PELLAGRA.

ITS OCCURRENCE IN THIS COUNTRY; REPORT OF CASES.*

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Pellagra is a trophoneurotic disease, affecting the cerebrospinal, digestive and cutaneous systems and characterized by an erythema. The immediate cause of pellagra is a fatty oil or extractive, called by Lombroso pellagrozein, that develops in fermenting and decomposing maize. This extractive is probably formed under the influence of a fungus. Poverty and unhygienic surroundings are predisposing causes, and most cases probably occur among the agricultural class, because they raise maize and eat it as a regular daily diet. Women are more often attacked than men, and children less often than adults. The disease occurs more often in patients between the ages of 30 and 50. As the erythema selects those portions of the body exposed to the sun's rays, it is more than probable that exposure to the sun is a factor in its development.

Belmondo believes that the disease is due to a specific organism. Lombroso experimentally produced in men and animals, with an extract from decomposed maize symptoms, analogous to those of pellagra. In Egypt pellagra occurs only where corn is eaten.

After a careful inquiry among farmers in regard to corn, I found the following facts:

1. Corn that is allowed to mature on the cob does not ferment or decompose after being gathered, and is suitable, as food, both for men and animals.

2. Corn gathered before maturing on the cob always ferments and decomposes. This process of fermentation is called "heating," and that of decomposition "rotting."

3. If this decomposed and fermented corn is fed to animals (except swine), it produces a condition called "blind staggers," which is accompanied by a severe diarrhea and inability of the animal to stand. It staggers from side to side, and is apparently blind. This disease is very fatal, 98 per cent. of the animals attacked dying, and if the animal passes through the acute attack, it is spastic and never able to work again, because of stiffness of the limbs. That the acute attack is analogous to acute pellagra, and the chronic condition to chronic pellagra, is probable.

4. Farmers have learned never to give decomposed corn to their stock. When visiting other people, some farmers will not eat bread or grits, for fear of it being made from decomposed corn.

5. The extreme end of the cob, which often projects from the end of the shuck, always decomposes, and farmers cut this off before throwing it into the bin.

6. When corn is planted, the farmers watch the hills, and if any fail to grow, they are replanted. In this way, when harvest time arrives, there is some corn not mature, and if it is used in this condition there is danger of the other corn becoming contaminated by it. The better class of farmers eliminate this corn, or leave it until it matures. In spite of this, some decomposed meal is marketed. When mixed with good meal, it is scarcely noticeable, and is sold at reduced prices to the very poorest. In this way, we account for the occurrence of pellagra.

Prior to 1907 pellagra was not recognized as occurring in the United States. During that year, Dr. G. H.

Searcy¹ reported eighty-eight cases of acute pellagra occurring at the asylum for the (colored) insane at Mount Vernon, Ala. This epidemic was very fatal, 64 per cent. of the patients dying. The maize eaten at this institution was found to be decomposed and unfit for food.

A sporadic case was reported by Dr. T. C. Merrill² of Colorado, Texas, in September, 1907.

Dr. J. W. Babcock, of Columbia, S. C., reported to the State Board of Health nine cases of pellagra. Three of these cases were complicated by hookworms, and treatment for this condition helped them.

Besides the cases which I report, a half-dozen more have occurred in my community. That this disease has been occurring there for many years there is little doubt, as a careful inquiry among older physicians brings to light many unrecognized cases.

PATHOLOGY.

There is fatty degeneration of the liver, kidneys, spleen, and myocardium; atrophy of the muscular coat of the intestines, and sometimes ulceration; atrophy, sclerosis and pigmentation of the skin; pigmentary degeneration of the cells of the brain, cord, liver, spleen, kidneys and heart; sclerosis of the crossed pyramidal tract in the dorsal portion; and degeneration of the column of Goll, in the median portion.

The posterior roots usually escape. Lombroso found Burdach's column and the posterior roots sometimes affected. There is, generally, involvement of the membranes of the brain and cord, with much thickening. The abdominal viscera are usually atrophied.

SYMPTOMS.

Chronic Form.—The symptoms begin in spring, with lassitude, headache, and anorexia. The epigastrium is usually tense, and there may be nausea and vomiting. Diarrhea—serous in quality—soon follows. This may be very severe, numbering ten to forty stools a day. The tongue is inflamed, red and smooth. In ten days to two weeks, as a rule, there develops an erythema, confined to those portions of the body exposed to the sun. The parts most usually affected are the backs of the hands; next, the backs of the hands and forearms, elbows, face and neck, in the order named. Those who go barefooted usually have the erythema on the backs of the feet. The back and chest may be affected, but this is rare. Sandwith's Egyptian cases showed the elbows and forearms often involved. The erythema is usually bright red in color, very like sunburn, and disappears on pressure, unless hemorrhagic. There are often vesicles and bullæ, but there is little itching and burning compared to the extent of the process. Generally, in two weeks from the beginning, the erythema subsides, becoming brown in the center, and desquamation takes place, leaving a thickened, rough and brownish skin. After repeated attacks, the skin becomes sclerosed and pigmented and finally atrophies.

