A STUDY OF THE HEREDITY OF PELLAGRA IN SPARTANBURG COUNTY, SOUTH CAROLINA*

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Early in the spring of 1913 the desirability of the study of pellagra from the viewpoint of heredity as a causative factor was brought to the attention of the Thompson-McFadden Pellagra Commission by Dr. Charles B. Davenport, Eugenics Record Office, Cold Spring Harbor, N. Y.

Under the joint patronage of the two offices fieldwork was begun in Spartanburg, June 1, 1913, and continued until Oct. 1, 1913. Through the winter the data collected were carefully reviewed, arranged in family groups and charted. It was found that in many instances more details were necessary, and the Thompson Pellagra Commission in 1914 decided that the results obtained were of sufficient merit to warrant another summer's work. Accordingly, fieldwork was begun May 1, 1914, and continued until Sept. 1, 1914. This year the association of pellagrins with antecedent cases was also carefully noted for comparison.

To study successfully the heredity of any disease it is necessary, first, for the disease to have been known through at least three generations; second, to have access to vital statistics; third, to review family records; and fourth, to interview various members of a family so that statements may be corroborative. The mill villages in South Carolina are not fertile fields for such study, because, first, pellagra has been generally recognized in the South only about twenty-five years, less than one generation; second, in many sections no vital statistics are recorded, or if so, they are so incomplete as to be of little value; third, the majority of families keep no family record; and fourth, while the persons interviewed were in most cases willing to give all the information they could, in many instances they were entirely ignorant of their family histories outside of their own households.

Recognizing the difficulty of presenting a study so imperfect in detail, yet, with a view to establishing a foundation for future study,

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we have gathered all possible data, have discarded anything we considered in any way inaccurate, and present herewith the results of the eight months' work.

Every family reported was visited, and as far as possible the members of the households were seen. All possible family history was collected and tabulated. The causes of death, the prevalence of disease, congenital weakness and diseases of the intestinal tract, skin diseases and mental diseases were carefully noted.

Eczema was reported fourteen times, insanity thirteen times, feeble-mindedness twelve times, morphin addiction three times, deaf-mutism ten times, brachydactylism three times, hydrocephalic children twice, dolichocephalic child once, harelip once.

This does not show a larger proportion of any disease than one might expect from the study of an equal number of individuals taken from any nonpellagrous community of similar status.

The history of forty-five colored pellagrins in thirty-five households was taken. Of these, there were twenty-eight female and seventeen male. They knew so little of their family history—many not even knowing their fathers' names—that the study of inheritance was not undertaken.

The family histories of 555 white pellagrins were studied, which involved a partial history of 1,872 households, 786 of which were visited.

The families were grouped according to the number of pellagrins into six groups (see Table 1) as follows:

Group I, one pellagrin in family.
Group II, two pellagrins in family.
Group III, three pellagrins in family.
Group IV, four pellagrins in family.
Group V, five pellagrins in family.
Group VI, more than five pellagrins in family.

In Group I, one pellagrin in a family, there were seventy-three parents with 248 children—201 living and forty-seven dead, 172 living at home with the parents. None of these had recognized pellagra, although fourteen children died with intestinal trouble after the mother developed pellagra. One died with measles and dysentery, aged 11 months; seven with bowel trouble, ages ranging from 3 to 21 months; one with thrush and pneumonia, aged 1½ years; one with hives, aged 3 months; one with hives and stomach trouble; one with dysentery and rash, aged 2 years; one with rash, sore mouth and diarrhea, aged 14 months.

Dr. Simonini recognizes two kinds of pellagra in childhood: (1) pellagra with cutaneous symptoms; (2) pellagra without cutaneous

symptoms. In all probability the fourteen cases cited above would have been classed by him as pellagra without cutaneous symptoms.

In one of these families, the grandfather, 75 years of age, has had indigestion for years. The great-grandfather died of tuberculosis of the bowels. Several members of the grandmother's family died of

TABLE 1.—DISTRIBUTION OF PELLAGRINS AND THE NUMBER OF FAMILIES, HOUSEHOLDS AND INDIVIDUALS IN EACH GROUP

Group	Pellagrins			Families	Households	Individuals
	Female	Male	Total			
I.....	83	22	105	105	626	2,259
II.....	72	30	102	51	306	1,056
III.....	71	31	102	34	380	1,027
IV.....	51	29	80	20	80	637
V.....	78	32	110	22	309	1,073
VI.....	39	17	56	7	171	644
Total.....	394	161	555	239	1,872	6,696

TABLE 2.—THE RELATIVE PROPORTION IN WHICH THE DIFFERENT MEMBERS OF A FAMILY WERE AFFECTED WITH PELLAGRA

Group	Mothers	Fathers	Wives*	Daughters	Sons	Total
I	63	10	7	12	13	105
II.....	45	14	..	27	16	102
III.....	40	17	10	21	14	102
IV.....	27	11	4	20	18	80
V.....	49	12	9	20	20	110
VI.....	21	10	2	18	5	56
Total.....	245	74	32	118	86	555
Rate per cent.	44	13.4	5.8	21.3	15.5	100

* Married women who have not borne children.

typhoid. The mother, Case 18, had typhoid in 1907 and developed pellagra in 1910. One child, born in 1911, died at the age of 3 months of bowel trouble; four other children are living and well.

In one family the grandmother died with chronic bowel trouble. Maternal uncles died with dysentery. Mother, Case 612, developed

pellagra in 1910. One daughter died in infancy with hives. One son died in infancy with bowel trouble. Seven other children are living and well.

In one family the grandmother died insane. In the mother's fraternity there were four infant deaths, and three births before term. The mother, Case 37, developed pellagra in 1908 and has had yearly recurrences ever since, always accompanied with severe mental symptoms. One son died at 2 years of age with dysentery and rash, one daughter died at 1½ years of age, with thrush and pneumonia. Two girls, aged 12 and 8, are living and unaffected.

In Group I, it is possible to trace an inherited weakness from the grandparents in twelve cases:

Case 18, one great grandfather died with tuberculosis of bowels.
Case 606, one grandfather died of typhoid.
Case 687, one grandfather died insane.
Case 612, one grandmother died with chronic bowel trouble.
Case 54, one grandmother died with dysentery.
Case 541, one grandmother died with dysentery.
Cases 693, 521 and 281, three grandmothers died of typhoid.
Case 37, one grandmother died insane.
Case 611, one grandmother died with indigestion.

In Group II, two pellagrins to a family, the fifty-nine parents had thirty pellagrous children and 153 nonpellagrous. There were thirteen pellagrous children with nonpellagrous parents, and forty-three brothers and sisters not pellagrous. Four children died after their mother developed pellagra. One died with hives at 4 months; one with dysentery at 5 months; and twins miscarried.

Inherited weakness was traced from the grandparents in eight cases:

Case 713, one great grandmother died with colic and the grandfather had pellagra in 1911, 1912 and 1913.
Case 81, one great-grandmother died with stomach trouble, and the grandmother developed pellagra in 1911.
Cases 107, 130 and 703, three grandmothers were pellagrins.
Case 160, one grandmother died insane.
Case 944, one grandfather died of pellagra in 1912.
Case 601, one grandfather died with typhoid.

In Group III, three pellagrins to a family, the fifty-seven parents had twenty-four* pellagrous children and 119 nonpellagrous. Twenty-one children were pellagrous in the same household with unaffected parents and sixty unaffected brothers and sisters. Four children died after their mother developed pellagra, one dying with marasmus, one with bowel trouble, one with hives, one with dysentery and hands peeling.

*Those pellagrins designated as wives in Table 2 are included here in the group of children.

In one family the grandfather committed suicide. Insanity ran in the grandmother's family. The mother, Case 25, developed pellagra in 1910 with marked mental symptoms. She died in 1913 in an asylum. Two children, one boy and one girl, developed pellagra in 1912. The youngest child, 4 years of age, is unaffected.

Inherited weakness is traced to grandparents in five cases:

Case 25, one grandfather committed suicide, and several members of the grandmother's family were insane.

Case 162, one grandfather died with typhoid; the father and son were both pellagrins.

Case 366, one grandfather died with bowel trouble; the mother and daughter were both pellagrins.

Case 526, one paternal grandfather died of bowel trouble; the father, daughter and mother were pellagrins.

Case 432, one grandfather died in 1901 of pellagra and insanity; mother and daughter are both pellagrins.

In Group IV, four pellagrins to a family, thirty-eight pellagrous parents had twenty-five pellagrous children and eighty-one nonpellagrous, while seventeen children were pellagrous in the same household with unaffected parents and thirty-eight unaffected brothers and sisters.

Inherited weakness was traced to grandparents four times:

Case 55, one great-grandmother died in 1904 with bowel trouble; the grandmother developed pellagra in 1911, the mother in 1912, and the son, aged 2 years, was dolichocephalic. His bowels were bad from birth. One great-grandson from another line of descent developed pellagra in 1913.

Case 83, one grandmother developed pellagra in 1910; the mother developed pellagra in 1909 and two sons developed the disease in 1913. One son died in infancy, cause unknown.

Case 132, one grandfather died in 1909 with pellagra and insanity. The grandmother developed pellagra in 1910. They had fifteen children, six of whom died in infancy. None of the children developed pellagra, but two grandchildren developed it in 1913.

Case 565, one maternal grandfather died of pellagra in 1909. The mother and son developed it in 1911 and the father, whose family history is negative, developed it in 1912.

In Group V, five pellagrins to a family, the sixty-one pellagrous parents had thirty-eight pellagrous children and 140 nonpellagrous. Eleven children were pellagrous in the same household with unaffected parents, and thirty-four unaffected brothers and sisters. Inherited weakness was traced to grandparents in three cases.

Case 308, one grandmother died of pellagra in 1900. The mother developed pellagra in 1910, her two sons in 1911, and the mother's sister in 1905. This sister had twins, who died three weeks after birth, and no other children.

Case 392, one grandfather died of chronic bowel trouble. The mother died of pellagra in 1910. Two daughters died of pellagra in 1908 and 1910. One son died of pellagra in 1910. One daughter, living, developed pellagra in 1911 and has recurrence yearly. She had eight children, two of whom died in infancy. (Fig. 19, R Family for other case.)

In Group VI, more than five pellagrins to a family, the thirty-one parents had twenty pellagrous children, and sixty-five nonpellagrous. Five children were pellagrous in the same household with unaffected parents and twenty-one unaffected brothers and sisters.

TABLE 3.—Comparative Incidence of Pellagra Among Children With Nonpellagrous Parents, With One Pellagrous Parent and With Two Pellagrous Parents

Group	Parents		Children	
	Pellagrous	Nonpellagrous	Pellagrous	Nonpellagrous
With nonpellagrous parents:				
I	0	58	32	84
II	0	41	23	43
III	0	81	45	60
IV	0	30	17	38
V	0	19	11	34
VI	0	10	5	21
Total	0	239	133	280
With one pellagrous parent:				
I	78	...	0	172
II	55	...	30	134
III	47	...	20	106
IV	26	...	17	54
V	55	...	38	124
VI	21	...	15	42
Total	277	...	120	632
With both parents pellagrous:				
I	4	...	0	19
II	10	. .	4	13
III	12	...	8	27
IV	6	...	0	16
V	10	...	10	23
VI	0	...	0	0
Total	42	...	22	98
Grand total	319	...	275	1,010

In Table 3 there are twenty-one matings of forty-two parents with both parents pellagrous. They have 120 children, twenty-two pellagrous and ninety-eight nonpellagrous. There are 277 matings of 554 parents with only one parent showing pellagra. They have 752 children, 120 pellagrous and 632 nonpellagrous. If pellagra were an heredi-

TABLE 4.—RELATIONSHIP EXISTING WHEN THERE WERE TWO OR MORE PELLAGRINS IN A FAMILY

Relationship*	Groups						
	I	II	III	IV	V	VI	All Groups
M and D only	..	13	7	3	6	5	34
M and S only	..	4	3	1	1	1	10
M, D, and S	..	..	4	4	4	1	13
M and any child	..	17	14	8	11	7	57
F and D only	..	6	2	1	3	1	13
F and S only	..	2	..	1	..	..	3
F, D, and S	..	..	1	..	..	..	1
F and any child	..	8	3	2	3	1	17
M, F and D	..	..	..	..	..	2	2
M, F and S	..	..	3	2	..	..	5
M, F, D and S	..	..	..	..	..	1	1
M, F and children	..	..	3	2	..	3	8
Total number of individuals of each class:							
Mother	63	45	40	27	49	21	245
Father	10	14	17	11	12	10	74
Daughter	12	27	21	20	20	18	118
Son	13	16	14	18	20	5	86
Total	98	102	92	76	101	54	523

* In this table M signifies mother; F, father; D, daughter, and S, son.

tary trait we might expect in the first instance ninety pellagrous children instead of twenty-two, and in the second instance at least 158 instead of 120. The 133 pellagrous children from unaffected parents would also demand explanation. Where did their susceptibility to the

disease originate? Again, the fact that in almost every instance the second or the third member of a family developed pellagra within a few weeks or months of the time of the incident case strengthens the indication that the disease is not transmitted by heredity.

In Table 4 there are 245 mothers in all groups, sixty-five, or 26.3 per cent., with pellagrous children, and 180, or 73.5 per cent., without pellagrous children, nearly three times as many without as with pellagrous children.

