to the salvarsan injection—especially of arsacetin, the damaging effect of which on the optic nerve is an established fact? Besides the complexities emanating from personal factors, we deal in human syphilis with a chronic disease. In some instances the spirochetes are undoubtedly enclosed, at least temporarily, in tissues, which for the time being, cannot be penetrated by the salvarsan solution. Furthermore, the method of administration of salvarsan is still in an unsettled state; it is insufficiently absorbed from some subcutaneous or intramuscular injections, and it is too rapidly eliminated, when it is injected intravenously. In spite of all these difficulties, however, the great mass of accumulated evidence establishes beyond a doubt that in human syphilis salvarsan acts in the same specific manner as in the experiments on animals; that is, it destroys the cause of the disease. The following clinical results are undisputed facts. It was found that with but few exceptions an injection of this drug causes disappearance of all accessible spirochetes. There are already a considerable number of cases on record, in which an early injection prevented so far the development of secondary manifestations, the time elapsed being in some cases seven or eight months. Syphilitic manifestations of nearly all forms and in all stages were profoundly affected by a single injection; there were only a few exceptions to this rule. There are a good many cases in which all the external manifestations disappeared without recurrence so far. These facts are surely sufficient to show that salvarsan acts on human syphilis in a definitely specific manner, that is, it destroys the cause of the disease. Its action is at least as specific as that of mercury on the same disease. It differs from mercury and has some advantages over it in the following points. Salvarsan destroys all spirilla; mercury affects only the spirochetes of syphilis. Salvarsan produces apparently antibodies in the blood as is shown by the effectiveness of the serum and the milk of those who were injected with it; there is no evidence of the formation of antibodies by mercury. The effect of salvarsan is much more rapid than that of mercury; one injection of salvarsan accomplishes in two weeks as much as repeated injections of mercury accomplishes in six weeks. Finally, whereas mercury is inimical not only to the parasite, but also to the host, causing cachexia of the patient, salvarsan, reversely, acts rather favorably toward the host; it stimulates to rapid healing and causes an increase of the weight of the patient. Careful future studies will bring to light any further quantitative and qualitative differences between the actions of the two specifics for the same disease and will determine the conditions in which they may compete or they may supplement each other. This desirable end, however, can be brought about only by an unbiased, judicial and scientific attitude toward the merits and demerits of either of the specific remedies.

Here it must be acknowledged that one of the original important expectations regarding the actions of salvarsan has not been realized in human syphilis. While in the animal experiments one injection cured the disease permanently, this has not been the rule in the treatment of human syphilis, especially when the treatment is begun after the onset of the secondary manifestations. In a good many instances the syphilitic symptoms reappeared even after repeated injections of salvarsan. While it seems that relapses occur less frequently after intravenous injections and become strikingly less extensive and less frequent with the repetition of the injections, the fact remains true that in many instances the syphilitic human body cannot be sterilized with one injection. This fact would have had to be put down as a very serious drawback in the treatment of syphilis by salvarsan, on account of the possibility of the gradual development of resistant strains of spirochetes. Fortunately it has been recently discovered by Margulies, in Ehrlich's institute, that, in contrast to arsacetin and arsenophenylglycin, salvarsan does not produce strains of spirilla resistant to it. This important observation finds its confirmation in recent clinical experience. The third and fourth injection of salvarsan affects the syphilitic manifestations with the same promptness as the first injection. This fact is very significant; it takes away the motive for the aim to destroy all the parasites with one injection, and it may lead to important changes in the method of administration of salvarsan. On the basis of the foregoing considerations I have recently advocated, instead of the use of one large dose, the injection for some time at regular intervals of small doses of salvarsan in very dilute solutions into the lumbar muscles. By this method it may be possible to prevent local and general by-effects as well as relapses. The method offers the further advantage that it could be used by the general practitioner.

