. This method will be discussed in the following topic, "Mosquitoes."

2. Mosquitoes. Mosquitoes are small two-winged flies belonging to the order Diptera, family Culicidae, subfamily Culicinai. They may be readily distinguished from other flies and from gnats by their beak, or proboscis, and by their wing structures. The wing venation is similar in all, each vein being fringed with a row of scales on each side, with a fringe of scales on the posterior and tip of the wing itself. Mosquitoes are found distributed all over the world, from the Arctic regions to the Tropics.

a. General Life History. In general, the life history of all mosquitoes is more or less similar. Only the female mosquito bites, the male depending entirely upon fruit and plant juices for sustenance. The male is readily distinguished from the female by the fact that the antennae are more plumose or heavily haired.

The flight range of the Anopheles, under ordinary conditions, has not been considered to be over a mile from their breeding
areas; but recent studies do not seem to confirm this. Under ordinary conditions the Culex, or common "house" mosquito, do not travel more than a few hundred yards.

Female Anopheles mosquitoes live an average of thirty-five (35) to forty (40) days during the summer, the male living only three (3) or four (4) days, even under the best of conditions. The female Anopheles hibernate during the winter and may pass several months in this state, appearing in the spring to propagate the species. Other mosquitoes pass the winter in the same manner, or as eggs, or larvae, according to the species.

Mosquitoes must have water in which to breed. The adults usually hide in the daytime, preferring cool, damp, darkened places to those exposed to light and sunshine. An unintermitted supply of water must be present for a minimum period of eight (8) days for the complete development of the mosquito. Four (4) successive stages are necessary in this development, as follows: (1) the egg; (2) the larvae or "wriggler"; (3) the pupae or "tumbler"; and (4) the adult mosquito.

(I). Eggs. These are laid either singly (Anopheles) or in raft shaped masses (Culex), on the surface of the water or in soft mud. Two hundred (200) or more eggs may be laid at one time.

(II). Larvae. The eggs usually hatch into very minute larvae within twenty-four (24) to seventy-two (72) hours after being in the water. When full grown, they are about one-third of an inch in length. The culicine varieties, which are considered a pest, will be seen hanging just beneath the
surface of the water, head down, body at an angle of possibly forty-five (45) degrees. They get their food at the sides and bottom of their breeding places. The Anopheles, or malarial mosquito, is strikingly different, having a very small head in contrast with other species, the body lying in a horizontal position parallel to and just beneath the surface film of water. They obtain their food at the water surface.

Although requiring water for growth and freedom in their search for food, mosquito larvae are true air-breathers, being provided near the tail with a breathing tube, which is projected just through the surface of the water for air.

Development of larvae is largely influenced by temperature and food supply, requiring from six (6) to ten (10) days in summer, and it may be prolonged to six (6) or eight (8) weeks in the early spring or late autumn.

(III). Pupae. This stage is also equatic in character. A form similar to a question mark is now assumed. The head and thorax have become greatly enlarged and now rest at the surface, with the tail below. Having no mouth, the pupae does not feed, but darts about when disturbed with sudden tumbling movements. The pupal stage is usually very short, lasting but twenty-four (24) to forty-eight (48) hours under favorable temperatures, the adult mosquito bursting through the pupal case and after a few minutes, required for hardening of the wings, it begins its nefarious existence. Ofttimes their development does not cease even though the water has dried, adult mosquitoes emerging from the pupal cases in the soft mud.
(IV). **Adult.** Anopheles mosquitoes have spotted wings, while most other types do not. In the female Anopheles, the palpi (slender rods found on either side of the beak, or proboscis) are nearly as long as the beak itself, while in the female of the other species it is rarely one-fourth as long.

Adult Anopheles may also be distinguished by their peculiar posture when resting or biting, the body assuming an almost perpendicular position with reference to the surface, making it appear as if the mosquito is standing upon its head. Other mosquitoes assume a humped-up position, both head and abdomen being lower than the thorax. Anopheles mosquitoes seldom bite in the daytime and rarely attack a person moving about.

A peculiarity of Anopheles larvae is that when disturbed they dart back along the surface rather than dive, as do the larvae of other species.

b. **Control.** Mosquitoes must have water in which to breed. Small pools and puddles should be filled with soil; cesspools, open septic tanks, unused shallow wells and cisterns should be closed; and rain barrels, broken crockery, and anything that holds water and is open should be eliminated.

If possible, all bodies of water that may harbor mosquitoes should be drained, and all ditches and streams which have become clogged by vegetation, debris, caving, or other results of neglect, should be carefully cleaned and the bottom so graded as to permit rapid run-off during periods of minimum flow.
Circumstances arise where it is impracticable to drain pools, lakes, fountains, and many places which habitually breed mosquitoes. The best resort is to stock such places with larvae destroying fishes. In confined area, such as fountains, old wells, watering troughs, and the like, almost any small fish will devour mosquito larvae if they are denied other food. In their natural habitat, however, the only fish worthy of consideration are those which by nature prefer an insect diet, such as the Stickleback and the Top-minnow.