TABLE 5.—RELATIONSHIP OF PELLAGRINS IN FAMILIES WITH PELLAGRA IN THE THIRD GENERATION

1 grandmother (1911-1913)	.....	1 granddaughter (1914)	Direct
2 grandmothers (1893-1911) (1910-1913)	.....	1 grandson (1913)	Direct
1 grandfather (1912)	Mother (1913-1914)	2 granddaughters (1913-1914)	Direct
1 grandfather (1909)	[Grandmother] (1911)	2 granddaughters (1913)	Direct
1 grandfather (1912-1913)	Father (1912-1913)	1 grandson (1911-1912)	Direct
1 grandfather (1901)	Mother (1907-1913)	1 granddaughter (1911-1913)	Direct
1 grandmother (1910-1912)	Mother (1909-1913)	2 grandsons (1910-1913)	Direct
1 grandfather (1908)	Mother (1904-1913)	2 grandsons (1912)	Direct
1 grandmother (1910-1912)	Mother (1909-1913)	2 grandsons (1910-1912) (1913)	Direct
1 grandmother (1900)	2 mothers (1905) (1910-1911)	2 grandsons (1911-1912)	Direct
1 grandmother (1910-1914)	4 daughters (1910) (1913) (1914)	2 granddaughters (1914)	Direct
1 grandfather (1913)	Son-in-law (1912-1913)	1 granddaughter (1914)	Direct and indirect
1 grandfather (1910-1912)	Daughter-in-law (1912-1913)	2 grandsons (1913) (1914)	Direct and indirect
1 grandfather (1909)	Daughter and son-in-law (1911-1913) (1912)	1 grandson (1911)	Direct and indirect
1 grandmother (1910)	Son and daughter-in-law (1910-1912) (1910)	3 grandchildren (1912)	Direct and indirect
There are also 1 step-grandfather (1911-1914)	3 stepchildren (1910) (1910) (1913)	2 step-grandchildren (1910) (1913)	
1 step-grandmother (1912)	1 stepdaughter (1910-1914)	3 step-grandchildren (1912)	

There are seventy-four fathers in all groups, twenty-five, or 33.8 per cent., with pellagrous children, and forty-nine, or 66.2 per cent., without pellagrous children, nearly twice as many without as with pellagrous children. The frequency with which mother and daughter only are affected is nearly three and one-half times the frequency with

which the mother and son only are affected. The frequency with which father and daughter only are affected is four times that when father and son only are affected. There is no definite explanation of this excessive number of daughters affected, it may be partially explained by the greater prevalence of pellagra in girls between the ages of 15 and 20. This is not borne out, however, by the number of pellagrins of the two sexes in our study where we have 118 daughters and eighty-six sons. The question arises whether the closer contact of the daughter with parents in the mill villages studied may not be a large factor in this excess. The boys from the time they can walk until the time when they go to work in the mill spend most of the time, except when sleeping, on the streets.

TABLE 6.—CAUSES OF DEATH IN ADULTS

Groups	I	II	III	IV	V	VI	Total
Typhoid	..	32	17	9	8	26	92
Chronic bowel trouble or dysentery	3	10	9	7	5	14	48
Indigestion	..	5	6	3	5	19	38
Tuberculosis	..	12	2	10	12	17	53
Heart	..	8	1	4	2	10	25
Paralysis, without specified cause	..	15	2	6	3	5	31
Kidney trouble	..	8	4	3	2	3	20
Pneumonia	..	4	4	3	3	3	17
Dropsy, without specified cause	..	6	2	1	1	6	16
Cancer	..	4	1	2	2	3	12
Suicide	1	..	..	1	..	5	7
Asthma	..	4	..	2	..	1	7
Rheumatism	..	4	2	..	..	1	7
Epilepsy	..	1	4	7	..	..	12

There are fifteen families in which grandparents are affected. These have been counted as members of one family, although the descent is not always in a direct line. The relationships are shown in Table 5.

If there were a sufficient number of cases, this table would appear to indicate heredity, but when we consider the 596 parents in our study and find that they should have had over 2,000 grandfathers, the number of affected grandparents, namely, fifteen, is an insignificant quantity.

In every instance except the last two cases, the disease has occurred coincidentally or within a year or two in the grandparents and the other members of the family. In every instance except the two last men-

tioned, there has been direct family contact. Lombroso says: "Often the influence of heredity is not demonstrable because the grandparental influence escapes the slight interest of the poor country people, although atavistic heredity is more common than from father and mother." Strambio wrote that the greater part of pellagrins are born of pellagrous parents, and that the offspring of these has a decided disposition for taking the disease. A study of these same families during twenty or thirty years would be necessary to confirm this statement.

Accurate death reports were impossible to obtain, but wherever the causes of death were actually known they were recorded.

TABLE 7.—CAUSES OF INFANT DEATH

Diseases	Groups						
	I	II	III	IV	V	VI	Total
Bowel trouble or dysentery	8	2	4	4	15	5	38
Whooping-cough	3	2	..	..	6	1	12
Hives	3	1	3	..	2	2	11
Pneumonia	2	2	1	..	4	2	11
Catarrh of stomach	3	2	1	..	2	..	8
Cholera infantum	1	1	2	1	..	2	7
Thrush	3	..	..	..	2	1	6
Marasmus	1	2	1	..	..	1	5
Meningitis	2	..	..	1	..	1	4
Measles	..	1	1	..	..	1	3
Peritonitis	1	..	..	..	..	1	2
Born dead	..	..	..	..	10	3	13
Unknown	62	35	26	12	23	24	182
Total known	27	13	13	6	41	20	120

No record was made of deaths from diphtheria, scarlet fever, malaria, measles, erysipelas or smallpox.

Table 6 is of value only in showing the relatively high proportion of typhoid fever and stomach and bowel trouble in the families in which there were more than one pellagrin.

Under the date of Oct. 23, 1909, Acting-Assistant Surgeon Sams[1] of the U. S. P. H. S. reported from Charleston as follows: "Pellagra, as such, has but recently been recognized in this city, the first case

1. Sams: Pub. Health Rep., 1909, xxiv, 1657.

having come under treatment in March, 1908. There is a very general impression among the local physicians that pellagra has existed in the city for probably twenty years or more, and been incorrectly diagnosed as eczema, dysentery, intestinal tuberculosis, etc., with dementia as a complication, or the reverse."

J. W. Babcock,[2] M.D., superintendent of State Hospital for Insane, Columbia, S. C., adds several others: "syphilis, malaria, acute delirium, hookworm, dermatitis exfoliativa, tuberculosis of the skin, liver spots, scurvy, neurasthenia, meningitis, nurse's sore mouth, sprue, meningo-encephalitis, neuritis, etc."

This table simply shows a record of the infant deaths in the households visited. It was impossible to get any account of the number or causes of infant death outside of the households of those visited. It is worthy of note that of the 120 deaths for which causes were assigned, there were seventy-two suggestive of stomach or intestinal disease.

C. Lombroso[3] in 1898 wrote:

> There are pellagrous and pseudopellagrous conditions which are even harder to diagnosticate than complicated pellagra, because the pellagra, while it is present, has not been able fully to develop. Here belongs a type which I designate hereditary pellagra. It occurs in a very severe and a very mild type. It is noticeable at the end of the second year of life, rarely with desquamation, more frequently with pains in the epigastrium, pyrosis, "Heisshunger," uncertain gait, timidity, diarrhea, a yellowing of the skin as in malaria-cachexia, retardation and cessation of development; but later all symptoms of pellagra appear and resist strongly any treatment. . . . In many cases I found a bad formation of the skull, exceptional brachycephaly or dolichocephaly, fleihende (retreating?) forehead, badly set ears, asymmetry of face, anomalies of genitalia.

A complete census was taken in two mill villages. The children in every family, whenever possible, were inspected, and no difference such as Lombroso mentions could be seen between those in pellagrous homes and those in nonpellagrous homes.

In every group except Group I the ratio of adult women with children to adult women without children is about three to one. There are four sets of pellagrins, namely, adult females without children, adult males with children, girls and boys under 20, of whom the number in each group is almost the same. We have not been able to attach any significance to this equality in number. In all groups the average age of incidence in boys is 11 years, in girls 14 years, in adult females 35 years, and in adult males 52 years. The earliest age at which the disease developed was in a boy of 15 months, and the oldest was in a man of 82 years, while in women and girls the youngest was 18 months and the oldest 78 years.

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2. Babcock, J. W.: A Study of Local Medical History, Am. Jour. Insan., 1912, lxix, 1.

3. Lombroso, C.: Die Lehre von der Pellagra, p. 116.

TABLE 8.—Pellagrins Under Twenty Years of Age, and the Relative Proportion of Adults Who Have Borne Children

	Groups						
	I	II	III	IV	V	VI	Total
Adult females with children	63	45	40	27	49	21	245
Adult females without children	10	13	15	10	16	6	70
Girls under 20 years	10	14	16	14	13	12	79
Total female	83	72	71	51	78	39	394
Adult males with children	10	14	17	11	12	10	74
Adult males without children	2	1	2	1	5	1	12
Boys under 20 years	10	15	12	17	15	6	75
Total male	22	30	31	29	32	17	161

TABLE 9.—Association of Pellagrins With Antecedent Cases

	Groups						
	I	II	III	IV	V	VI	Total
Association outside family	37	19	12	7	14	8	97
Association within family	0	36	46	51	55	33	221
Endemic neighborhood	46	20	8	3	19	3	99
Negative history	22	27	36	19	22	12	138
Total number pellagrins	105	102	102	80	110	56	555

ASSOCIATION STUDY

An effort was made to find to what extent pellagrins had associated with the antecedent cases. The pellagrins studied have been grouped as follows:

1. Those who associated with pellagrins outside of the family.
2. Those who associated with pellagrins in the family.
3. Those who could give no history of association, but lived in endemic neighborhood.
4. Those who could give no history of contact.

A negative history does not mean that there had been no contact, but only that the pellagrin does not know of contact.

Table No. 9 shows positive association in 318 cases, with a possible association in the ninety-nine cases more living in endemic neighborhoods, against 138 with negative history.

CONCLUSION

An analysis of the data collected shows no evidence of direct heredity. There may, however, be an hereditary predisposition to the disease in those families in which chronic gastro-intestinal symptoms have existed for several generations. The relatively high proportion of gastric and intestinal diseases among pellagrous families would seem to substantiate this hypothesis. Of the 105 families in which there is only one case of pellagra, only three give history of intestinal or skin diseases in the ancestors, and only 1 gives history of antecedent insanity. With this predisposition to the disease, direct contact or life in endemic sections might be the exciting factor necessary for its development.

The abstracts of family histories and charts which follow will serve to show the manner of studying family groups.

The symbols used in the charts are the following:


Square indicates male.

Square with Pl inside indicates male pellagrin.

Square with question mark inside indicates pellagra questionable.


Circle indicates female

Circle with Pl inside indicates female pellagrin.


Diamond indicates sex unknown.

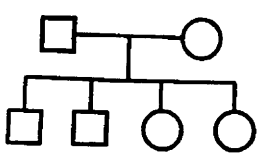
d. inf. indicates died in infancy.

Number within square or circle indicates number of children of that sex.

Year number under symbol indicates incidence and recurrence of pellagra.

A indicates alcoholic; B indicates blind; D indicates deaf; D M indicates deaf mute; E indicates epileptic; F indicates foolbminded; I indicates insane; T indicates tubercular; d indicates died; P indicates paralysis.

Each horizontal line represents a generation, the symbols for the individuals of a fraternity (full brothers and sisters) being on the same horizontal line. This line is connected by a vertical line to a line joining the symbols of father and mother.


Indicate husband and wife.

Indicate brothers and sisters.

Broken lines indicate illegitimacy.


Hand indicates earliest recognized case in family.

Fig. 1.—This chart gives an explanation of the symbols that are used in the succeeding illustrations of this article.

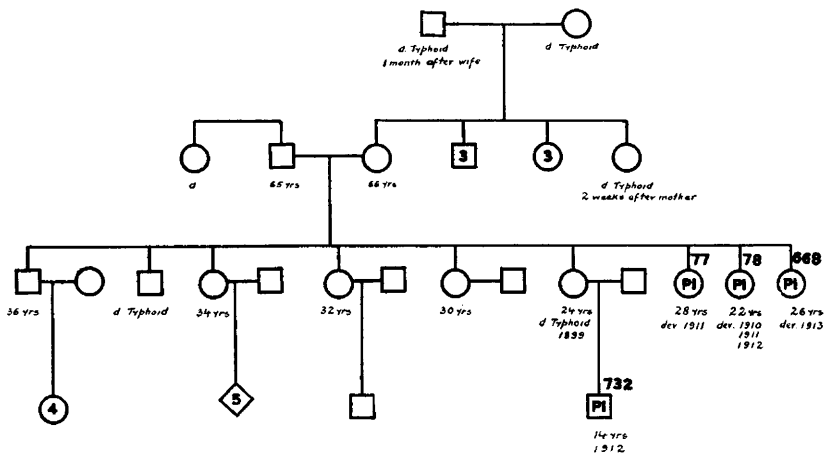


Fig. 2 (N Family).—The N family is in comfortable circumstances, two of the daughters being teachers. The first to develop pellagra was Pellagrin 78, B. N., aged 22, who clerked in a store from 1906 to 1909 and attended a "female college" from 1909 to 1911. She is now teaching. In June, 1910, pellagra developed with light erythema on hands, and in 1911 she had skin and gastro-intestinal symptoms; in 1912 only skin symptoms. Pellagrin 77, G. N., aged 28, did the housework at home and slept in the same room with her sister. In the spring of 1911 she developed pellagra, which recurred in 1912, but was not present June 30, 1913, when visited.

Pellagrin 668, T. N., aged 26, a teacher, developed an acute attack of pellagra in 1913 at Good Samaritan Hospital, while there for a minor surgical operation. She had a very slight recurrence in 1914. The parents of these young women are living and well.

Pellagrin 732, E. S., aged 14, a nephew, lived with his aunts for six months in the winter of 1911 and developed pellagra the next year, 1912. He was not seen in 1913 or 1914 and it is not known whether he had a recurrence. His mother died in 1899 with typhoid fever. There were five deaths in this family from typhoid (see chart).

