Cutaneous Arachnoidism or Gangrenous Spot of Chile[1]

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BETWEEN the years 1873 and 1894, Prado[3] studied some fifteen to twenty patients presenting gangrenous skin lesions, produced by insect bites—in all probability, by some member of the Arachnida. In 1894, Guzmán[4] presented before the *Congreso Científico de Santiago* the above cases, plus seven more that had come under his observation. His paper was published in 1896. Puga Borne's[5] excellent work compared nine cases of cutaneous arachnoidism with others produced by the sting of *Latrodectus mactans*, or *araña del trigo* (wheat spider). Porter's[6] *Notes on Chilean Arachnida* appeared in 1917; with this publication he completed a series of taxonomic studies having special reference to the *Dysderidae*, whose bites he suspected capable of producing poisonous accidents. Matus[7] reported a case of arachnoidism in 1927 and, though he never identified the insect in question, he suspected it of being a spider. In 1931, Tirado[8] reviewed the literature on the subject and added to it the data on twelve cases that he had personally observed from 1890 on, in the city of Ovalle. Even though this author did not see the insects, in nine of these cases the patients assured him that they had been bitten by spiders.

The writer, in 1928, attended a patient from the Seguro Obrero (Workmen's Compensation Bureau), at Antofagasta, who presented a gangrenous lesion of an eyelid, presumably produced by a spider-bite. Tirado was consulted, finding the lesion similar to those observed in Ovalle. During 1933 and 1934, the writer[9] presented

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1. Received for publication August 23, 1946.

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3. Cited by C. Guzmán, Accidentes causados por insectos ponzoñosos en Chile. Progreso Médico, 1896.

4. C. Guzmán, *op. cit.*

5. F. Puga Borne, El Latrodectus formidabilis de Chile. Actes Soc. Scientifique du Chile, 1892, 1896, 1911.

6. C. Porter, Apuntes sobre aracnología chilena. Rev. chilena de hist. nat., 21:172, 1917; Catálogo sinonímico, reseña histórica, bibliografía y distribución geográfica de los arácnidos de Chile. Temuco, 1913.

7. M. Matus, Mancha gangrenosa. La Clínica, 76:590, 1927.

8. A. Tirado, Aracnoidismo cutáneo gangrenoso en Chile. Rev.del Inst.Bact.de Chile, 3:73, 1932.

9. A. Macchiavello, Arañas venenosas. El Mercurio, Antofagasta, marzo 7, 1934; Nota preliminar sobre el aracnoidismo cutáneo gangrenoso de la Provincia de Antofagasta. Comuni-

eleven cases of cutaneous gangrenous arachnoidism at the clinical meetings of the Regional Hospital of Antofagasta, before the *Primeras Jornadas Sanitarias de Santiago*, the *Sociedad de Cirugía*, of Santiago, and in 1938, before the *Primeras Jornadas de Medicina y Cirugía* (*Sudamericana*), of Montevideo. In 1933, he commenced systematic laboratory experiments and, in 1934, succeeded in reproducing this condition in guinea pigs through the innoculation of the glandular poisons of the spider. Collecting and classifying the arachnids in the zones where patients were found[10] was part of the studies in question. The classification of the specimens from the northern zone was confirmed by Professors Mello Leitão, of Brazil, and N. Banks, of Harvard University. Experimental evidence was obtained proving that the glandular poison of *Loxosceles laeta* was capable of producing the cutaneous lesion observed.

Escudero,[11] in 1935, reported the study of a fatal case of arachnoidism that he had observed in Colina, in the vicinity of Santiago de Chile. In 1936, Vellard[12] summed up in his important monograph the main aspects of the condition, stressing, however, the fact that its true cause had not yet been determined and recommending further study. In 1934, the writer was able to study the insect causing the lesion in one case and classified it as *Loxosceles laeta*. In December of 1936, Gallinato presented before the Pediatric Society, of Chile, a mild case of cutaneous arachnoidism which he tried to associate with the bite of *L. laeta*. Drs. A. Neghme and G. Gasic forwarded to this writer, in 1937, the clinical record of a patient whom they had attended towards the end of 1936. This record, together with another sent by Dr. J. Ibaceta,[13] from Antofagasta, were of special interest since they revealed a clinical picture quite different from the cases already on record. In the latter case, the spider submitted was classified as *L. laeta*. In 1942, 1944, and 1946 additional cases came to his attention.