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SAMBON'S NEW THEORY OF PELLAGRA AND ITS APPLICATION TO CONDITIONS IN GEORGIA

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I wish to call attention to a new theory of pellagra, and especially to apply this theory to conditions in Georgia, and to show that the same conditions exist in Georgia to produce the disease that exist in Italy, the chief home of the disease. This theory was formulated by Dr. Louis W. Sambon, lecturer on tropical medicine at the Liverpool School of Tropical Medicine, who was detailed for three months in 1910 in Italy, where he studied pellagra. Dr. Sambon is a research student of recognized ability. In 1903 he formulated the tsetse fly theory of sleeping-sickness, which has proved true. His "Progress Report" on pellagra and the result of his investigations appeared in the London *Journal of Tropical Medicine* during September, October and November, 1910, and I shall draw freely on these accurate and interesting articles.

First, I wish to define pellagra according to our present knowledge. Pellagra is a non-contagious, non-inheritable disease, of insidious course, characterized by a peculiar, periodic eruption, and a series of symptoms involving the nervous and digestive systems, periodic and progressive. This definition is based entirely on the clinical history of the disease, and does not take into account the cause or the environment in which the disease develops. We can now proceed more fully to the consideration of this new theory of cause and origin.

There is one primary condition on which all theories are based, and one easy way by which we test freely and accurately every theory. It is stated in this simple way: Every theory to be correct must be in accord with the

facts. On this simple proposition all theories must stand or fall, and by this same simple rule we may test this new theory of pellagra.

Sambon opens with five propositions:

1. Pellagra is not due to the eating of maize, either sound or deteriorated, as hitherto almost universally believed. In support of this statement are the following facts:

A. Maize was grown in Italy from one and a half to two centuries before pellagra appeared in that country, and it is, therefore, impossible to connect the introduction of the new cereal with the first appearance of the disease.

B. Pellagra occurs in people who do not eat maize or corn products. Casana stated at a meeting of the Catalonian Academy of Medicine that in Spain the greater prevalence of pellagra existed in those provinces where the cultivation and use of corn is unknown. Children contract the disease in Italy as early as the third month, provided they are brought outdoors and exposed to the bites of the *Simulium* fly. An illegitimate child was born in an Italian jail, and at five months was adopted by peasants living along a running stream. It developed pellagra in two weeks after exposure to the bite of this fly, though it had never eaten any corn products of any kind.

C. The absolute failure of preventive measures on the part of the Italian government; *e. g.*, the inspection of maize and its products; abolition of the late varieties of maize; notification of cases; and establishment of pellagrosarios for the treatment of the disease.

2. Pellagra has a striking, peculiar, and well-defined topographical distribution. In northern and central Italy the pellagra foci are found in the narrower valleys of the country districts, where the streams are infested by the *Simulium* fly. Wherever pellagra is found, these flies are found in the districts bordering the streams.

3. These endemic foci, or stations, have remained exactly the same for at least a century. The disease presents the same relative proportions in all the affected districts, and towns are generally exempt.

4. The pellagra stations are closely associated with streams of running water. Pellagra is a rural disease, and the greater number of cases occur in the country districts, and especially among people living along running streams. The greater liability of field laborers is explained by the fact that they are more exposed to the infective agent than others. Nearly all the pellagrins in Italy say that in the spring they are greatly tormented by the bites of the sandflies. These flies are more active in the early morning and late evening.

5. A blood-sucking fly, of the genus *Simulium*, is, in all probability, the agent by which pellagra is conveyed. It is a periodic disease, the seasons of incidence being spring and fall, and the *Simulium* fly has these same periods of activity.

This is a condensed statement of the Sambon report as to conditions in Italy. We now turn to conditions in Georgia. I asked the junior and senior classes in the Atlanta College of Physicians and Surgeons for a statement of the cases of pellagra in their home communities with regard to sex and the relation of the homes of the pellagrins to standing or running water. Georgia is not in the statistical area, and this was as accurate a method as I could find to get an estimate. Thirty-six cases were reported, twenty-six women and ten men. All of the number but one either lived on or very near streams of water; this patient was a banker living in a small town and the relation of his residence to streams could not be determined. Thirty students reported from as many different communities. These separate reports follow:

Number of Report.	Number of Pellagrins.	Residence.
1	3	Swamp, 3 streams.
2	3	Swamp.
3	1	Stream within 50 yards.
4	1	Location wet and swampy.
5	2	Stream within ¼ mile.
6	1	Unknown.
7	1	¼ mile standing water.
8	1	¼ mile branch.
9	1	Between two streams.
10	1	¼ mile pond and stream.
11	1	300 yards of a branch.
12	1	On Chickamauga Creek.
13	1	Within 200 yards of creek.
14	1	Within 300 yards of creek.
15	2	Within ¼ mile of creek.
16	1	On stream.
17	1	On stream.
18	1	Resided on pond 5 years.
19	1	Between two springs and fresh branches.
20	1	Within 1 mile of stream.
21	1	Within 250 yards of stream.
22	1	Within 200 yards of stream.
23	1	12 years within 100 yards of stream.
24	1	15 years within 100 yards of stream.
25	1	Within 1 mile of stream.
26	1	Within ¼ mile of stream.
27	1	Within 30 yards of stream.
28	1	On sea coasts.
29	1	In city.
30	1	Within 100 yards of stream.

The testimony of these thirty men from different sections of Georgia and some of the other southern states agrees in this: The cases of pellagra in the South originate in those living on or near streams of running water. The idea was new to these students; they were from places far distant from each other, and yet their testimony is practically united. While in Franklin, N. C., last summer I investigated the premises and surroundings of a pellagra patient, a woman, who had recently died. The house bordered the road in front, and behind a branch of rapid mountain water ran within fifty feet of the back porch. On the right of the house was a perfect swamp, and the stream marked out a narrow mountain valley; exactly the same topographic conditions found in Italy by Sambon. These valleys and stream areas were so alike in situation and environment that he was able, after viewing the topography of a given locality, to state whether pellagra existed in that locality, and this without being once in error, and even before he was given the pellagra statistics of the given area.

The *Simulium* fly is of the order *Diptera*, or two-winged flies; family *Simuliidæ;* with the one genus *Simulium*, having species. Of these Sambon found three species in Italy—*Simulium reptans, S. ornatum*, and *S. pubescens*, chiefly the last. The two chief species in America are *Simulium venustum*, or black fly, the great biter of the Northern woods; and *Simulium pecuarum*, the southern buffalo gnat. This buffalo gnat causes the death of many mules and domestic animals. It is found along the tributaries of the Mississippi river, through the state of Mississippi, possibly all of Arkansas, in Tennessee, Kentucky, and parts of Missouri, Illinois, and Indiana. Since 1850 this buffalo gnat has killed many thousand domestic animals. The gnats appeared in Mississippi as early as 1818, and in 1884 killed in Franklin Parish, La., 300 head of stock in one week. They do not seem to appear every year in damaging numbers, but are always more numerous in time of flood. Sambon notes that in Italy the greatest number of pellagra cases occur in the flood and overflow years.

Two crops of the insect emerge from the streams each year; one appearing from February to April, and the other from September to December. The eggs are laid, when possible, in streams of rapid, shallow water, as in an ordinary branch or creek. Rock, leaves and brush in the water are good places. They hatch in about eight

days to a larva, passing in about four weeks into the pupa stage, and emerging in three weeks, after having spent the pupa stage in the bottom of the stream, as the mature two-winged fly or gnat. Pellagra is most active in spring and autumn, and toxins have no relation to seasons, whereas diseases of parasitic origin are seasonal.

It has been shown that the same topographic conditions exist in Georgia and some of the other southern states that Sambon found in Italy. It has also been shown by the united testimony of several students that practically all the cases of pellagra are rural in origin and exist along streams. I asked Dr. Bradley, assistant state entomologist of Georgia, to determine for me, if possible, whether any species of the *Simuliidæ* existed in Georgia. He consulted Dr. J. M. Reade, professor of botany in the University of Georgia, at Athens, and they found in a creek two miles from Athens the larvæ of the fly in such numbers that they completely covered some of the rocks. Attached at the anal end, they waved their two modified mandibles in the fast-flowing water in search of desmids, diatoms, and other aquatic growths. They were found February 8, and they merged as the spring brood of the mature fly March 27, 1911. This species was identified as *Simulium pictipes*, a remarkably large species, found also and reported from the Adirondack Mountains, Texas, Michigan and California. This species was identified for Dr. Bradley by Dr. O. A. Johannsen of the Maine Experiment Station. The third condition exists in Georgia as in Italy, viz., the presence of an abundance of *Simulium* flies. Lastly, we have a large rural population, as has Italy.