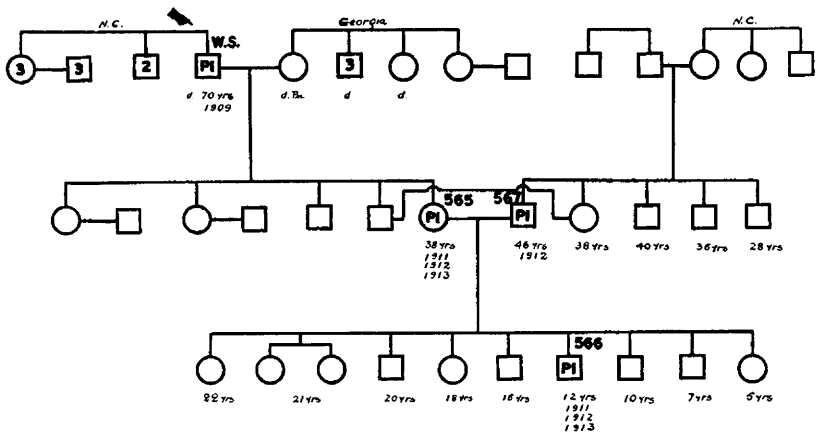


Fig. 3 (B. S. Family).—The father of Pellagrin 565, W. S., and his family lived in North Carolina. Mortality statistics were not available. W. S. died, aged 70 years, of pellagra, in North Carolina in 1909. He was nursed by his daughter, Pellagrin 565. His wife had died previously from pneumonia. Her family is in Georgia. Nothing definite could be learned concerning his illness. His daughter said that the gastro-intestinal symptoms were most pronounced, but he had also marked discoloration over hands, feet and shoulders. Three months previous to death there were marked mental symptoms.

Pellagrin 565, I. B., came with her husband to S, mill village, in 1910. She had good health until 1911. Then erythema, stomatitis and diarrhea developed. She had a typical recurrence in 1912 and very slight recurrence in 1913. Her husband, Pellagrin 567, W. F. B., aged 46 years, a mill worker, developed the disease in 1912. He did not show any recurrence of the erythema, but for four months in 1912 his other symptoms were quite severe. He had always lived in North Carolina, and his family is still there and are not known to have any disease. His father and mother and his aunts and uncles are all living and well.

They have ten children, ranging in ages from 22 years to 5 years. Only one showed pellagra, Pellagrin 566, H. B., who developed it the same time his mother did, and had recurrences in 1912 and 1913. He seemed to be as well as the other children previous to the attack.

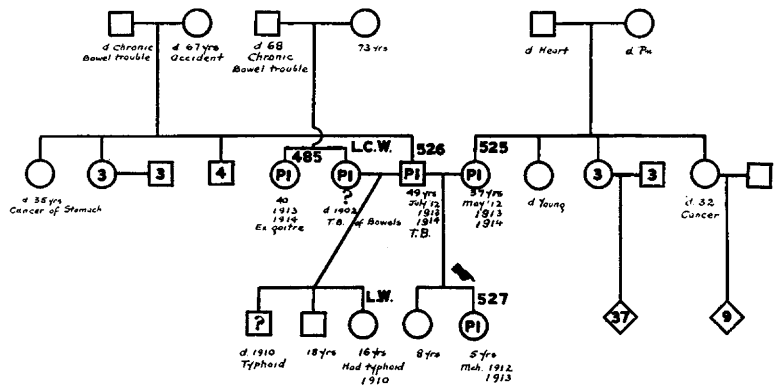


Fig. 4 (Wl. Family).—L. C. W., the first wife of Pellagrin 526, died in 1902 of tuberculosis of the bowels. Since pellagra has been recognized, the family thinks the cause of death was pellagra instead of tuberculosis. She left three children, one of whom, L. W., had typhoid fever May 28, and died in November, 1910. His symptoms were very similar to those of pellagra. One daughter, L. W., had typhoid (?) at the same time, but recovered in two months. One son, aged 18 years, is living and well.

Pellagrin 485, S. C., aged 40 years, sister of L. C. W., developed a well-marked case of pellagra in 1913. She had marked nervous and mental symptoms. There was no recurrence of erythema in 1914, but there was great nervousness and weakness. As she has exopthalmic goiter in a pronounced form, these symptoms may be due to that condition. Her mother is living and well, but her father died several years ago with chronic bowel trouble. There has been and is close association between this family and the family of Pellagrin 526.

Pellagrin 527, E. W., aged 5 years, daughter of second wife of Pellagrin 526, had whooping-cough in January and February, 1912, and in March, before she recovered, had a well-developed attack of pellagra. There was a slight recurrence of symptoms in 1913; no recurrence in 1914. Her sister, 8 years of age, shows no symptoms.

Pellagrin 525, B. W., second wife of Pellagrin 526, aged 37 years, had typhoid in 1892 and dysentery for several years following, in the summer. In May, 1912, she developed a typical case of pellagra with erythema, diarrhea and great weakness. The diarrhea continued through the winter. There were recurrences in 1913 and 1914. Her general health is improving, however. There is no history of any bowel trouble in her family. Her father died with heart trouble and her mother with pneumonia. One sister died young, cause unknown, and one married sister died, aged 32 years, with cancer of stomach. She fell and injured herself and the cancer is supposed to have resulted from the injury.

Pellagrin 526, C. J. W., aged 49 years, developed pellagra in July, 1912, and had recurrences in 1913 and 1914. He was also tubercular and became very much emaciated and excessively weak. He was in hospital for treatment in 1913; much improved in 1914. One of his sisters died, aged 35 years, of cancer. She was paralyzed at 5 years and used a wheeled chair for 30 years. The father of Pellagrin 526 died with chronic bowel trouble and his mother was thrown from a carriage when 67 years old and died from result of injury.

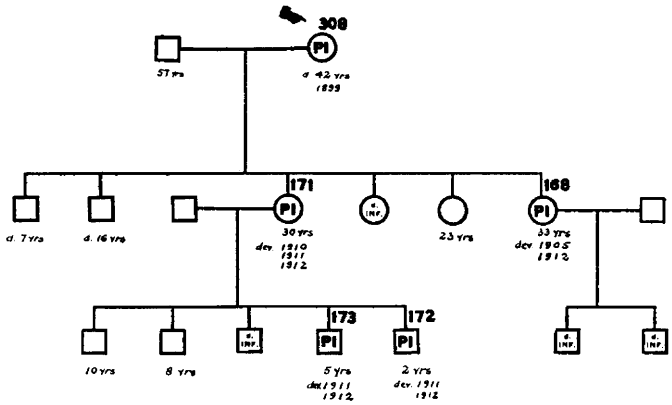


Fig. 5 (J. Family).—Pellagrin 308, E. D., mother of Pellagrin 168, died, aged 42, in 1899, on a farm in Spartanburg County. She had been in bad health for twenty years, and had skin lesions for seven years before death. She had scaling of skin of hands and severe bowel trouble. Her mind failed two years before death. The doctor who attended her thinks she undoubtedly had pellagra. The father of Pellagrin 168 is still living, aged 57 years. No one in his family is known to have pellagra. There were six children. Two boys died young—causes unknown. One daughter died in infancy; one unmarried daughter is living, apparently normal. The two remaining daughters are pellagrins.

Pellagrin 168, C. J., aged 33, worked in the mill, but for the last eight years has done housework. She cared for her mother in her last illness. All three sisters were at home during this time. Pellagrin 168 had typhoid fourteen years ago, the year following her mother's death. In June, 1905, the first typical pellagra symptoms were noticed. There has been a recurrence every year, but symptoms were most severe in 1911 and 1912. She had two sons, who died when a few weeks old; no other children. Her sister, Pellagrin 171, B. J., aged 30 years, had a bad attack of dysentery eight years ago, after the second child was born. She has not been strong since. In March, 1910, she lost her baby; did not gain health afterward; in October of the same year showed typical skin and intestinal symptoms; had recurrence in 1911 and 1912. Her husband's family is said to be free from pellagra. They had five children: two sons, aged 10 and 8 years, living and well; one son died in infancy. Pellagrin 173, W. J., had severe illness when 21 months old. He had spasms and does not talk well. His first pellagra symptoms, erythema and diarrhea, appeared in July, 1911, with recurrence in June, 1912. Pellagrin 172, A. J., was 15 months old when he showed typical symptoms in June, 1911; had a very light attack with recurrence in 1912.

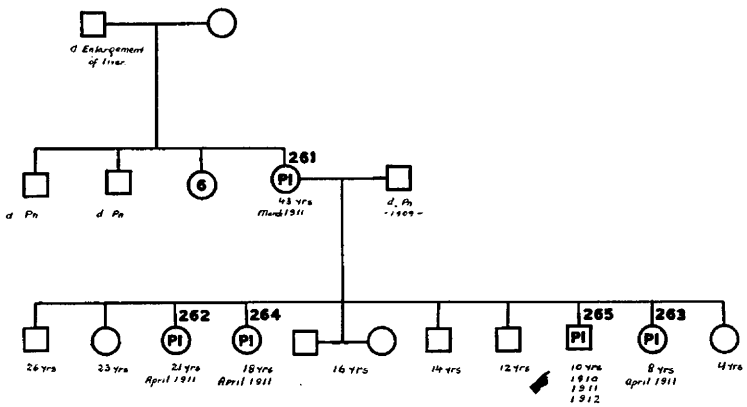


Fig. 6 (Sc. Family).—Pellagrin 261, Mrs. J. S., came originally from Tennessee, where her family all live now. Her father died of enlargement of liver, and her mother and six sisters are still living. Two brothers died of pneumonia. Her husband, Q. S., died in 1909 in Oklahoma, of pneumonia. After his death she came to South Carolina and settled in mill village B, where her son, Pellagrin 265, F. S., aged 10 years, developed pellagra in 1910. He had a marked erythema of hands, feet and legs. In 1911 there was a recurrence of erythema and dysentery. Pellagrin 261, the mother, was the next in the family to develop the disease, March, 1911. She was born in 1870, had typhoid many years ago, and malaria three years ago. In March, 1911, she had typical erythema of hands and forearms followed by stomatitis, diarrhea and general weakness. There were no definite symptoms in 1912, but she was not well during the summer. Every year since 1911 she has had diarrhea and weakness. Her mind seems dull; she is listless and stupid. It is difficult to tell whether this is the result of disease or habit.

In April, 1911, three other children, Pellagrins 262, 263 and 264 all developed pellagra. Pellagrin 262, M. S., aged 21 years, had erythema of hands and arms which lasted four months. There was no recurrence in 1912. In 1913 her hands were very red during May and June, but it was attributed to sunburn, although she works in the mill all day. Pellagrin 263, H. S., aged 8 years, had erythema of hands and feet, with severe stomatitis and diarrhea. There was a recurrence in 1912; not present in 1913. Pellagrin 264, M. S., aged 18, had simply erythema of hands and arms without other symptoms. This recurred in 1912, but was not present in 1913. There are four sons and three daughters ranging from 26 years to 4 years, not affected.

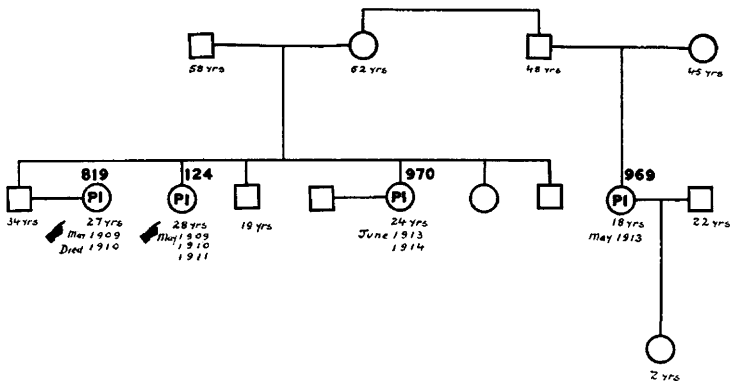


Fig. 7 (T. H. Family).—This family lived in one of the most insanitary mill villages visited. There has been much pellagra there in the last ten years, and there was an outbreak of it in 1909. The father and mother are living, strong and sturdy. They had six children, two of them pellagrins. The wife of one of the sons was also a pellagrin.

Pellagrin 124, O. T., aged 28 years, and her sister-in-law, Pellagrin 819, aged 27 years, developed pellagra about the same time, May, 1909. Pellagrin 819 lost strength rapidly and died in 1910. There were no children. Pellagrin 124, O. T., lived at home, and although she slept with a younger sister, the latter did not contract the disease. She had erythema, stomatitis and later developed diarrhea and dysentery. There were recurrences in May, 1910, and June, 1911, but there has been no recurrence since. In June, 1913, her sister, Pellagrin 970, M. H., also developed the disease. She had married and left home. She had a recurrence in June, 1914. Her cousin, Pellagrin 969, Mrs. J. L., aged 19 years, living near, and next door to a pellagrin, also developed the disease in May, 1913. She has a child 2 years old, not affected.

