Recent Trends in Pellagra*

WILLIAM DEKLEINE, M.D., F.A.P.H.A.

American Red Cross, Washington, D. C.

In the early part of the present century, two important but opposing views were advanced as to the cause of pellagra—one that it was of infectious origin, probably excreta-borne; the other, that it was of dietary origin, probably resulting from eating deteriorated foods. Eating "musty corn" was quite generally believed to be associated with the disease. These theories were, however, abandoned when the brilliant investigations of Goldberger and his associates disproved the infection theory beyond any reasonable doubt and at the same time proved that the disease was of dietary origin. There are those who still refuse to accept this point of view and continue to espouse the infection theory.

Pellagra is principally a rural problem. It occurs mostly among tenant farmers of the South and among those who, through close association, have acquired similar food habits. It occurs less frequently in urban centers where the populace has access to a larger variety of foods in modern grocery stores, and where economic conditions do not become quite so distressing during hard times as they do for tenant farmers. The latter obtain their food at plantation commissaries or corner grocery stores which carry only a limited number of staple articles of diet. Antipellagra foods such as milk, lean meat, and vegetables are generally lacking. Except for some family gardening introduced in recent years, tenant farmers do not raise their own produce as do the independent farmers of other sections of the country. When hard times strike they find it necessary to restrict their diet even more than usual to those few staples that lack the essentials for health. It is then that the incidence of pellagra and the death rate begin to increase.

Goldberger and others frequently called attention to the relationship between the incidence of pellagra and economic conditions. They did not, however, distinguish between industrial and agricultural depressions, assuming perhaps that they were one and the same, which is not always the case.

The last agricultural depression began during the early post-war period, while the industrial depression did not begin until after 1929. Prices of farm lands and produce began to drop everywhere as early as 1920 and 1921, and continued until conditions on the farm became very distressing in some sections of the country, even long before the memorable crash of 1929. Pellagra began to increase at a rapid rate after 1924, reaching its peak about 1928. After that it began to decrease and has continued to do so to the present.

I call attention to this rise and fall because it indicates that trends in pellagra are more closely related to economic conditions in agriculture than industry.

* Read before the Food and Nutrition Section of the American Public Health Association at the Sixty-fifth Annual Meeting in New Orleans, La., October 21, 1936.
Table I and Figure I show that the highest aggregate death rate for the 13 states where the disease prevails most extensively occurred in 1928. The rate increased from 9.4 in 1924 to 22.4 in 1928, an increase of 58 per cent. The aggregate rate for 1935 is 8.8, which is 60 per cent below the rate for 1928. This decrease varies in the different states from 43 to 74 per cent. These rates, namely 22.4 and 8.8 are the highest and the lowest aggregate rates respectively ever recorded for these states. In at least a few states pellagra was one of the first causes of death during the 2 or 3 peak years. It looks now as though this disease may be on the way out as a serious public health problem if the factors responsible for this unprecedented decrease remain in force.

The cause of the increase prior to 1928 is very evident but the cause of the decrease since that time, during the worst period of the depression for agriculture as well as industry is a matter of some speculation. Circumstantial evidence, however, points very strongly to 2 measures—the promotion of gardening and the use of pure powdered yeast. Both projects were introduced by the Red Cross in 1927 in the flood areas of 4 states in the Mississippi Valley—Mississippi, Arkansas, Louisiana, and Tennessee. The following years they were extended into other states. By 1929 the majority of health departments in the 13 states referred to participated in a yeast distribution program.

During the period from 1927 to 1935 inclusive, the Red Cross distributed some 500,000 lb. of yeast through its chapters, health departments and physicians, and well over 750,000 packages of garden seeds. Even larger quantities of both yeast and seeds were distributed by health departments, farm bureaus, and relief agencies.

The largest seed distribution by the Red Cross was made in the spring of 1931, when 611,000 packages containing from 13 to 18 varieties of seeds were distributed to as many families. Each package weighed about 4 lb. and contained seeds sufficient to plant from 1/4
to ½ acre. Literally, thousands of acres of fertile land were converted that year into gardens in sections of the country where gardening had become a lost art. Families that had depended upon cotton or some other “cash crop” for trading at the grocery stores and commissaries, now raised part of their own food supply. Canning and other methods of preserving foods for winter use were also introduced. Thousands of families were thus able to supplement the food they obtained from the grocery store with “protective foods” grown in their own gardens. There can be no doubt as to the health value of this simple but effective measure.

Absolute proof that the two projects referred to were responsible for this reduction is lacking and can be obtained only through carefully controlled field experiments. There is no record of such experiments. Goldberger and others have repeatedly proved the antipurpellagra value of milk, lean meat, certain vegetables, pure yeast, and other foods. However, the experimental application of this knowledge in the civilian population on a sufficiently large scale to determine the relative value of these measures under controlled conditions is lacking. A large number of local health officers either independently or in cooperation with the Red Cross have distributed powdered yeast among pellagra families. Several have kept records of the distribution and tabulated results. Similarly, a number of agencies participated in promoting gardening, but we do not know of any instances where a control group was set up with which to compare results. In spite of that, considerable evidence has accumulated to indicate that gardening and pure yeast have been very effective measures.