To summarize:

1. Georgia and Italy both have pellagra.
2. The two have the same topographical conditions.
3. Pellagra originates in both territories along streams.
4. Both countries have many *Simulium* flies.
5. Both countries have a large rural population, from which most cases of pellagra originate.

This theory of Sambon has received the support of Sir Patrick Manson in the fourth edition of his book on tropical medicine; and Castellani and Chalmers support it in their recent book on the same subject. Professor Terni at the Pellagra Congress held at Milan, and Drs. Moore, Wood and Taylor, spoke in favor of Sambon's insect theory at the Columbia, S. C., Congress on Pellagra, though Sambon had not in 1908 connected the *Simulium* with the disease. The supreme criticism of the theory lies in the fact that the parasite has not yet been discovered, and this discovery is necessary to complete the theory. Analogies are always dangerous, and when pursued too far lead one into an illogical abyss, but I think that there is an analogy between pellagra and malaria. Both develop in swamp and stream localities, both have periods of seasonal incidence, and removal from the endemic areas common to each disease results in improvement, and prevents reinfection. Laveran discovered the parasite of malaria in 1880, but it was not until 1898 that Ross discovered the mosquito as the definite host. The discovery would have been just as real had Laveran discovered the insect first, and Ross the parasite last. Indeed, this is the order in which Sambon discovered the tsetse fly and the sleeping-sickness parasite as the cause of sleeping-sickness—insect first and parasite last. The parasite of pellagra is a discovery to which we may look forward in the near future. Certain it is that the corn theory is not in accord with the facts, and must die the death of unfounded theories.

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A DIRECTORY FOR WET-NURSES: ITS EXPERIENCES FOR TWELVE MONTHS

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Most general practitioners and all men who deal especially with infants have had at one time or another occasion to find a wet-nurse for some sick baby. Often it has been a question of obtaining human milk within twenty-four hours to save the life of the baby. Anyone who has searched for a wet-nurse and has hunted hours and sometimes days without success, knows what a discouraging chase it has been; it has been doubly so when the emaciated baby was quickly slipping beyond all hope of recovery.

An attempt was made, about ten years ago, to register wet-nurses at the Boston Medical Library under the same system as an intelligence office and thus to centralize the demand and supply. This was a failure for several reasons: A mother who was forced to wet-nurse usually did so because she had not enough money to live on and, therefore, could not wait for a position. If she was married her husband had either deserted her, was dead, or incapacitated by disease, and she, therefore, was forced to become the wage earner of the family; if she was unmarried, she was either deserted by the father of her child or was unable to obtain help from him for various reasons. If she was lucky enough to obtain other sorts of work she weaned the baby immediately and boarded it with some woman. The attempt at the Boston Medical Library was, therefore, a failure. In 1906 Dr. F. P. Denny of Brookline, in closing the discussion of a paper that he read before the American Medical Association, said, "If some charitable institution, preferably a hospital under medical supervision, would keep at least a registry for wet-nurses, whose antecedents are well known, it would be of great benefit. Such an institution, using every precaution, in desperate cases, might furnish breast-milk on short notice." The matter dropped there and nothing more was done. This paper is a description of a directory and home for wet-nurses which has been run for one year, and which has been the means of saving many babies' lives. So far as I can find out, this is the first successful attempt to establish a directory for wet-nurses.

Two things are necessary for success: first, the directory must be run in connection with some babies' hospital where the problems of breast-feeding are understood; and second, the women must have a home where they can wait for work without expense to themselves. The money necessary for this venture was given by a philanthropist who made no restriction as to the scope of the work, but who wisely insisted that it should be widely advertised.

On Feb. 1, 1910, the directory was opened, under the supervision of the hospital of the Massachusetts Infant Asylum. A moderate-sized house was obtained with a parlor, kitchen and three bedrooms fitted for six women and their babies, and accommodations for a matron. The women at first took their meals at the hospital; later it was found wise to send the meals from the hospital to the house in a specially constructed box which was donated by one of the directors. The food is good and wholesome, such as is given to the wet-nurses in the hospital.[1]

1. Talbot, F. B.: Two Methods of Obtaining Human Milk for Hospital Use, Boston Med. and Surg. Jour., March 2, 1911, p. 304.