Another method of mosquito extermination is to place a film of oil on the water to kill the larvae present. Oiling should be done every week or ten (10) days during the summer months when mosquito development is rapid, the time being lengthened in the spring or fall, when three (3) weeks or more may elapse.

Many larvicides have been tried for mosquito control, but most of those used are more or less dangerous to the lives of stock or poultry which drink the water. There stock or poultry are not present paris green may be used as a larvicide against Anopheles mosquito larvae. Due to their peculiar habit of seeking their food at the surface of the water only, they fall an easy prey to this method. It is not effective against larvae of other species nor will it destroy the eggs or pupae of Anopheles mosquitoes.

Remember, mosquitoes breed only in water, and only Anopheles mosquitoes transmit malaria.
G. Flies

(Suggested courses -- General science and civics)

The housefly, Musca domestica, or "filth" fly as it is better called, is a medium sized, grayish fly with a non-piercing proboscis. It is not only disgusting in its habits, but is positively dangerous to health because it is a potent food contaminator. The fly is bred in manure or other filthy substance and, when it reaches its winged state, proceeds to feed on liquid filth (excrement in outdoor toilets, garbage piles, sputum, vomit, etc.) in which disease-producing germs may occur and forthwith transfers its activities to the dining-room and kitchen, where it promenades on your food and mine.

Structurally the fly is well equipped to collect filth as may be seen by an examination of its proboscis and feet. The proboscis is provided with a profusion of fine hairs, which readily catch particles of filth, and each of the six (6) feet is equally fitted with bristles and sticky, spiny pads.

Furthermore, the intestinal contents of flies become heavily charged with infectious material and consequently even the fly specks are dangerous. Again, they may become infected in the larval stage by developing in infective fecal matter and the newly emerged flies may already be a potential menace to health.

The germs of such infective diseases as typhoid fever, dysentery, cholera, tuberculosis, diarrhea, scarlet fever, eggs of parasitic worms, etc. are readily carried by the housefly in the manners already described.
1. Life Cycle.

a. Egg. The female fly lays a hundred or more eggs in stable manure (mostly commonly in the crevices of warm, moist horse manure newly added to the heap just outside the barn or in the stalls where manure and urine fall - never in dry manure), or when this is not available, in human excreta, garbage, or any decaying vegetable matter, including even damp rags or paper.

b. Larva. In a short time after the eggs are laid, they hatch into white, worm-like creatures called maggots. Those maggots, or larva, live and grow in the manure or other suitable substance for about four (4) to eight (8) days, when they come to the surface, and a hard, dark case forms about them.

c. Pupa. During the next five (5) to seven (7) days, while in this "pupa case" or "chrysalis" stage of development, as it is called, the maggots change into flies.

d. Adult. So complete is the change that goes on in the "pupa case" that within an hour or so after the newborn fly emerges, it is a full-grown adult insect. Within a couple of weeks, the female fly is old enough to lay eggs for another generation. The average length of life of a fly is about thirty (30) days during the summer, and if conditions are favorable, it can repeat the egg-laying process eight or nine times a season. Assuming that all the progeny live, a single pair of flies would produce by the end of the summer something like 191,000,000,000,000,000,000 flies or, if pressed together, enough to occupy a space of over 14,000,000 cubic feet, equivalent to a structure ten (10) times as large as a six-story building one hundred (100)
by one hundred eighty-five (185) feet. Fortunately, the lack of food, natural enemies, and other unfavorable conditions prevent this occurrence, but at times we are almost persuaded that all have succeeded in living in some localities.

2. **Control.** Cleanliness is one of the first requirements in controlling the breeding of flies. Keep the premises free from open and exposed accumulations of garbage, manure, heaps of decaying vegetation, and other substances that might be selected by the female fly for her eggs. Outdoor toilets should be carefully screened to prevent their use as breeding-places and also to prevent flies from feeding upon their contents.

In and around stables the disposal of manure in a way that will prevent the breeding of flies is a difficult problem. Manure bins and composting pits should be fly proof. If manure is spread out thinly on the ground every few days, the moisture in it will dry out and thus prevent its use as a breeding place for flies.

Chemical treatment of manure is not very successful, although creosote oil may be used to some advantage.

A fair degree of control can be accomplished by selecting a well drained, open spot several hundred feet from the stable and build, by daily additions, a long, narrow, compact pile with straight sides. It will be found that the outside exposed parts dry out quickly and the inner parts become too hot for fly larva.

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Do not leave the manure in the stables all winter for fly larvae may dormant, particularly in cow manure, and when warmed up continue their development.

All doors and windows should be screened, these screens kept in good repair and properly used by all occupants of the house.