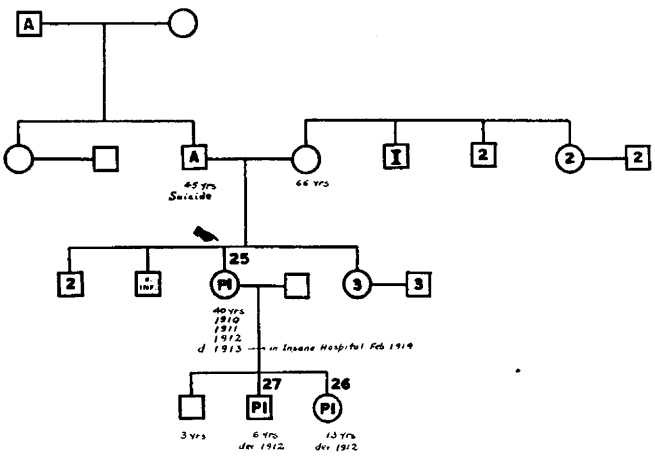


Fig. 8 (G. Family).—Pellagrin 25, J. G., born in 1872 in Georgia, married in 1897. She worked in a mill until 1906; then did housework. In 1908 she had hookworm disease followed by nervous exhaustion and physical debility. She was in the insane hospital when pellagra developed, April, 1910. She recovered sufficiently to go home; had a second attack from May to July, 1911, and a third attack in June, 1912. Her mental condition grew progressively worse, until, after a fourth attack in June, 1913, she was taken to the insane hospital, where she died in February, 1914. She had three children, two of whom were pellagrins. Pellagrin 26, E. G., born in Georgia in 1899, was a healthy child, well developed. In June, 1912, she showed skin and intestinal symptoms of pellagra. Pellagrin 27, C. G., born in 1906 in Georgia, developed pellagra about the same time. These children did not have a recurrence in 1913. They were not seen in 1914. They are now living out of the county. The father of Pellagrin 25 was alcoholic and committed suicide when 45 years of age. The paternal grandfather was also alcoholic. The mother, aged 66, is well and strong and nursed Pellagrin 25 when her mental condition was bad. Two maternal aunts and two maternal uncles are normal. One maternal uncle is insane (manic depressive?). He is in the hospital off and on. They live in Georgia—information meager. None of these relatives are known to have pellagra.

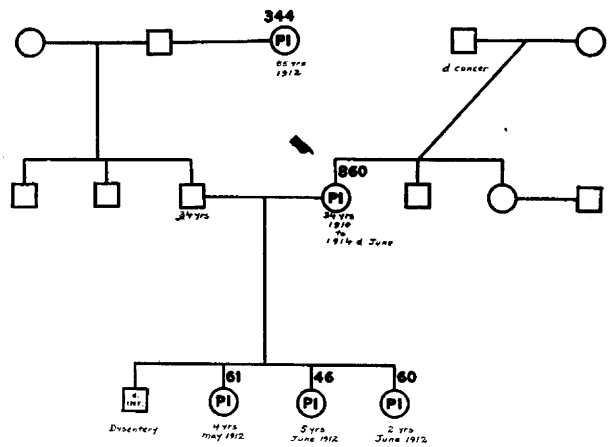


Fig. 9 (Q. Family).—Pellagrin 860, L. Q. S., aged 34 years, was a millworker in S mill village. She developed a typical case of pellagra in 1910, with a slight recurrence each year until June, 1914, when she died. These attacks were not severe enough to interfere with her work at the mill until late in the fall of 1913. Nothing could be learned of her family—she was even reticent concerning her own symptoms. Her husband is living and well. His father died of cancer.

They had four children. One boy died in infancy of dysentery. The three girls are all pellagrins. After they left North Carolina the family came to S mill village into an endemic neighborhood, a severe case of pellagra living three doors away. Pellagrin 61, L. S., aged 4 years, showed first symptoms May 1, 1912. In June of the same year both sisters, Pellagrin 46, aged 6 years, and Pellagrin 60, E. S., aged 8 years, showed typical symptoms. There was no recurrence in 1913 or in 1914.

Late in the summer of 1912 Pellagrin 344, Mrs. A. S., the children's stepgrandmother, who lives with them, developed suspicious symptoms, having severe dysentery and discoloration of skin and peeling. She cared for them while parents were in the mill. In 1913 she was improving and denied having had pellagra.

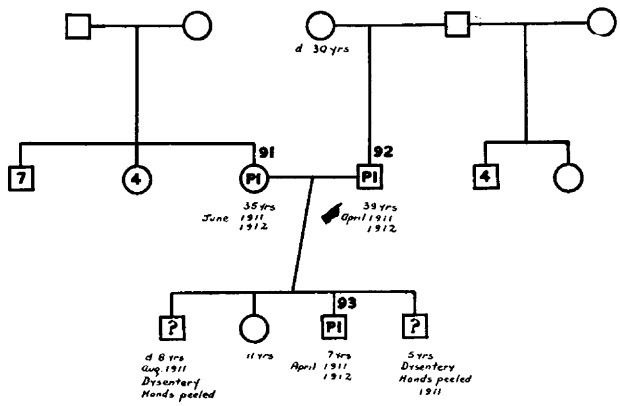


Fig. 10 (Cd. Family).—The Cd. family lived next door to a pellagrin. Mr. J. C., Pellagrin 92, aged 39 years, was a store-keeper from 1909 to 1911 in an endemic center of D mill village. Later he worked in the mill. Late in April, 1911, he developed a well-marked case of pellagra. He had a definite recurrence in 1912. His son, Pellagrin 93, F. C., had developed the disease early in the same month, and he also had a recurrence in 1912. There were three other children. The oldest, a girl 11 years of age, has never shown any symptoms, but both boys are uncertain. A boy, aged 8 years, died in 1911 with dysentery. His hands peeled; and a younger brother, aged 5 years, who is living, also had dysentery and peeling of the hands the same year. These two were reported by the mother in 1912.

The mother took care of the children, and in June she also developed the disease. She had a recurrence in 1912. Her mother, father, seven brothers and four sisters have never shown any symptoms of pellagra.

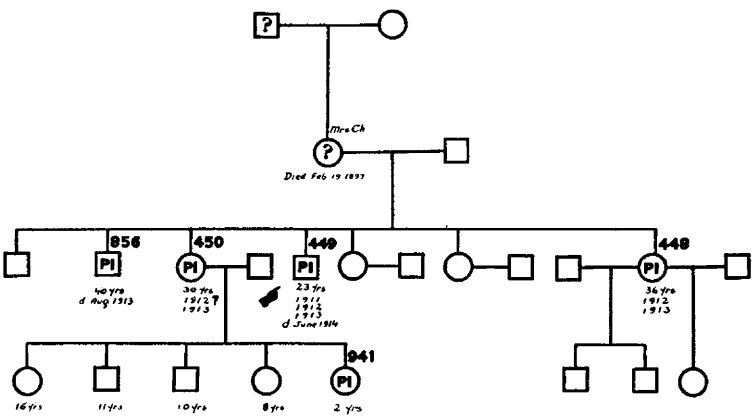


Fig. 11 (Ch. Family).—The maternal grandfather of the Ch. family is said to have died with symptoms resembling pellagra in October, 1896. He lived on a farm in North Carolina, twenty-five miles from his daughter's family. The mother, Mrs. Ch., had recurrent spring attacks of stomatitis, bowel trouble and breaking out of hands and face. Her mind was affected toward the last. She was sick about four years and died Feb. 19, 1897. All the children were living at home while she was sick. Four of them have since developed pellagra. Pellagrin 449, R. C., aged 23, developed pellagra in 1911 or 1912 in Kentucky or North Carolina. In 1913 he visited his sister, Pellagrin 450. He was in a run-down condition, but secured work in the mill and remained with his sister through 1913 and 1914. He grew gradually worse and died in the City Hospital in June, 1914. His sister, Pellagrin 450, aged 30, has had sore mouth and stomatitis for six or seven years. Pellagra was not recognized, however, until 1912. Her hands peeled definitely in 1913. There was no recurrence in 1914.

She has five children, none affected except the youngest, Pellagrin 941, C. C., aged 2 years. She developed gastro-intestinal trouble in January, 1913, and showed her first erythema in May, 1914. She was very fond of her Uncle Bob, Pellagrin 449, and slept with him even after he was confined to bed. They used a common drinking cup. Pellagrin 448, F. D., aged 36, developed pellagra while living in Kentucky in 1912. She later came to a mill village near S; had a recurrence in 1914. Pellagrin 856, H. C., aged 40 years, has had bowel and stomach trouble every spring for three years. He visited in the homes of Pellagrin 448 and Pellagrin 449, staying some nights with one and some with the other. He has been insane since 1912. No erythema was noticed until June, 1913. He died in August, 1913, in North Carolina.

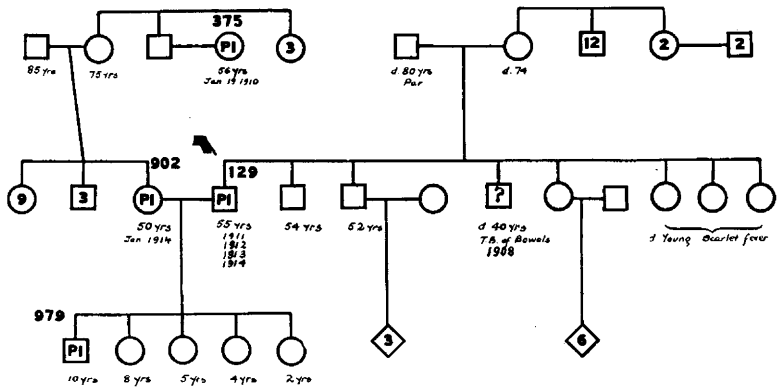


Fig. 12 (T. Family).—Pellagrin 129, aged 55 years, was a farmer in well-to-do circumstances. In 1909 he had a severe attack of typhoid fever, from which he has never fully recovered. In 1911 he developed pellagra, with severe gastro-intestinal symptoms. He has had a recurrence every year since. He became too weak to run his farm and moved to town. His family history is negative, except possibly one brother, who died in 1908 of tuberculosis of the bowels. Pellagrin 902, E. T., aged 50 years, wife of Pellagrin 129, developed a severe attack in 1914. She was taken to the New York Post-Graduate Hospital. She returned during the summer much improved, but still very weak. They have five children, only one of whom has pellagra. This son, Pellagrin 979, R. T., aged 10 years, developed severe erythema with slight intestinal symptoms in July, 1914. He sleeps with his father. The mother and baby sleep together and the three unaffected girls sleep in another room.

Pellagrin 375, D. C. T., aged 56 years, the maternal aunt of Pellagrin 902, developed pellagra in 1909, the same year that Pellagrin 129 had typhoid. She had a severe attack and died Jan. 19, 1910. No history could be obtained of the causes of death of ancestors in either husband's or wife's family. Pellagrin 902 has nine sisters and three brothers living, not affected.

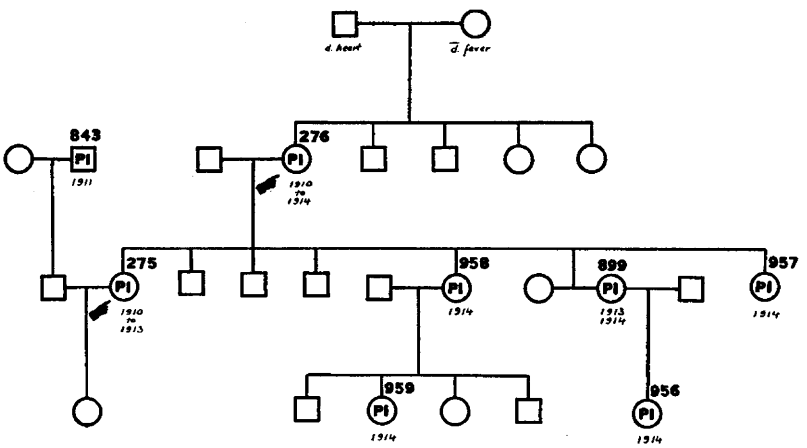


Fig. 13 (W. Family).—In the spring of 1910 Pellagrin 276, Mrs. M. W., and Pellagrin 275, Mrs. E. W., mother and daughter, developed pellagra about the same time. They were both in good physical condition, but Pellagrin 276 gave a history of dysentery in the summer for three years prior to 1910. They had both visited Pellagrins 352 and 825, cases with very severe symptoms. The mother, Pellagrin 276, aged 50 years, had recurrences in 1911, 1912, 1913 and 1914. There has been severe mental disturbance from the beginning of the disease, and when seen in June, 1914, her mind was almost a blank. She was greatly emaciated and a great care to her family. Her ancestors and fraternity are negative to pellagra. Of eight children, four are pellagrins; she has also two pellagrous grandchildren. This family lived in mill village A from 1910 to 1912, when they moved to the country and remained there until June, 1913. They then returned to mill village A and moved into a house just vacated by a pellagrin.

Pellagrin 275, Mrs. E. W., aged 22 years, who developed the disease the same year her mother did, had recurrences in 1911, 1912 and 1913, with a slight return of stomatitis and erythema Aug. 1, 1914. Pellagrin 843, Mr. M. W., father-in-law of Pellagrin 275, was a frequent visitor at his son's house. In 1911 he had a sharp and severe attack of pellagra, but there has been no definite recurrence. In August, 1913, Pellagrin 899, Mrs. W. W. L., another daughter of Pellagrin 276, had all the typical symptoms of pellagra, which recurred with lessened severity in May, 1914. Her daughter, Pellagrin 956, R. L., aged 4 years, developed pellagra in May, 1914. Pellagrin 957, A. W., another daughter of Pellagrin 276, aged 18 years, developed pellagra in February, 1914, and her hands were peeling when Pellagrin 959 developed the disease. Pellagrin 958, Mrs. M. W. P., another married daughter of Pellagrin 276, living next door, aged 23 years, developed the disease in February, 1914, and the gastro-intestinal symptoms were still present in August, 1914. She was a daily visitor at her mother's home. In March, 1914, Pellagrin 959, I. P., daughter of 958, aged 6 years, developed the disease. When seen this child was on the bed by the grandmother, and it is certain that the association was very close in all of these cases.