During 1942, realizing that no cases had ever been reported from Ecuador but yet verifying the presence of *L. laeta* in that country, the author investigated the activity of the glandular poisons of spiders from this region in search of an explanation for the absence of cases.

The purpose of this paper is to present an over-all picture of this condition, commonly known in Chile as mancha gangrenosa (gangrenous spot). The experimental work, in connection with it, will be dealt with in another communication.[14]

Types of Arachnoidism Observed in Chile

Three types of arachnoidism have been observed in Chile:

1. That produced by the poison of the spider, *Latrodectus mactans*, which condition will not be considered in this paper since it has already been dealt with at length, first, by Puga Borne,[15] and later, by other authors, among them, Atria and Fritis,[16] and especially by Gajardo,[17] who has given a detailed study of this condition.

2. Cutaneous arachnoidism, produced by spiders that inject a necrotizing poison on biting. This type has the characteristics of an accident rather than of an illness. Serious localized symptoms are in contrast, usually, to the lack of general symptoms.

In 1917, Porter[18] suggested that specimens of the *Dysderidae* might be the cause of such accidents, but the author had already demonstrated that the bite of this last named species only produces necrotic pin-point lesions and that the poison itself has hardly any necrotizing effect on the skin. In like manner, *Aranea audax* and *Sicarius ruoepes* were suspected. Aside from minimal lesions, produced experimentally by the inoculation of the poison of the first named species, there was no proof for such suspicions. On the other hand, both through experimentation and by localizing the spider in some of the accidents reported, the author was able to prove that *L. laeta* can be said to be the causative agent of cutaneous arachnoidism in Chile.

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cación a las Primeras Jornadas Sanitarias, Santiago de Chile, 1934; Mancha gangrenosa de Chile. Conferencia dictada ante la Sociedad de Cirugía de Chile. Resumida en Bol. de Soc. de Cirugía de Chile, 1935; La *Loxosceles laeta*, causa del aracnoidismo cutáneo, o mancha gangrenosa, de Chile. Rev. chilena de hist.nat., **41**:11–19, 1937; Rev.uruguaya de dermat. y sifil., 3:104–111, 1938.

10. Drs. J. Ibaceta, M. Contreras Macaya, and P. Cornú, of Antofagasta, cooperated with the author in the clinical study of patients. Personal communications relative to new cases, and to observations of old ones, were supplied by Dr. A. Figueroa, of Antofagasta, who claimed to have observed extensive and even fatal cutaneous lesions; by Dr. G. Rodríguez, of Tocopilla, who turned over a photograph of a patient attended by him in 1934; by Dr. A. Vivanco, also of Tocopilla; Dr. J. Donoso, of Santiago, and Dr. Planella, of Talca. All agreed that this condition was due to the bite of a spider, but none was able to produce a specimen of the species involved.

11. F. E. Escudero, Un caso de aracnoidismo mortal en Chile. Rev.chilena de hist.nat., 39:339, 1935.

12. J. Vellard, *Le venin des araignées*. (Paris: Masson & Compagnie, 1936).

13. Oficio 81, de la Jef. San. Prov. de Antofagasta, marzo 3, 1939; Providencia 2181, de la Dirección General de Sanidad de Chile, marzo 10, 1939; Informe del Dr. A. Macchiavello, abril 11, 1939. Fol. 316, 1. 9, Dir.Gen.de Sanidad.