Application of salves and washes to the erythema does not benefit it. It seems to run a regular course, and if left alone, disappears earlier than if treated. The diarrhea is particularly stubborn, and will not yield. There is not the burning nor itching that is seen in other erythemas; for instance, genuine sunburn.

Toward late summer, the patient begins to improve,

* Read in the Section on Practice of Medicine of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

1. Searcy, George H.: Epidemic of Acute Pellagra, THE JOURNAL A. M. A., July 6, 1907; xlix, 37.

2. Merrill, T. C.: Sporadic Case Diagnosed as Pellagra THE JOURNAL A. M. A., Sept. 14, 1907, xlix, 940.

and may feel perfectly well during the winter, until the next spring, when a recurrence takes place, with greater or less severity.

After the third recurrence, the patient usually becomes much emaciated; diarrhea increases in severity, and melancholia, increasing to dementia, occurs. There may be edema and foul sweats. Paralysis of the third nerve and changes in the fundus oculi have been observed. There may be epileptiform convulsions, paresis of extensors, and paralysis of the bladder. The knee jerks and all reflexes are much increased early in the disease, but toward the end they are either diminished or abolished. There is no albuminuria as a general rule, and ankle clonus is rare. Blood changes are unimportant. The disease lasts five years, on an average, but may be prolonged fifteen years.

Acute Form.—This begins with pain in the epigastrium, headache, nausea and vomiting. This is followed by a severe diarrhea and stomatitis. The stools are often bloody, and occasionally there is bleeding from the gums and tongue. The patient emaciates rapidly. The erythema follows the same course as in the chronic form. There is some elevation of temperature, but not higher, as a rule, than 102 F., usually ranging between 99 and 101 F. There is delirium and a typical typhoid course, which usually ends in death in ten days or six weeks. I have never seen a patient recover.

I have ten cases of pellagra to report; three of these are of the chronic form, and seven of the acute.

CHRONIC CASES.

CASE 1.—Patient.—Miss L., white, aged 45, American born, family history negative.

History.—The patient had enteric fever at 20 years of age, and malaria several times. She has never been strong, but fairly healthy as a rule. She does not use alcohol, and there is no history of syphilis. She uses snuff, moderately. During March, 1907, she had headache and some distress in the epigastrium, and vomited occasionally. This was soon followed by a severe diarrhea, which was painless, and serous in quality. She became much emaciated and very weak. In early part of April an erythema developed on the backs of hands and lower part of forearms. This was much like sunburn. Very soon a few bullæ and vesicles formed. There was very little burning or itching.

Examination.—The patient's tongue was red, smooth and painful. Her temperature was normal; pulse 100 to 120. The heart and lungs were negative; abdomen flat, and nothing abnormal on examination. The pupils were equal and reacted to light and accommodation. The reflexes were much exaggerated, and there was no ankle clonus. Urine contained neither albumin nor sugar, but an abundance of indican. Examination of the blood revealed a well-marked secondary anemia, no abnormal cells, and absence of leucocytosis.

Course of Disease.—The erythema persisted for three weeks; then the skin became much thickened, with a brown hue, and exfoliated, leaving a rough, thickened brown skin beneath. The diarrhea continued through the summer, during which time the patient was very weak, and became much emaciated. She was much depressed, and cried often. In October, 1907, she seemed perfectly well. In April, 1908, she had a recurrence. She is now in the country, and her symptoms are much more severe than they were in the original attack.

This patient lived on a farm with a niece. Her corn supply gave out in December, 1906. She bought corn elsewhere, and used this during the winter and spring. Her niece, who lived with her, did not eat corn in any form, but patient did so daily. An examination of this corn showed that it was unfit for food.

CASE 2.—Patient.—Mrs. D., widow, aged 56; American born, family history negative, except that one brother had tuberculosis.

History.—The patient was never a very strong woman, but had no sickness of note. She never used alcohol and had no syphilitic history. She felt bad during February, 1907; was often nauseated, and had no appetite. A severe diarrhea began in March, 1907, and was accompanied by stomatitis, the tongue being especially painful. An erythema confined to the backs of the hands developed in a few days. This was like sunburn, and there were a few bullæ and vesicles. She was much emaciated, and starved herself because of diarrhea.