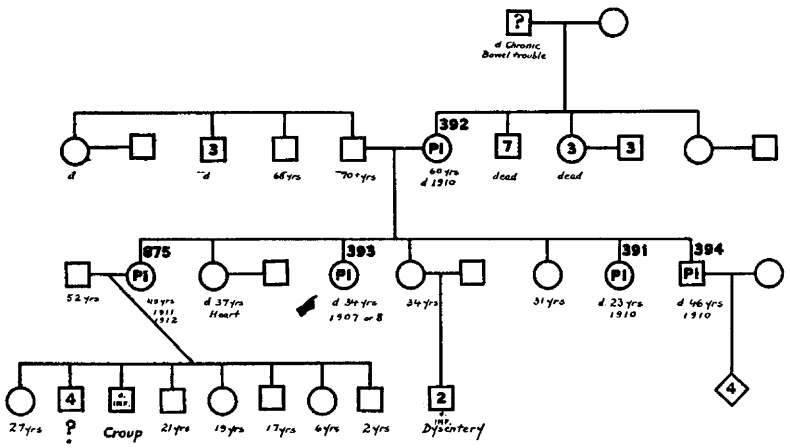


Fig. 14 (H. L. Family).—The first authentic case in the family is Pellagrin 393, M. H., aged 34 years. Hers was one of the early cases of pellagra in Spartanburg County, and she died either in 1907 or 1908. Her mother, Pellagrin 392, A. B. H., aged 60 years, had suffered for several years with chronic bowel trouble and recurrent erythema. She had a stroke of paralysis in 1908. She lost strength rapidly and died in 1910, after being helpless nearly two years. She had seven brothers and three sisters, all dead. None of them were known to have had any signs of pellagra. Her husband, F. A. H., is still living, over 70 years of age. He has one brother living and well. The rest of his family are dead.

There were seven children, four of whom had pellagra. One daughter died at the age of 37 years with heart trouble. One daughter, living and well, lost both her boys in infancy with dysentery. The only son, Pellagrin 394, J. H., aged 40 years, died with pellagra in August, 1910, the same year his mother and sister died. Pellagrin 391, E. H., aged 23 years, died in the State Hospital for the Insane May 15, 1910.

The following year another sister, Pellagrin 875, M. L., aged 45, had severe erythema and gastro-intestinal symptoms, with a recurrence in 1912. Her husband is living and well and there is no history of pellagra in his family. They had six living children ranging in ages from 27 to 2 years, not affected. Five children died in infancy.

It is questionable whether the father of Pellagrin 392 did not die with pellagra. He died with chronic bowel trouble, and the neighbors say he had erythema and mental derangement before death.

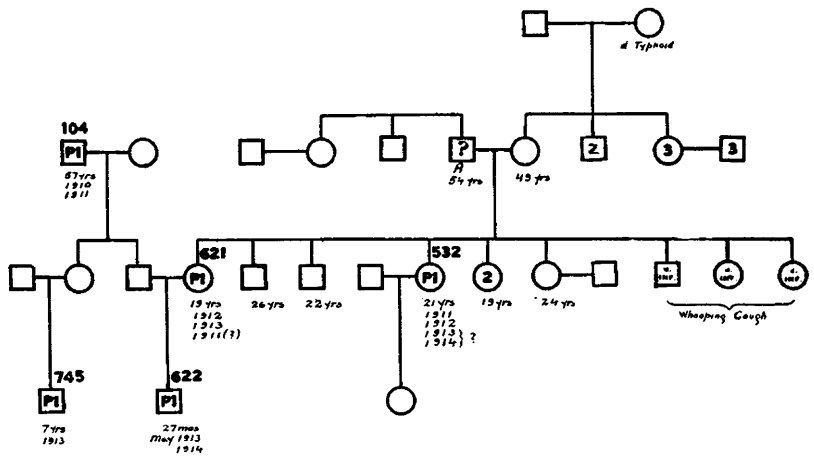


Fig. 15 (P. W. Family).—Pellagrin 104, N. P., aged 57 years, a mill operative, was in good physical condition until the spring of 1910, when he developed a severe case of pellagra. He had severe gastro-intestinal symptoms, stomatitis and erythema. He soon became prostrated and was obliged to give up his work. His wife was afraid that she would contract the disease, so it was necessary for him to visit around among his relatives to get the necessary care. He spent much time with Pellagrin 621, a daughter-in-law, and with his daughter, the mother of Pellagrin 745. He became a little better in the winter, but in the spring of 1911 he had a recurrence. No history of his antecedents was obtainable.

Pellagrin 621, B. P., aged 19 years, waited on her father-in-law in 1910. In 1911 her hands and arms peeled, and it was thought she had pellagra, but no other symptoms developed, and the diagnosis was questionable until 1912, when she had a recurrence with stomatitis and erythema. There was also a recurrence in 1913. In 1914 she was working in the mill, having separated from her husband. She and her son were living at her father's. Her son, Pellagrin 260, H. P., 27 months old, developed pellagra in 1913. When seen in 1914 there was a very slight erythema on the hands and forearms and a slight diarrhea.

In 1911 Pellagrin 532, Mrs. A. B., aged 21 years, sister of Pellagrin 621, developed a well-marked case of pellagra. She lost weight and became apathetic and depressed. She had recurrences in 1912 and 1913, but the symptoms were more mental than physical. She has a daughter not affected. She and her sister visited frequently, and in addition to this, she lived next door to a pellagrin, their water-closets adjoining. Pellagrin 621 and Pellagrin 532 have two brothers and three sisters, never affected. One brother and two sisters died in infancy with whooping-cough. Their father is alcoholic. He is living, aged 54 years, in the country near one of the mill villages in which pellagra is endemic. He had some vague symptoms which the family thought might be pellagra, but the diagnosis was not confirmed. The mother is living and well. Her family, two brothers and three sisters, are negative to pellagra.

Pellagrin 104 has had no recurrence of pellagra since 1911. He still visits around, spending much time with his daughter. Her son, Pellagrin 745, P. C., aged 7 years, is very fond of his grandfather and is with him constantly when opportunity offers. In 1913 he developed a well-defined case of pellagra.

(Query: If pellagra is a germ disease, in what way can it be carried from one person to another? Can a person be a carrier of the disease after he is apparently well?)

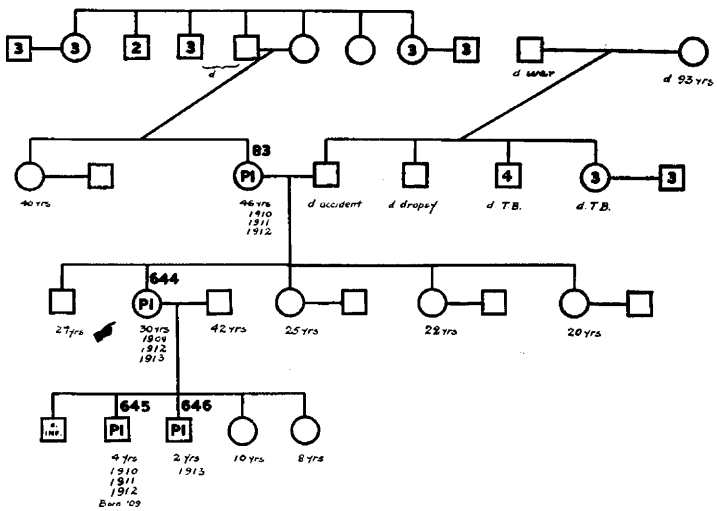


Fig. 16 (F. S. Family).—Pellagrin 83, I. F., 46 years of age, was born in North Carolina. She had typhoid fever twenty-one years ago, since which time her general health has been good. She developed pellagra in June, 1910, while living in W mill village. It recurred in August, 1911, and again in 1912. No details could be obtained of her ancestors except that her father and three uncles died in the war, and the others are living in North Carolina; no history of pellagra in any of them. She has one sister, 40 years of age. Her husband, A. F., died of an accident to his head. His family all died young, one brother with dropsy, four brothers and three sisters with tuberculosis.

Pellagrin 83 had five children ranging in ages from 30 years to 20 years, only one of them having pellagra. Pellagrin 644, A. S., the oldest child, born in North Carolina in 1883, had asthma and heart trouble. She moved to Spartanburg County and the first symptom of pellagra appeared in April, 1909. It was quite mild, as she was four months pregnant. Her baby was born in September, 1909. Her second attack was in 1910, but there was no erythema on the hands. The third attack occurred in 1911, but without erythema on hands; fourth attack occurred in 1912 with stomatitis; fifth attack, in 1913, mild, but with definite and typical eruption. She has lost 22 pounds in two years. She has had five children: One son died in infancy, two daughters are well, and two children born while she had pellagra have both developed the disease.

Pellagrin 645, F. S., born in September, 1909, developed pellagra in March, 1910, and has had recurrences in 1911, 1912 and 1913. Pellagrin 646, A. S., born in September, 1911, developed the disease in 1913. These children have had slight attacks of erythema with rather severe intestinal symptoms.

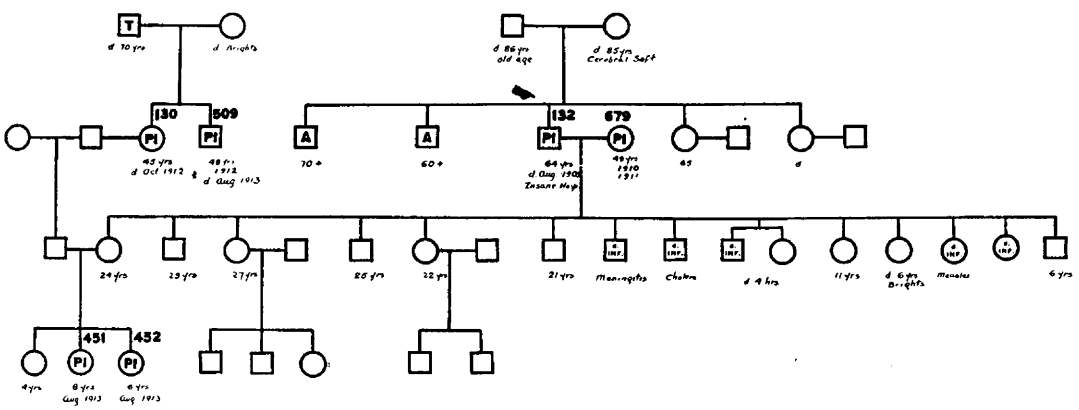


Fig. 17 (S. B. Family).—The S. B. family history is offered to show the way pellagra seems to be transmitted to others by close association. The earliest known case in this family was Pellagrin 132, Mr. J. B., aged 64 years. He was naturally a strong man, slightly but not excessively alcoholic. His digestion had been impaired for several years. He was a mill worker in mill village S and lived in an endemic area. He developed pellagra in the spring of 1909. He had marked erythema, severe diarrhea and decided mental disturbance. He grew rapidly worse and was taken to the State Hospital for the Insane, where he died in August, 1909. His wife denies that he had pellagra. She says that he had sunburn and died of cerebral softening just as his mother did. Two of his brothers, both alcoholic, are living; one sister is living, and one died a few years ago. None of them showed any pellagra symptoms. They did not live in the same section.

His wife, Pellagrin 679, Mrs. J. B., aged 49 years, took care of her husband until he went to the hospital. The next spring, 1910, she had a slight attack of pellagra without mental symptoms. She had also a recurrence in 1911. It was impossible to get her family history, as she resented questioning and even denied the presence of pellagra in herself and husband. They had fifteen children: six died in infancy, one died of Bright's disease when 6 years of age; the other eight are all living, none of them ever having shown signs of pellagra, although six of them lived at home when the mother and father had pellagra.

Two grandchildren, Pellagrin 451, A. S., aged 8 years, and Pellagrin 452, P. S., aged 6 years, developed pellagra in August, 1913. A younger sister in the same household is free from the disease. In addition to living in an endemic section and playing with affected children, these children were frequent visitors at the home of their step-grandmother, who died of pellagra the previous year. Pellagrin 130, Mrs. P. S., aged 45 years, the step-grandmother mentioned, was always visiting the sick and waiting on them. She developed pellagra in 1911 or 1912. She had very severe erythema and intestinal trouble and died in October, 1912. Her brother, Pellagrin 509, J. S., aged 48 years, visited at the home of his sister, staying over night and often eating there. In 1912 he developed pellagra, and in August, 1913, he died at the Pellagra Hospital. His skin lesions were very severe and diarrhea excessive.

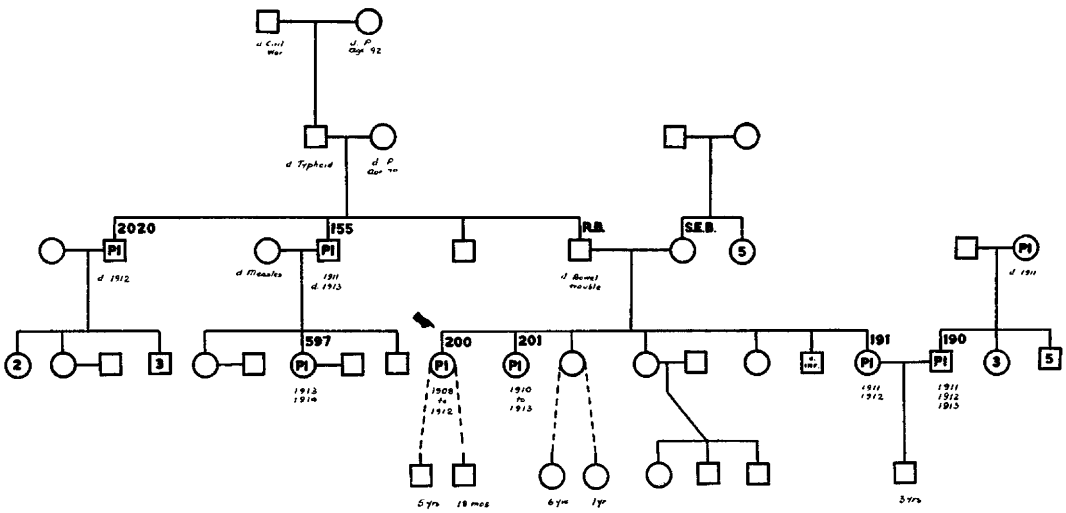


Fig. 18 (B. Family).—The first member of the B. family to show symptoms was Pellagrin 200, M. B., aged 30 years. In 1906 she had typhoid fever; the following year she gave birth to an illegitimate child. She did not fully recover, had dysentery off and on, and early in 1908 developed pellagra. There were five recurrences. Her health has been improving since 1912. In 1911 she gave birth to another illegitimate child. Her sister, Pellagrin 201, developed pellagra in May, 1910, and had recurrences in 1911, 1912 and 1913. Another sister, Pellagrin 191, Mrs. J. T., had a well-defined attack in 1911, with slight recurrence in 1912. Pellagrin 190, husband of Pellagrin 191, also developed pellagra in 1911. Symptoms subsided partially with cold weather, and there has been a recurrence of erythema every year, but less severe; the nervous symptoms were increasing in 1913. He was not seen in 1914. They have a son 3 years old, not affected. This family were frequent visitors at the home of Pellagrins 200 and 201. The mother of Pellagrin 190 is said to have died in 1911 of pellagra. His father, three sisters and five brothers are negative to the disease. Two other sisters of Pellagrin 200, living at home, have never shown any symptoms. The mother, S. E. B., still living in S, aged 60, has never shown any symptoms. Her father, mother and five sisters are negative to pellagra.