14. Aracnoidismo cutáneo experimental con veneno glandular de *L. laeta*. *In press.*

15. F. Puga Borne, Sobre la puesta del *Latrodectus formidabilis* de Chile. Actes Soc.Scientifique du Chile, 5:202–204, 1875.

16. A. Atria y E. Fritis, Arachnoidismo por Latrodectus. Bol.Soc.Méd. de Chile, 66:1052–1056, 1938.

17. R. Gajardo Tobar, El latrodectismo. Prensa Méd., 6:3, 1941.

18. C. Porter, *op. cit.*

Notwithstanding, the close similarity of these cases to some described by Vital Brazil, Kraus, and Betelho forced him to study more carefully the possibility that such bites might have been produced by species of the *Lycosidae*. Such a hypothesis could not be proved, however, as none of the spiders collected in the places where the patients live could be classified as a Lycosa. It is possible, though, that under unknown conditions some other species may produce the same clinical picture as that of *L. laeta*, though no evidence to date supports this statement.

3. The observation of an intermediate type of arachnoidism led to the belief that a third species of insect might be the causative agent in certain accidents wherein the patients, in addition to cutaneous signs, showed symptoms of hepatitis with jaundice, hematuria, fever, and slight nervous disorders. Although such observations were somewhat rare, they differed considerably from those corresponding to latrodectism, or to the type commonly known as gangrenous spot. At one time it was thought that the *Segestriae* might be the causative agent because of the similarity of the above named symptoms to those produced by the bite of these spiders of Argentine. However, in one of the cases reported by Dr. Ibaceta, of Antofagasta, the writer again proved that the species in question was *L. laeta*. In the series of sixteen patients, personally observed by him, it was not possible to find a single such case, however.

Clinically, there are notable differences between the types of arachnoidism here cited, therefore they will be described separately, which is justified from a clinical point of view.

Study of the glandular poison of the spider sent by Dr. Ibaceta revealed it lacking in hemolytic power; the type of hematuria produced in the patient corresponded to a glomerulo-nephritis. In other patients jaundice suggested that the liver was affected. All of this led to the belief that, under certain conditions—possibly due to the penetration of the poison into the circulatory system—there may exist, in addition to the necrotizing action, some toxic action on the parenchyma of certain viscera.

From the preceding observations, the clinical manifestations of the arachnoidism found in Chile can be divided into three groups: (a) cutaneous arachnoidism or gangrenous spot, (b) viscero-cutaneous arachnoidism, and (c) latrodectism, or nervous arachnoidism.

1. Cutaneous Arachnoidism

All the cases of cutaneous arachnoidism observed in Chile present the same clinical picture and the same type of cutaneous lesion.

From 1933 on, both through collecting the specimens and by classifying them (3 cases: one with certain reservations), the writer concluded that *L. laeta* was the cause of this condition, characterized by the ever-present gangrenous spot, by the absence of generalized symptoms—especially nervous symptoms—and by being caused by the bite of *L. laeta*.

Symptomatology and evolution of cutaneous accidents. The biting of the spider is immediately followed by a sharp, penetrating pain, distinctly localized, which changes progressively into a burning sensation. Persons who are bitten instinctively try to kill the insect, or perhaps it gets away, for which reasons it is not possible to obtain the specimen in the majority of cases. In a short while, the area immediately surrounding the bite becomes edematous; this edema then slowly extends to the more flaccid subcutaneous tissues. The swelling itself becomes hard like putty. The erythema, which in the beginning had been limited to the immediate vicinity of the bite, continues to extend until it practically coincides with the edema. It may progress for one to three days and in exceptional cases, up to the first or second week. At this point, however, the swelling becomes a hardened lump, the edema proper limiting itself to the reddened borders. The redness of the skin now begins to turn violaceous, sometimes almost black. This violet discoloration may be seen from the beginning around the bite. By the third day, it has completely covered that portion of the skin that will later slough off. The skin then becomes dry, parchment-like, more or less shiny, and tough; the underlying edema can only be detected at the edges of the violaceous area, disappearing a little later and leaving in its place a hard circular welt, slightly raised, which constitutes the boundary between the healthy and the sick epidermis.