The destruction of flies within the house should be unceasing. "Fly swatters" should be kept in convenient places and used whenever needed. Fly traps, fly poisons, sticky fly paper, and fumigants should all play their parts.

Fly campaigns, especially in the spring, are very valuable, for each female fly destroyed early in the season prevents not one but many generations of flies before the summer is over. Indeed, a community which has freed itself of flies, and mosquitoes and their breeding and harboring places, has conducted a very good clean-up campaign. A flyless home is a clean home, and conversely, many flies always denote a dirty home even though the front yard is lined with beautiful flowers. It is the condition of the back yard, stable, and alley that counts most in creating a clean place of residence, whether farm, city, town, or village. A clean, healthful environment reflects in a wholesome manner upon the inhabitants. A dirty, unsanitary environment generally produces an unfit citizenship.

Eradicate this most common and dangerous pest, and remember that, when flies are encountered in great numbers, their breeding place is quite near, generally within five hundred (500) yards. This means that it is probably on your premises and that
it is your duty to eliminate the source.

H. Tularemia

(Suggested course - Biology)

Tularemia is a new disease to most of us. It is an acute infectious disease caused by bacterium tularense and is found in nature only in certain infected rodents. Animals such as wild rabbits, coyotes, gophers, and ground squirrels may be infected. This disease is found practically all over the United States, except in most of New England and in Japan.

Wild rabbits are the main source of infection and in most cases this disease is fatal to them. It affects the liver and spleen of rabbits, producing decay of the tissue cells in these organs and is shown by a large number of white spots, from the size of a pin point to that of a pin head, over the surface of these organs. Man is readily inoculated with this disease in dressing rabbits as the infection may easily pass from the liver or spleen of the rabbit through a scratch or broken place in the skin on the hand. Wood ticks also transmit the infection from rabbits to man and may be considered a constant menace as a permanent reservoir of infection, because they transmit this infection through their eggs to the next generation. Certain species of flies, that are blood-sucking and are commonly found on horses, also bite infected rabbits and thus transmit the infection to man through their bite.
There are three (3) general types of this disease. First, and most prevalent, the ulceroglandular type, in which the primary lesion is a papule which later becomes an ulcer of the skin, with enlargement of regional lymph glands.

Second, the oculoglandular type, in which the primary lesion is situated in the conjunctiva with enlargement of regional lymph glands. Also, the glands of the head and neck are infected. Permanent blindness is rare but rapidly fatal cases have been noted in this type of the disease.

Third, the typhoid type, is so-called because of its similarity to a typhoid symptomatology, especially the temperature curve, there being no skin lesion or glandular involvement.

The symptoms of the disease in man are headache, chills, pains in the body, sometimes vomiting, and a tired-out feeling accompanied with fever. These symptoms develop anywhere from two (2) to nine (9) days after infection. At the same time that one begins to feel ill from the development of tularemia, the lymph glands, which drain the infection, swell and become painful. If the infection is on the hand, there will be red streaks extending up the arm. The regional lymph glands may break down, and there is quite a great deal of weakness and prostration with a septic, intermittent type of fever which may reach a height of one hundred four (104) degrees. The sickness usually lasts from two (2) to three (3) weeks or even months. The diagnosis is confirmed by an agglutination blood test.
Convalescence from tularemia is slow. It is rare for a patient to be at work again at the end of a month. Usually the second month is spent lying about the house, owing to weakness on exertion, and during the third month only half-time work is possible. Patients usually recover, but sometimes it takes six (6) months or a year to get well.

No isolation or quarantine of the patient is necessary, for no instance is known of the spread of the infection from man to man by mere contact or by the bite of insects that have previously bitten a patient.

There is no special treatment for this disease. No preventive vaccine or curative serum has been perfected, nor has any special drug been found effective against tularemia. Rest in bed is the most important measure.

One attack of the disease generally confers immunity in man from further attacks.

"Prevention is the key-note of modern medicine. Keep your bare hands out of a wild rabbit - one per cent of them are infected with tularemia. Rabbit meat, thoroughly cooked, is harmless for food, because a temperature of 133 degrees F. kills the infection. Rubber gloves afford complete protection to those who must dress wild rabbits."8 The ordinary dis-

8Leaflet, distributed by the Indiana State Department of Health, The New American Disease - Tularemia, Pp. 1, quoting the words of Dr. Edward Francis, Surgeon of the United States Public Health Service, who is the best authority on this disease.
infectants are effective. Immune persons should be employed to dress rabbits where possible.

Also, beware of the wild rabbit which the dog or cat has caught, or which has been killed with a club, for it is probably a sick rabbit. The hunter should be a sportsman and shoot his rabbits on the run at twenty-five (25) feet, say, and the chances will be lessened that the rabbits he bags will be sick with tularemia.
IV. APPENDIX
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Seasonal Incidence of Tularemia and Sources of Infection.