Examination.—The patient's temperature was 98.4, pulse 110. Heart and lungs were negative; the abdomen was flat, with some tenderness on pressure. The abdominal viscera were negative. The urine contained neither albumin nor sugar, and blood showed secondary anemia.

Course of Disease.—The erythema subsided in a month, leaving a brownish, thickened, rough skin. The patient had diarrhea continuously until September, 1907, when she improved, gained flesh, and diarrhea subsided. During the winter she seemed well, with the exception of some mental depression at times. In March, 1908, recurrence took place, but was not so severe as the original attack. The diarrhea was not so severe, but stomatitis more so, the tongue being especially inflamed, red and smooth. The erythema was confined to the backs of hands as in the original attack, and was never red, but was brown in color from the beginning. The skin exfoliated, leaving the backs of hands brown, smooth and atrophic in appearance. The patient was much depressed mentally and showed some evidence of melancholia. The reflexes were much exaggerated and there was some spasticity about her gait. There was no elevation of temperature, and the pulse was 90. Examination now showed that the abdomen was negative, and heart and lungs the same. The urine was diminished in quantity, but contained neither albumin nor sugar. There was some anemia.

This patient's chief diet was corn bread and grits, a sample of which could not be procured.

CASE 3.—Patient.—Mrs. W., aged 36; American born. Family history negative.

History.—The patient was always healthy, up to March, 1906. At that time she had epigastric pain, headache and nausea. This was followed by a severe diarrhea, serous in character. In April an erythema developed on the backs of hands and forearms; it looked like sunburn, and was accompanied by vesicles. The patient was sick all summer; apparently recovered in October, 1906, but relapsed in the spring of 1907, having the same symptoms as in original attack, except in a severer form. She again apparently recovered in the winter of 1907, but again relapsed in March, 1908, at which time I saw her, with Dr. T. M. Green.

Examination.—The patient was now much emaciated and had a severe diarrhea. Her tongue was red, smooth and very painful. On the backs of hands and forearms, over and below each eye, on each side of back and front of neck, there was the evidence of a subsiding erythema. This condition was also evident on the under surface of forearms and on elbows. The skin was very brown over these areas, and in some places almost black. It was rough and much thickened. Erythema appeared only on face and neck during this recurrence. The patient had dementia, preceded by much mental depression. Her reflexes were much exaggerated, and sense of pain and temperature much retarded. There was slight ankle clonus, and pupils responded sluggishly to light and accommodation. The heart and lungs were negative. The abdomen was flat, with some enlargement of the spleen. The blood was negative. The urine contained albumin and casts.

This patient died May 19, 1908.

She had eaten corn bread daily and grits occasionally; a sample could not be obtained.

Autopsy.—The liver and kidneys appeared atrophied. The spleen was slightly larger than normal. Microscopically there was fatty degeneration of liver and kidneys, and extensive degeneration of the posterior and lateral columns of cord. The spleen and adrenals appeared normal. The brain and different levels of cord were not examined. There was some thickening of membrane of brain and cord.

ACUTE CASES.

There were seven acute cases. Three patients were colored and four white; they ranged in age between four and forty years. They were all in apparent good health before attack. There was no history of syphilis in any; two used alcohol. One of these was a chronic alcoholic; the other used alcohol only in moderate amounts. They were all American born. They all ate corn bread and grits daily. One patient had myocardial degeneration. His urine contained albumin and casts. This condition was probably due to the alcohol which he used to excess. This patient's abdomen and lungs were normal, and his reflexes not exaggerated. An examination of the urine, heart, lungs, abdomen and reflexes of the other six showed them to be negative. The pupils of all reacted to light and accommodation. An examination of their blood showed an absence of leucocytosis, malarial parasites, and bacteria of all kinds. None had the *Ankylostomum duodenale*, or its ova, in the stools. The patients were all attacked suddenly, the first symptoms being headache, slight fever, 100 to 102 F., and some nausea. There was anorexia and some gastric distress. All had severe stomatitis, six bleeding from the gums. The tongue was red, and much inflamed in each case.

Three cases in children showed the erythema well developed on the dorsum of feet. In these cases there was much inflammatory edema of feet, with bullæ and vesicles. These children also developed erythema on the backs of hands and forearms, over each eye, and on back of neck. They went barefooted. One of the other four patients had erythema on the backs of hands and forearms, elbows and back of neck. In the other three, the erythema was confined to the backs of the hands. Erythema was symmetrical in all cases. All the patients had diarrhea. In four cases, it was very severe, numbering thirty to forty stools a day; in two, about fifteen stools per day; and in one, three to eight stools. In two cases, stools always contained blood in abundance, and in one case, occasionally. The diarrhea in other cases was always serous in quality.