The father, R. B., died twenty years ago, aged 41, with chronic bowel trouble which lasted fourteen months. The father's brother, Pellagrin 155, G. B., aged 55 years, developed pellagra in 1911. He had typhoid when 10 years of age. He was poorly nourished and anemic, a frequent visitor at the homes of Pellagrins 200 and 201, and lived in endemic section of mill village A. In 1912 there was no definite recurrence. Early in the spring of 1913 he had a severe recurrent attack, which resulted in death in August, 1913. His daughter, Pellagrin 597, V. Q., nursed him until he was taken to the hospital. She had typhoid fever in 1909 and married in April, 1912. She continued to work in the mill until April, 1913, and lost 40 pounds in weight during the year. In May, 1913, pellagra developed. She had a very mild recurrence in 1914. One sister not living at home and four brothers living at home did not develop the disease.

Her paternal grandfather, W. B., died of typhoid fever. Her paternal grandmother, S. H. B., died of paralysis, aged 78. The paternal great-grandfather, W. B., died in the Civil War. The paternal great-grandmother, S. J., died of paralysis, aged 92 years.

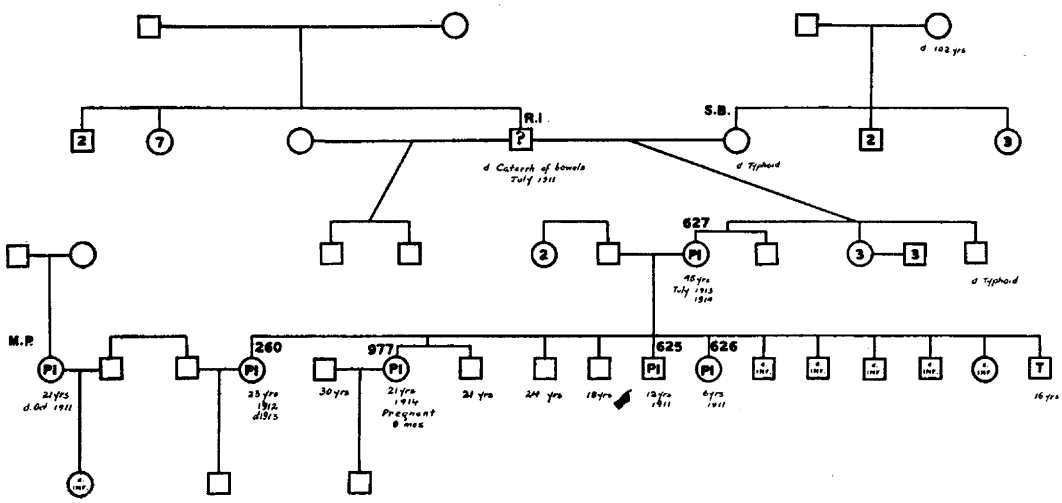


Fig. 19 (R. Family).—Pellagrin 260, S. M. P., aged 23 years, had the first case of pellagra discovered in this family. She developed it during pregnancy in 1912. She lived with her mother until the mental symptoms became marked, when she was taken to the Good Samaritan Hospital, where she died on Sept. 7, 1913. In July, 1913, the mother, Pellagrin 627, M. E. R., aged 45 years, had typical symptoms. She has eight living children. Four sons have shown no symptoms of pellagra. One son, 16 years of age, has a pronounced case of tuberculosis. There were five children who died in infancy, either being born dead or having died in a few days or hours. Two sons, D. R., Pellagrin 625, aged 12 years, and P. R., Pellagrin 626, aged 6 years, had pronounced symptoms in 1911, the same year her father died with catarrh of the bowels. In June, 1914, M. L., Pellagrin 977, visited her mother for a week. The mother returned home with her and spent two weeks. July 6, 1914, Pellagrin 977 developed the disease. As she was eight months pregnant, she was quite nervous for fear she would have it as Pellagrin 260 did.

Mrs. R., Pellagrin 627, could not remember whether her father, R. L., had skin symptoms or not. He died of catarrh of the bowels in July, 1911. He had seven sisters and two brothers, who were negative to pellagra. R. L. was married twice. By his second wife there were two sons, living and well; by his first wife there were six children. One son, B. L., died of typhoid; one daughter, Pellagrin 627, mother of Pellagrin 260, has pellagra; the others are living in South Carolina and are well. The maternal grandmother, S. B., died of typhoid. The history of her two brothers and three sisters is unknown. Her mother died at the age of 102, of old age. M. P., a sister-in-law of Pellagrin 260, living diagonally across the street from the R. family, died of pellagra in October, 1911.

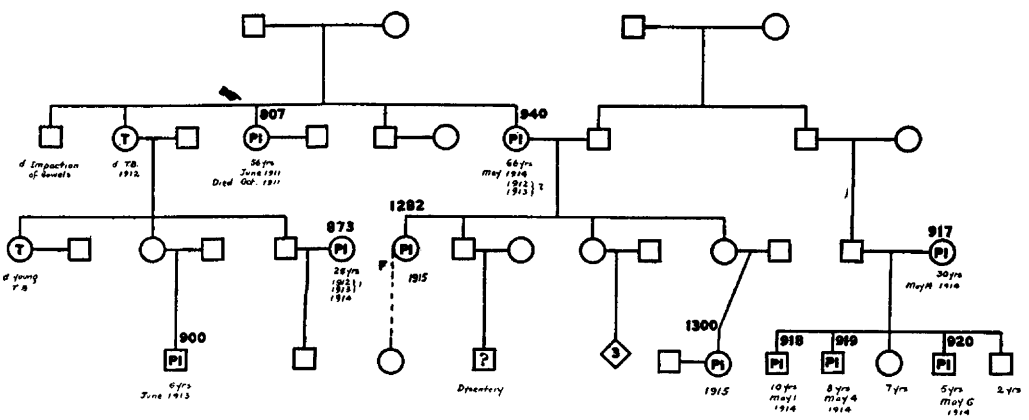


Fig. 20 (H. Family).—The pellagrins in this group are all related, but they represent three distinct families. Pellagrins 873 and 917 married into the H. family. They were, however, so intimately connected that it was impossible to consider them separately. The first member of the H. family to develop pellagra was Pellagrin 807, Mrs. F. H. M., aged 56 years. She was living in the country and no contact history could be obtained, but it is known that four other cases within a radius of one mile developed pellagra the same year. Pellagrin 807 began April, 1910, to show symptoms of indigestion followed by bowel trouble. She was sick during the summer, but in December was feeling much better. In February, 1911, she had a very severe attack of indigestion, lost weight, and in June, 1911, developed erythema on the hands and arms. She died on Oct. 11, 1911. She was cared for by her nephew's wife, Pellagrin 873. Later she was taken to her sister's, Pellagrin 940, in village A, where she died in about ten days.

Pellagrin 873, Mrs. F. H. C., niece by marriage, lived nearly opposite Pellagrin 807, and nursed her for several months. She had indefinite symptoms of pellagra in 1912 and again in 1913, insomnia, burning of the hands, weakness and dizzy feelings. The first erythema appeared in April, 1914. She now has a well-developed case of pellagra. Her husband's sister died in 1912 of tuberculosis. Another sister of the husband lives only 100 yards away, and the son of this woman, Pellagrin 900, H. C., aged 6 years, developed pellagra in June, 1913, with recurrence in June, 1914. There was a typical eruption each year. He was a constant visitor at the house of Pellagrin 873.

Pellagrin 940, F. H. B., aged 66, at whose home Pellagrin 807 died, has had indigestion and loose bowels since 1912. In May, 1914, the first erythema appeared, accompanied by weakness, loose bowels and stomatitis. When last seen, Aug. 1, 1914, she was in bed with weakness and mental symptoms. One brother of Pellagrin 940 is still living. One sister died of tuberculosis and one brother died last year of impaction of the bowels.

Pellagrin 1282, L. B., aged 29 years, living with her mother, Pellagrin 940, developed pellagra in June, 1915; other early symptoms were denied. There was slight desquamation still present when seen Aug. 6, 1915. Pellagrin 1300, M. P. W., aged 22 years, granddaughter of Pellagrin 940, developed pellagra in July, 1915, while in Danville, Va. She had been living there only three months when the disease developed. Prior to that time she had lived in mill village Sa, next door to a pellagrin, whose son she married.

Pellagrin 917, Mrs. S. B., aged 30 years, niece by marriage, lived near her aunt in an endemic area five months before pellagra developed. She had lived four years prior to this next door to a pellagrin; there was very intimate association, and the children played together. She and three of her four children, Pellagrins 918, 919 and 920, all developed definite cases in May, 1914. Pellagrin 918, A. B., the 10-year-old son, was the first to show symptoms, the others following in quick succession.

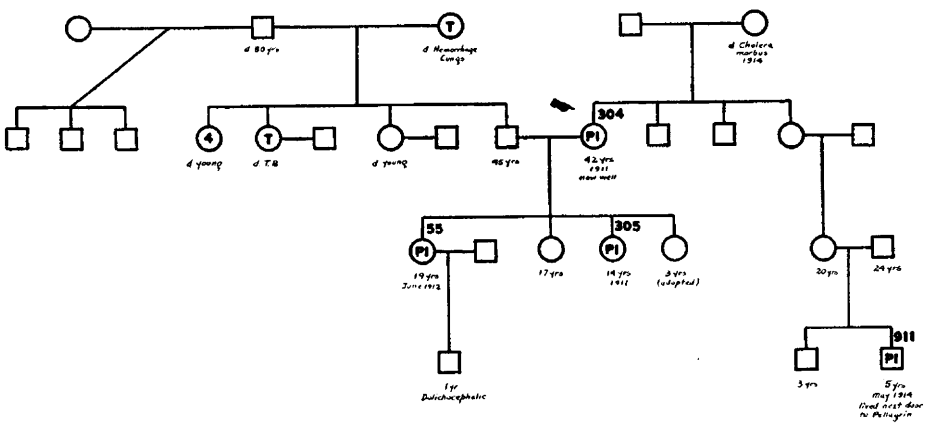


Fig. 21 (P. Family).—The maternal grandmother died in 1904 with cholera morbus. The father's family was tubercular. The mother, Pellagrin 304, Mrs. J. P., aged 42 years, developed pellagra in mill village S, an endemic center. She had no recurrence in 1912 and 1913. Her daughter, Pellagrin 305, Miss O. P., aged 14, had active symptoms the same year. Another daughter, Mrs. G. P. G., Pellagrin 55, aged 19, moved in March, 1912, to a house in the country formerly occupied by Pellagrin 56. In June, 1912, she developed pellagra. She had been closely associated with her mother and sister, and had lived in several mill villages where pellagra existed. When seen in 1913 there were no active symptoms, but she was very weak and had digestive trouble; was pregnant. Her son, 1 year old, has had chronic bowel trouble all his life. He is dolichocephalic.

In May, 1914, Pellagrin 911, J. B., aged 5 years, the son of a cousin of Pellagrin 55, developed pellagra. The family had been living from December, 1913, to February, 1914 in a house next door to Pellagrin 133.

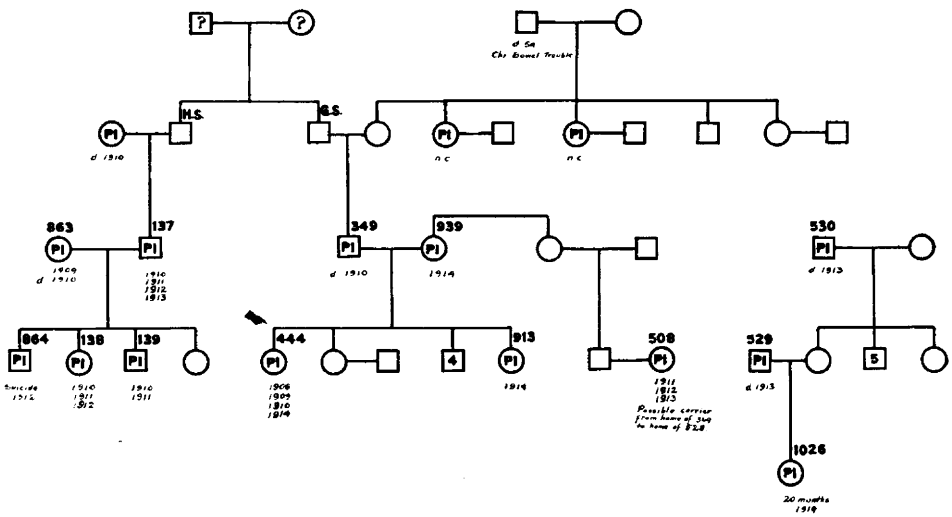


Fig. 22 (S. Family).—The paternal grandfather of Pellagrin 137 and Pellagrin 349 lived and died in Spartanburg County; cause of death unknown. He had two sons, H. S. and G. S. H. S. married M. C., who died in 1910 with pellagra. She had not been well for two years prior to the development of the disease. Their son, Pellagrin 137, Mr. J. S., developed pellagra the year his mother died. At that time he was living on a farm not in an endemic section, but visited his mother frequently, and she also paid long visits to him. In 1907 he began to have chronic dysentery and indigestion, and in 1908 had a severe and prolonged attack of malaria. His digestion became more impaired and in 1910 he had typical erythema accompanied by gastro-intestinal symptoms and mental disturbance. In June he went to the Columbia State Hospital for treatment and remained there six weeks. Symptoms subsided and he returned home. There were recurrences in 1911, 1912 and very slightly in 1913. His wife, Pellagrin 863, Mrs. J. S., developed pellagra in the fall of 1909. She had a very severe attack and died in April, 1910. There were four children.