Space does not permit quoting extensively from reports and letters of health officers, physicians, and others, a large number of which accumulated in our files. They nearly all agree that gardening and the use of powdered yeast, together with the educational efforts necessary to introduce these projects, have been largely responsible for this recent downward trend. One county health officer reports:

In 1931 there were 1,313 cases of pellagra reported in the county and 890 packages of yeast (2 lb.) were given to the indigent patients. In 1932 the number dropped to 331, which indicates that the yeast has been effective in controlling the disease.

Others write as follows:

We consider gardening an essential factor in the control of pellagra and probably largely responsible for the downward trend.

... I believe that powdered yeast as an emergency measure in the absence of an adequate diet is most effective. ... Growing gardens is encouraged generally by the planters among their tenants. ... It is our impression that commissaries and grocery stores keep salmon and other anti-pellagra food in stock more than in former years. ...

These quotations are representative of the views expressed by a large number of health officers and physicians who have had opportunity to observe the application of these measures.

Table I of death rates also seems to indicate some relationship between the time these measures were introduced and the beginning of the downward trend. For example, the distribution of garden seeds and yeast was started in Arkansas, Tennessee, Louisiana, and Mississippi in 1927. That was also the peak year for 3 of these states. Mississippi had a slight increase the following year. The distribution was extended to neighboring states in 1928, among these Kentucky, Alabama, and Georgia, 2 of which had their highest death rate that year. Oklahoma and Texas were among the last to introduce powdered yeast. Their highest rates occurred in 1930. That coincidence at least adds
There is some evidence that where either gardening or the distribution of yeast is discontinued the disease again increases. That occurred in at least one state after the Red Cross discontinued both projects in 1932. It was believed that their value had been sufficiently well demonstrated to be continued through local initiative, but this did not prove to be the case. The rate in that state increased in 1934 and again decreased in 1935 when the distribution of yeast was resumed.

All of this is circumstantial evidence, but it seems to be quite convincing. Such evidence should be accepted until more scientific proof is available. Scientific medicine has made progress that way through the years and it will continue to do so. It will develop measures that are born of experience and observation as well as through experimentation. It is hoped, however, that some one will conduct the field experiments necessary under controlled conditions to determine not only the relative value of these measures, but also whether all or nearly all deaths from pellagra in a given area can be prevented by these or other measures. Considering the progress made in recent years, that does not seem at all impossible, and is worthy of careful study.

Relief measures may have had some influence on this downward trend, but only to a limited extent. The relief program did not start on a national scale until the fall of 1930 following the devastating drought. Federal relief did not begin until 1933. The downward trend was well under way long before that time. Local relief efforts were too scattered to influence materially this situation in all these states.

Pellagra can eventually be prevented only through the use of proper foods, among which vegetables are all important. Milk, lean meats, liver, and fish are also valuable antipellagra foods, but

**Table I**

*Death Rates from Pellagra per 100,000 Estimated Population (U.S.P.H.S.) for the Years 1922 to 1935, Inclusive*