The erythema at first could not be differentiated from sunburn, but in a few days the skin became livid and vesicles developed. The skin gradually thickened, lost its angry look, and in two or three weeks, all erythema had disappeared, leaving a brownish red and thickened skin. In those cases which lasted only ten days, these changes could not be seen.

There was delirium in six cases, and in three it was well marked, for it was necessary to hold the patients in bed forcibly. The chronic alcoholic was not delirious, and diarrhea was not severe in his case, yet the erythema and stomatitis were particularly severe.

After a few days or a week, temperature was either normal or not above 100 F. In six cases there was gradual emaciation, loss of strength and development of stupor. The patients gradually passed into the typhoid state with delirium, carphologia and finally death from toxemia.

All these patients died. Three lived six, eight and ten days, respectively. One lived three weeks, two lived a month, and one lived six weeks. Every drug thought indicated, including arsenic and specific treatment, was tried in earlier cases, but, as this treatment gave no result, the other cases were treated symptomatically. In three cases autopsy was made, except on the spinal cord and brain, and nothing abnormal found. It was impossible to examine the nervous systems. Postmortem was refused in other cases. I am sorry that I can not report

the pathologic changes in these cases, but circumstances prevented it. That we have genuine pellagra in the South I am sure, and there is no doubt in my mind that the above were genuine cases of the disease.

DISCUSSION.

DR. WILLIAM S. THAYER, Baltimore: It is true that there are a great number of cases of pellagra to-day. To pellagra, like uncinariasis, not much attention was paid until many cases were reported. In a paper published by Dr. J. F. Babcock of South Carolina, who was in charge of the State Asylum, it was reported that there were cases of pellagra in the vicinity, and that a number of cases had been found in the asylum. I saw a case one or two years ago that might have been one of this disease. It was remarkable how symmetrical the changes were, involving the hands, the forearm, with the formation of bullæ, scabs, etc. At the time I saw this case I thought of pellagra, but there were certain symptoms suggestive of myxedema present. I cured this patient by thyroid. I doubt not but that in a few years there will be as many reports of cases of pellagra as there have been of uncinariasis since the work of Stiles.

DR. JOHN L. DAWSON, Charleston, S. C.: Undoubtedly this disease, pellagra, exists among us and is not recognized. Since the paper by Dr. Babcock several cases have appeared in the city of Charleston and surrounding country. I have seen three cases, none of which would have been diagnosed had it not been for the publication of the paper by Dr. Babcock.

DR. ALFRED MEYER, New York: Is it not proper for the state and country to take cognizance of such a disease as exists in and about Charleston, and to suggest certain measures for its effacement, such as described by Dr. Bellamy? If some authority were obtained, as by the national Food and Drugs Act, some power of controlling this disease might be had. Perhaps it is more common than supposed, and will be more commonly recognized in the future, and something should be done for its suppression. I advise drawing attention to governmental rather than to individual medical efforts for the prevention of the spread of pellagra.

DR. R. H. BELLAMY, Wilmington, N. C.: When changes take place in the corn after its gathering, it has been gathered before it was mature. The meal was obtained from the corn after the ferments had produced the condition. Many believe this disease to be due to a specific organism; but if this were so the corn and meal could not be the source of infection, for these foods are always cooked two hours, and any organisms which they might contain would be killed. We have reported these cases to the State Board of Health, and are now prepared to go before the State Board of Agriculture. We have obtained the consent of the farmers to study the disease, and the farmers have been asked to be more careful in gathering the corn. I have no doubt that there are one hundred cases occurring every year that are not recognized. I myself see from twelve to fifteen cases every year. Although the disease was not seen or at least not recognized in my part of the country before 1903, there are certainly plenty of cases there now, and generally of the acute type, that is, there are more of the acute than of the chronic form of pellagra.

Local Pigmentation in Tuberculosis.—M. Delmont-Bebet, *Progrès méd.*, May 2, calls attention to a peculiarity observed by him in several hundred infants afflicted with localized tuberculosis, namely, that the sun tan is much more pronounced in the affected parts. At the maritime hospital Berck, the children go without stockings in summer and so are exposed to the sun's rays for several hours of the day which quickly tan all exposed parts, and he noticed a marked difference in the intensity of pigmentation of the exposed surfaces of the affected limbs as compared to their fellows, the tan being much more pronounced on the former. In fact, it is easy to judge which side or member is affected by this sign. It persists after operation and in the recently cured, but M. Delmont-Bebet has not been able to say how lasting it may be in those long cured. It is not seen in rachitic infants or those affected with other non-tuberculous conditions.