Pellagrin 864, C. S., son, developed pellagra in 1911 and in 1912 developed marked mental symptoms. He tried to shoot his wife and was taken to the Columbia State Hospital, where he committed suicide. Pellagrin 138, A. L. S., daughter aged 17 years, had erythema in 1910, with recurrences in 1911 and 1912. There were no symptoms in 1913. Pellagrin 139, C. S., son aged 19 years, developed pellagra in 1910, with recurrences in 1911. There were no definite symptoms in 1912 and 1913. One daughter, 15 years of age, living in the same house, did not have the disease.

G. S., the other son, married and had a son, Pellagrin 349, G. S., aged 53 years, who developed pellagra in the spring of 1909 after caring for his daughter, Pellagrin 444. There is no history of contact with his cousin's family. Pellagrin 444, C. S., aged 10 years, developed pellagra in the spring of 1908. It recurred in 1909 and 1910. The erythema was severe, especially on the feet and legs. These were dressed by his father, Pellagrin 349, who developed the disease and died in June, 1910. Pellagrin 444, had no recurrences of the disease after 1910 until May, 1914. In June, 1914, her sister, Pellagrin 913, L. S., aged 6 years, developed it. Four brothers and one married sister living at home have not yet had the disease. In June, 1914, the mother, Pellagrin 939, Mrs. G. S., aged 42 years, developed a well-marked attack of pellagra. Their home is in an endemic section. The question arises whether there was a fresh infection in 1914, or whether Pellagrin 444 had a recurrence after three years.

It was impossible to get the history of this family on the paternal side. The maternal grandfather of Pellagrin 349 died with chronic bowel trouble. Two aunts died with pellagra.

There is an interesting connecting-link between this family and the E. family. Pellagrin 508, E. C., aged 20, lived with the family of Pellagrin 349 for one year, 1910. In 1911 she developed pellagra. She boarded with Mr. H. L., Pellagrin 529, in 1912, when she had a recurrence. From there she went to North Carolina, where she remained six months. In the spring of 1913 she returned, married a nephew of Pellagrin 939 and boarded in the vicinity, being a frequent visitor at the homes of Pellagrin 939 and Pellagrin 529. She died in May, 1913.

Pellagrin 529, with whom Pellagrin 508 boarded, Mr. H. L., aged 23, developed pellagra in March, 1913. His mental symptoms were marked from the first. He went to Tennessee, where he died in the summer of 1913. Before going to Tennessee he lived eleven weeks with his wife and baby in rooms upstairs in the home of his father-in-law, Pellagrin 530, Mr. E., who developed pellagra in May, 1913. He became rapidly worse, lost weight, and died in July, 1913. In July, 1914, T. L., daughter of Pellagrin 529, and granddaughter of Pellagrin 530 developed a typical case of pellagra, Case 1026.

This chart seems to signify heredity, but it will be noticed that there are five distinct families represented by pellagrins, and in every instance except the case of the mother of Pellagrin 137 and the case of Pellagrin 444 there is a history of close contact.

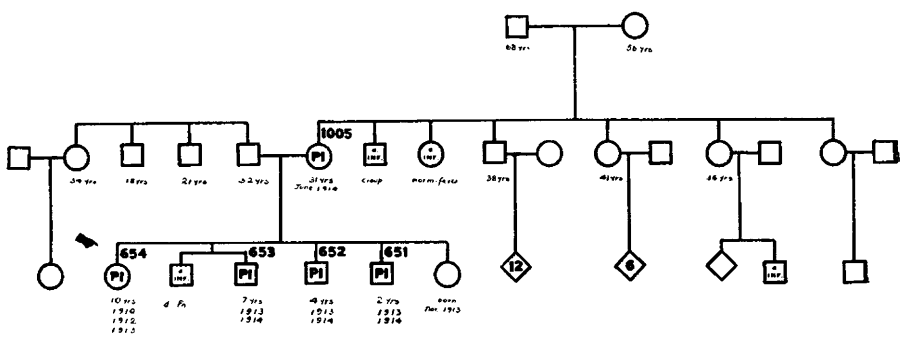


Fig. 23 (F. Family).—The first member of the F. family to develop pellagra was Pellagrin 654, B. F., aged 10 years, a school girl. She had typhoid when 2 years of age, but recovered and was apparently in good physical condition in 1910, when the first symptoms appeared. There were recurrences in 1912 and 1913, but in 1914 she seemed perfectly well. In June, 1913, the three remaining children, Pellagrin 653, P. F., aged 7 years, Pellagrin 652, C. F., aged 4 years, and Pellagrin 651, T. C. F., aged 2 years, all had severe bowel trouble and showed the typical skin lesions. Each of these three children had a recurrence in May, 1914. R. F., born November, 1913, had not developed pellagra.

Pellagrin 1005, N. P. F., the mother, also has the disease. She developed it in June, 1914. There is no known physical defect in her family. Her father and mother are living and well, and she has two brothers, three sisters and twenty nieces and nephews, who have never had pellagra. One brother died in infancy of "worm-fever." She lost one son, the twin brother of Pellagrin 653, when 21 months old, with pneumonia.

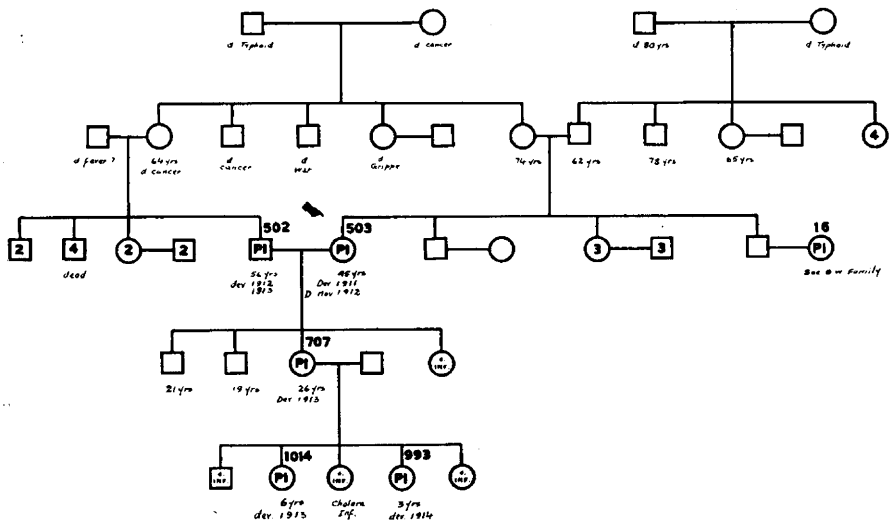


Fig. 24 (B. R. Family).—The first member of this family to have pellagra was Pellagrin 503, although her brother's wife, Pellagrin 16, had it three years earlier. It is not known whether there was close association or not. Pellagrin 503, F. B. R., aged 45 years, was always a hard worker at housework exclusively. She developed pellagra in May or June, 1911; she seemed to get better during the winter, but had a recurrence in 1912, with marked mental symptoms. She died in November. She visited frequently Pellagrin 110. Her husband, Pellagrin 502, W. R., aged 56, born on a farm near Columbia in 1857, was a farmer all his life. His general health was good. In 1912 he began to have trouble with his digestion, and early in November, 1912, he developed typical symptoms of pellagra. These recurred in 1913, but in 1914 there were no marked symptoms though there was a general weakness. In addition to living with his wife, he was a frequent visitor at the homes of Pellagrins 110, 130 and 17. They had four children: one died in infancy; two sons were not affected, and a daughter, Pellagrin 707, M. C., 26 years of age, who had a typical attack of pellagra in the summer of 1913, was a constant visitor at her mother's home and after the mother's death lived with her father. She is married and has had five children. Three died in infancy, one with cholera infantum and one teething. Two are pellagrins. Pellagrin 1014, M. C., 6 years of age, developed the disease in 1913. She lived most of the time with her grandmother, often sleeping with her. Pellagrin 993, K. C., aged 3 years, developed pellagra in 1914. Hygiene and sanitation were practically unknown in this family.

The mothers of Pellagrin 502 and Pellagrin 503 were sisters. The mother of Pellagrin 502 died with cancer; her brother and mother died with the same disease. The mother of Pellagrin 503 is still living, aged 74 years, strong and healthy. The father of Pellagrin 503 is also living. They are better-class mill people, and are in very comfortable circumstances. The father's mother and the mother's father died of typhoid.

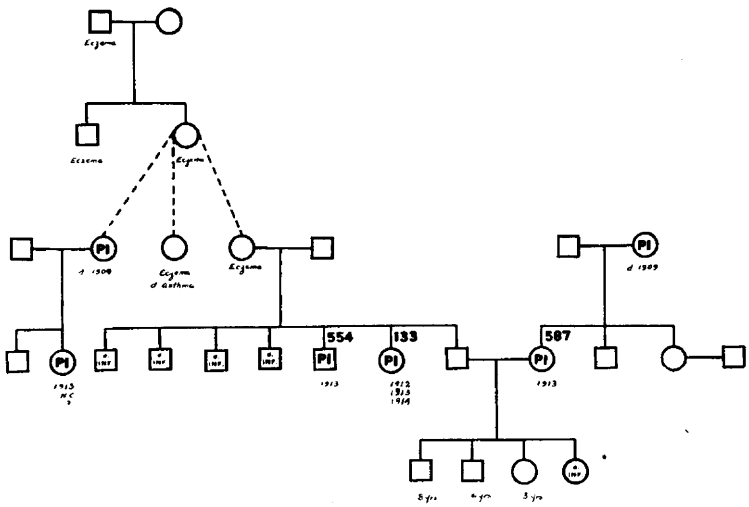


Fig. 25 (C. Family).—The C. family has had eczema as far back as its history can be traced. The maternal grandfather had indigestion and eczema. The mother and uncle both had eczema so badly that the hands had to be wrapped in winter. The mother had three illegitimate children; one, C. B., died in 1904, with all symptoms of pellagra. Her hands and feet were badly broken out and marked gastro-intestinal symptoms and severe mental disturbance occurred before death. Her daughter is said to have developed pellagra in 1913, but as she lives in North Carolina, this report was not verified. One daughter died at the age of 33, with asthma. The other daughter, mother of Pellagrins 133 and 554, has had eczema all her life. The family is living in mill village S in abject poverty. Hygiene, personal and domestic, is unknown. The diet is poor in quality and insufficient in quantity.

In 1910 the family lived in mill village I in a house formerly occupied by a pellagrin. In March, 1912, they moved to S, into a house formerly occupied by Pellagrins 17 and 402. In May, Pellagrin 133, D. C., developed pellagra. She had recurrences in 1913 and 1914. Her brother, Pellagrin 554, W. C., living in the same house, developed pellagra in 1913. He has been in poor health for years. Pellagrin 587, L. C., sister-in-law of Pellagrin 133, visited this house many times, staying night and day. In April, 1913, while here on a visit, she developed pellagra. Erythema was very severe and mental symptoms marked. Three children who accompanied her on the visit have not developed the disease. Her mother, N. S. P., had catarrh of the bowels for years, and in 1909 died with all the symptoms of pellagra. She was cared for by Pellagrin 587.

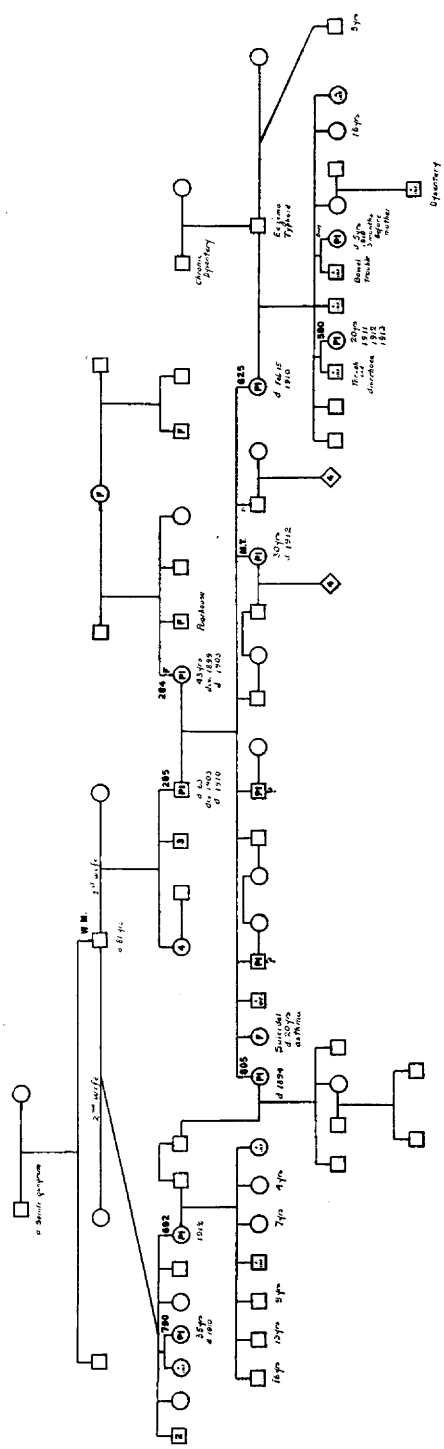


Figure 26.