<table>
<thead>
<tr>
<th>State</th>
<th>1922</th>
<th>1923</th>
<th>1924</th>
<th>1925</th>
<th>1926</th>
<th>1927</th>
<th>1928</th>
<th>1929</th>
<th>1930</th>
<th>1931</th>
<th>1932</th>
<th>1933</th>
<th>1934</th>
<th>1935</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia</td>
<td>4.6</td>
<td>3.3</td>
<td>3.2</td>
<td>4.1</td>
<td>4.8</td>
<td>6.5</td>
<td>8.0</td>
<td>9.4*</td>
<td>9.0</td>
<td>8.3</td>
<td>5.3</td>
<td>4.8</td>
<td>4.8</td>
<td>5.3</td>
</tr>
<tr>
<td>North Carolina South</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carolina</td>
<td>12.2</td>
<td>8.6</td>
<td>9.9</td>
<td>13.2</td>
<td>15.4</td>
<td>22.3</td>
<td>27.8</td>
<td>30.3</td>
<td>32.4*</td>
<td>21.6</td>
<td>14.8</td>
<td>12.0</td>
<td>13.0</td>
<td>11.3</td>
</tr>
<tr>
<td>Georgia</td>
<td>17.2</td>
<td>15.1</td>
<td>11.5</td>
<td>12.6</td>
<td>14.6</td>
<td>21.2</td>
<td>29.6</td>
<td>30.2*</td>
<td>24.4</td>
<td>19.5</td>
<td>17.0</td>
<td>14.3</td>
<td>10.7</td>
<td>10.9</td>
</tr>
<tr>
<td>Florida</td>
<td>10.1</td>
<td>8.9</td>
<td>8.6</td>
<td>10.2</td>
<td>10.2</td>
<td>16.6</td>
<td>21.0</td>
<td>22.0*</td>
<td>16.1</td>
<td>14.5</td>
<td>13.1</td>
<td>12.3</td>
<td>14.3</td>
<td>11.2</td>
</tr>
<tr>
<td>Kentucky</td>
<td>3.0</td>
<td>2.7</td>
<td>2.3</td>
<td>3.5</td>
<td>5.7</td>
<td>6.2</td>
<td>6.9*</td>
<td>5.1</td>
<td>4.9</td>
<td>4.2</td>
<td>2.6</td>
<td>3.5</td>
<td>2.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Tennessee</td>
<td>11.3</td>
<td>12.2</td>
<td>10.7</td>
<td>15.4</td>
<td>21.1</td>
<td>23.8*</td>
<td>20.3</td>
<td>15.9</td>
<td>15.5</td>
<td>11.4</td>
<td>10.9</td>
<td>8.6</td>
<td>8.0</td>
<td>7.4</td>
</tr>
<tr>
<td>Alabama</td>
<td>16.6</td>
<td>15.4</td>
<td>14.6</td>
<td>16.5</td>
<td>19.8</td>
<td>21.7</td>
<td>27.0*</td>
<td>25.4</td>
<td>24.0</td>
<td>16.9</td>
<td>13.2</td>
<td>13.3</td>
<td>11.8</td>
<td>11.1</td>
</tr>
<tr>
<td>Mississippi</td>
<td>24.4</td>
<td>21.9</td>
<td>23.0</td>
<td>29.9</td>
<td>29.2</td>
<td>36.2</td>
<td>38.3*</td>
<td>37.8</td>
<td>28.4</td>
<td>27.8</td>
<td>17.3</td>
<td>15.0</td>
<td>11.1</td>
<td>11.3</td>
</tr>
<tr>
<td>Arkansas</td>
<td>11.3</td>
<td>12.1</td>
<td>9.0</td>
<td>17.3</td>
<td>27.0</td>
<td>35.9*</td>
<td>34.5</td>
<td>27.9</td>
<td>26.2</td>
<td>23.0</td>
<td>11.8</td>
<td>12.1</td>
<td>9.3</td>
<td>9.3</td>
</tr>
<tr>
<td>Louisiana</td>
<td>7.2</td>
<td>8.0</td>
<td>9.6</td>
<td>18.0</td>
<td>13.5</td>
<td>16.9*</td>
<td>16.1</td>
<td>13.7</td>
<td>13.0</td>
<td>11.4</td>
<td>8.3</td>
<td>9.0</td>
<td>6.7</td>
<td>6.4</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>4.7</td>
<td>3.0</td>
<td>2.6</td>
<td>5.6</td>
<td>8.9</td>
<td>7.8</td>
<td>10.2</td>
<td>11.8</td>
<td>12.5*</td>
<td>9.9</td>
<td>6.1</td>
<td>4.4</td>
<td>4.2</td>
<td>4.7</td>
</tr>
<tr>
<td>Texas</td>
<td>.....</td>
<td>5.0</td>
<td>5.7</td>
<td>10.3</td>
<td>13.6</td>
<td>14.5</td>
<td>15.1</td>
<td>15.0</td>
<td>18.9*</td>
<td>17.6</td>
<td>11.8</td>
<td>11.9</td>
<td>9.5</td>
<td>9.9</td>
</tr>
</tbody>
</table>

**Aggregate rates**

| 12.1 | 9.8  | 9.4  | 13.2 | 16.0 | 19.6 | 22.4*| 21.6 | 20.4 | 16.5 | 11.8 | 10.7 | 9.3  | 8.8  | 60   |

* Peak year. 1935 rates are provisional.
for economic reasons are not available in sufficient quantity to a large part of the farm tenant population of the South where the disease prevails most extensively. Until economic conditions for these people are improved and their food habits changed, they cannot or will not include these articles in their diet. Experience indicates that they can and will use garden produce. Gardening therefore occupies a unique place in the pellagra control program.

Pure powdered yeast occupies an equally important place in this program. For those who have developed symptoms of pellagra and for those who cannot or do not use the foods they need to prevent this disease, pure yeast is most valuable. It contains the pellagra preventive in quantity and form especially well tolerated by patients complaining of digestive disturbances, which is very common in pellagra. That cannot always be said of other antipellagra foods. Pure yeast is unusually well suited for treatment purposes, and it is comparatively inexpensive. It can be purchased at present for 19 cents a pound.

In the absence of other physical complications, 50 to 60 grams a day for from 6 to 10 weeks will relieve the individual of all symptoms of the disease and restore him to what seems to be a normal state of health even without any alteration in the regular diet. Smaller amounts are sufficient as a preventive.

The pellagra problem cannot be solved by ordinary educational methods. Even the most intensive efforts to spread information about dietary requirements will not suffice. That may be helpful to a few, but not to the vast majority of families who are victims of the disease by force of circumstances over which they have no control. It is not enough to tell them that milk, lean meat, and vegetables will prevent pellagra unless it is also made possible for them to obtain these protective foods without extra cost.

Pellagra is principally a poor man's disease and can be prevented only by measures within his reach. Family gardening and pure yeast, both of which are available at low cost, seem to meet these requirements best.

REFERENCES