Fig. 26 (M. Family).—In 1893 Pellagrin 805 went with her husband to the farm of her uncle, where Italian laborers were employed to help with the farmwork. They stayed there during May, June and July, 1893, when they returned home. In the spring of 1894 Pellagrin 805 developed pellagra and died in October of the same year. This was one of the earliest-known cases of pellagra in Spartanburg County. In her fraternity there were ten children. One sister, J. M., was feebleminded. She had asthma after second year of life. Her mental condition became so marked that she was taken to Columbia Hospital in 1906, where she remained six years. She was suicidal at times. She died at Columbia Hospital in 1912. One brother died at birth. Five brothers are living in various parts of South Carolina and North Carolina. It is reported that two of the brothers are pellagrins, but this has not been verified. One sister, M. T., aged 30 years, died in 1912, of pellagra. Her husband and four children are not affected. One sister, Pellagrin 825, died in 1910 at A. She was very badly affected, and not having any one of the family able to care for her, she was nursed at intervals by various friends and neighbors. She died in 1910. (It is worthy of note that many new cases of pellagra developed in this mill village the following year.) The house was thoroughly fumigated after her death. Her husband has married a second time and has a son aged 3 years. The family are still living in the village. He was the father of ten children by Pellagrin 825.

Two daughters and two sons of this couple are living at home unaffected. One son died at 18 months with thrush and diarrhea. One girl, a twin, died in 1910, three months before her mother, aged 5 years, 7 months. She had erythema, severe bowel trouble, and was "crazy" for six weeks before death. Another baby girl died at birth. One daughter, aged 19, married. She is not affected. Her son died, aged 20 months, of dysentery. She has no other children. Another daughter, Pellagrin 580, who married in 1910, developed pellagra in July, 1911, and has had recurrences in 1912, 1913 and 1914. She had severe mental symptoms in 1913, with stomatitis and bowel trouble. There was a remission during the winter, but early in January there was severe recurrence. She is at present anemic, listless and indifferent to her surroundings. The parental grandmother of Pellagrin 580 had chronic dysentery for years, and her father has eczema, which developed after an attack of typhoid.

The maternal grandmother, Pellagrin 284, a woman of weak intellect, whose mother and two brothers were feebleminded, developed pellagra in 1899 in A, Spartanburg County, and later moved to S, where she died in June, 1903. Mental symptoms were pronounced for three months before death. The maternal grandfather, Pellagrin 285, developed pellagra at S in 1903. He died at his son's home in Laurens County in 1910. There was complete mental failure before death. He was the only one of seven children known to have pellagra. His father, W. M., lived and died in Laurens County. He was always strong and healthy, and died of old age, 81 years. The brother of W. M. died in the southern part of Spartanburg County, aged 80 years. Their father died of gangrene. W. M. was married twice. His widow is living in E, Spartanburg County. By his second wife there were six children, all living except twin girls. One died in infancy, the other, Pellagrin 790, N. M., died at E, in Spartanburg County in 1910, of pellagra. Her mental symptoms were marked. Another daughter, Pellagrin 692, was reported to have pellagra in 1912. There was no recurrence in 1913 or 1914.

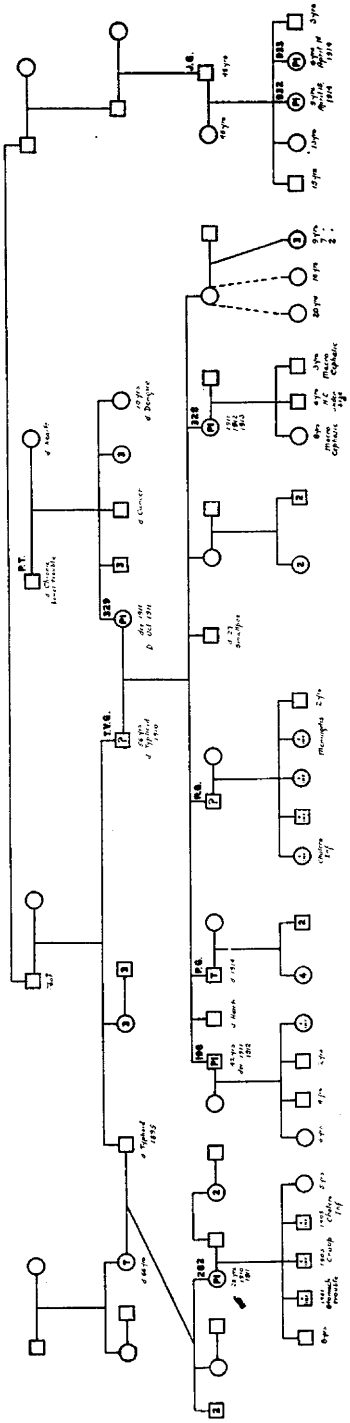


Figure 27.

Fig. 27 (T. G. Family).—P. T., the maternal grandfather of Pellagrin 198, died of "chronic bowel trouble." His wife died with heart trouble. Pellagrin 329, N. T., the mother of Pellagrin 198, died of pellagra in October, 1911. She developed it in the early spring. She had the usual skin and intestinal symptoms; her mind soon became affected and she needed constant watching. Her son, Pellagrin 198, spent much time at her house and took care of her at night. Her husband, T. V. G., had died the previous year of typhoid fever. He had chronic bowel trouble for six months, ten years before death, without any recurrence. Pellagrin 329 had serious bowel trouble at the same time, and three years before death, that is, in 1908, she had another attack. T. V. G. had three sisters, whose families are free from pellagra. One brother died in 1895 with typhoid fever. This brother's wife died, aged 66 years, of tuberculosis. They had four children, one of whom, Pellagrin 282, J. C., aged 28 years, developed pellagra in 1910 and had a recurrence in 1911. There has been no known recurrence since, and it was not ascertained whether there was association between the families the year that T. V. C. had typhoid. Pellagrin 282 had five children: three died in infancy before their mother had pellagra, and two, the oldest and the youngest, are living, free from the disease. The youngest was one year old when the mother developed the disease.

Pellagrin 198, T. G., aged 42 years, developed pellagra in 1911, the year his mother died. Erythema appeared on arms, hands and neck. Later, stomatitis and diarrhea occurred. There was a recurrence of symptoms in 1912, but when seen in 1913 and 1914 the patient seemed to have recovered. He has three children, all well; one child died in infancy. One brother of Pellagrin 198 died of heart trouble. One brother, P. G., died of tuberculosis in June, 1914. Six children and his wife are well. Unusual precautions were taken by his wife to prevent infection. One brother, R. G., has had indefinite symptoms of pellagra for four years. He lives near Pellagrin 198, and their families are closely associated. He married a strong woman, but out of five children, only one, a boy 17 months old, is living. One daughter died of cholera infantum, one of whooping-cough, one of meningitis, and one son was born dead. One sister of Pellagrin 198, B. M., Pellagrin 328, developed pellagra in 1911. She had a recurrence in 1912 and in 1913. She has three children, one of whom, M. M., 8 years of age, is macrocephalic. She was "born with bowel trouble" and did not walk for three years. She has never been to school. She is affectionate, but mentally dull and sluggish in movements. F. M., 6 years old, is undersize and has a harelip. G. M., 3 years old, is macrocephalic, and does not walk yet. One sister of Pellagrin 198, L. T., had two illegitimate children. She is now married to an old man and has three other girls. All seem normal.

In April, 1914, Pellagrins 932 and 933, two children of J. G., a second cousin of Pellagrin 198, developed pellagra in mill village P. There has been no association with the other members of the family for years. A family of children living directly across the street from Pellagrins 932 and 933 developed pellagra in 1913 and the children all play together. Two other children, aged 15 years and 13 years respectively, working in the mill, and the baby, aged 3 years, were free from the disease.

(Query: Have these children an inherited weakness, making them more susceptible than a dozen other children who are playmates of these same pellagrins?)

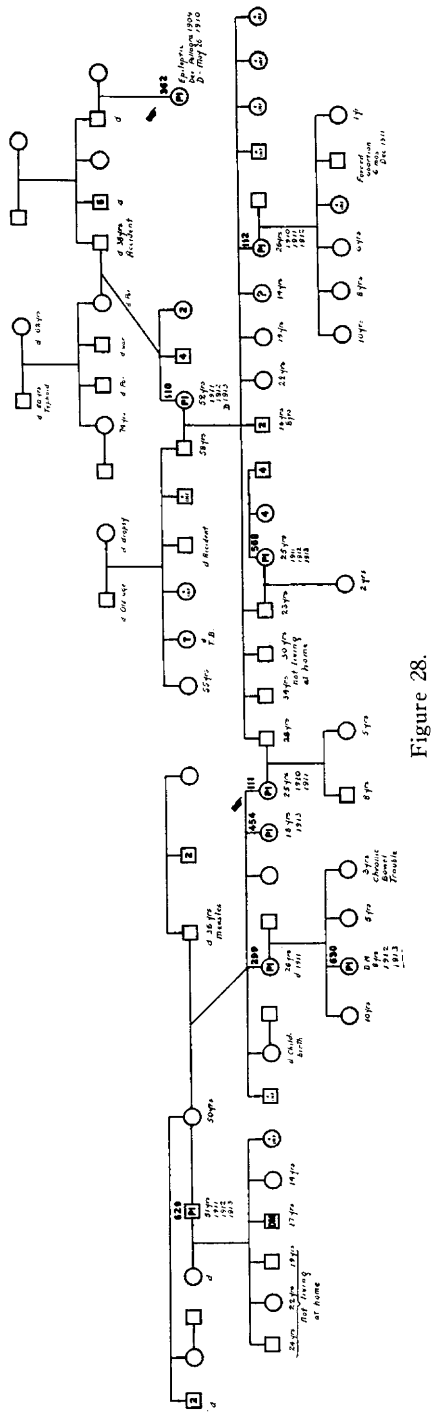


Figure 28.

Fig. 28 (H. W. Family).—The members of this family lived in two mill villages where pellagra was endemic. They were poor, ignorant, unclean and degenerate. Conditions in the homes were as bad, if not worse, than in any of the homes visited. This, in spite of the fact that there were several mill workers whose wages, if pooled, would make a larger income than is common in the South.

Pellagrin 110, Mrs. M. H., aged 52 years, visited many of the pellagrins in S mill village and helped to "lay out" several after death. She developed the disease in a very severe form in July, 1911. She had a recurrence in 1912, followed by progressive weakness until her death in 1913. She had four brothers and two sisters, still living and unaffected. Her mother and maternal uncle died of paralysis and her maternal grandfather of typhoid. Her father was accidentally killed when a young man. His family history is very vague, most of his fraternity being dead. He had a niece, Pellagrin 362, A. H., an epileptic, who developed pellagra in December, 1909, in S mill village and died in June, 1910. Nothing definite could be learned of this case except that her symptoms were severe and she was visited by many of the village people. An epidemic of pellagra in S mill village in 1910 and 1911 may or may not have originated here.

Pellagrin 110 married a man who is still living and whose family history is negative to pellagra. One of his brothers was accidentally shot, one died in infancy and one sister died also in infancy; one sister died young of tuberculosis, and one sister is still living and is well. This couple had fourteen children, only one of whom developed pellagra, Pellagrin 112. The wives of two of the sons, Pellagrin 111 and Pellagrin 568, however, developed pellagra. Of the fourteen children, four died in infancy.

Pellagrin 112, Mrs. M. N., aged 26 years, developed pellagra in 1910 and has had recurrences every year since, except in 1914. She lived in the country about a mile from her mother's home. In 1911, owing to persistent vomiting, there was an induced abortion of a 6 months' child. In 1913 a child was born who showed no symptoms of pellagra. There are three older children, aged from 10 to 6 years.

Pellagrin 568, L. H., aged 25 years, married B. H., son of Pellagrin 110. Her father, mother, four sisters and four brothers are living in North Carolina and they have never seen a case of pellagra. She developed the disease in 1911 and had recurrences in 1912 and 1913. A son, born after she developed pellagra, has no symptoms.

Pellagrin 111, Mrs. F. H., aged 25 years, has lived part of the time with Pellagrin 110 and part of the time she has kept house herself. She was a constant visitor at the homes of pellagrins. She developed the disease in 1910. There was a slight recurrence in 1911, but there have been no symptoms since. She has two children, aged 8 years and 5 years, who show no symptoms of pellagra. In her family there are three other cases of pellagra. Her sister, Pellagrin 299, P. D., aged 26 years, living in P mill village, died in 1911 of the disease. She left four children, one a deaf-mute, Pellagrin 630, G. D., aged 6 years, who developed pellagra in 1912, and had a recurrence in 1913. The youngest child has had chronic bowel trouble for three years. No definite history of erythema could be obtained. Pellagrin 454, A. W., aged 18 years, another sister, developed pellagra in 1913. Her stepfather, Pellagrin 629, developed pellagra in 1911. He worked in the mill until this time. He had a recurrence in 1912 and most decided symptoms in 1913, when he was in the hospital for months. He has a deaf-mute son, aged 17 years; also a daughter, aged 14 years, by a former wife. He also has three sons not living with him, none showing any pellagra symptoms.