Sometimes, just after the biting, there may appear a small blister which, on breaking spontaneously, reveals the underlying necrotized tissue. This is in reality the beginning of the ulcer that will form when the dry eschar sloughs off. The eschar is nothing more than the skin tissue that undergoes necrosis through the coagulation of the cytoplasm of its cells.

The sloughing-off process commences at the borders of the necrotized zone, when this area breaks away from the more healthy tissue. The eschar withers and slowly contracts away from the deeper tissues until it falls off completely in one piece, or in large parchment-like fragments. However, at times, the necrotizing process takes place more rapidly, leaving uncovered a large ulcer of irregular surface, filled with fleshy, bleeding mamelations. When the

bite is directly over an aponeurosis, this can be seen, intact, at the base of the ulcer.

The eschar may measure up to 30 cm., or more, on its longest axis. The largest one observed by the writer was of 22 cm., but Dr. A. Figueroa, of Antofagasta, reported an ulcer covering the entire back and part of the axilla of a patient. This dry leathery eschar becomes painless as soon as the swelling turns into a hardened lump. The sloughing-off process, during the second or third week, is also painless.

The ulcer takes the place of the eschar and affects the constituents of the skin exclusively. Rarely do the fatty tissue or the underlying muscle layers become involved, showing vascularized mameations; this is mainly the case when the sloughing-off has been too rapid. Generally, the base of the ulcer, muscular or aponeurotic, appears atonic, without the least sign of being affected by the necrotizing process. The violaceous or almost black discoloration of the lesion and its general appearance justify the name of *mancha gangrenosa* (gangrenous spot).

When the ulcer appears, there are no longer any other symptoms of illness. As a rule, these are really of no great importance even from the beginning, with the exception of the first day, when the localized pain is acute and insomnia is the rule. The use of morphine and other sedatives neither calms the pain nor brings about sleep in the more acute cases. In the milder ones, the sensation is more that of a burn. The exception was the case of an infant, one year four months old, who showed a febrile reaction and difficulty in swallowing—a condition that may have possibly been related to the edema rather than to a nervous lesion (see Case 9). The other patients did not show either general or systemic symptoms.

The regeneration of the sloughed-off tissue takes place very slowly and very sluggishly; the time for complete healing depends usually on the size of the ulcer and lasts more than a hundred days in some cases. However, healing is not always proportional to the size of the ulcerated surface; in cases of complete atony, it is necessary to have recourse to skin graftings, which usually grow at a normal rate. The final scar is generally star-shaped, or it may take the form of concentric circles, the rings on the outer edge having a darker coloration than those more recently formed.

The more frequent sequela is a keloidal degeneration of the scar, which may become extremely sensitive to touch or may be absolutely painless. Other sequelae, especially contractures, depend on the site of the lesion. The ulcer heals without complications except for

staphilococcic suppuration, but rarely does erysipelas develop. The histopathology of the eschar does not permit a detailed study of the process that precedes its formation. Coagulation necrosis is the rule.

A diagnosis of the accident and ensuing lesion must be made on the basis of the anamnesis, of the minute wounds left by the stingers of the insect, which are parallel and at a short distance from each other (a distance that serves to calculate the size of the spider), of the violaceous discoloration of the lesion, of the presence of the blister, of the sharp localized pain, but very rarely, on the basis of actual observation of the spider. However, the ensuing edema, induration, eschar, ulcer, the almost constant absence of general symptoms, and the healthy condition of the patient help in arriving at a diagnosis.

In certain cases, when the patient does not give a clear history of having been bitten by a spider, it may be necessary to make a differential diagnosis, the most important points to consider being: (1) a possible bite by some other insect. (The appearance of a gangrenous spot and the absence of nervous symptoms permits one to eliminate the sting of a scorpion, just as the absence of visceral disturbances eliminates the bite of *Latrodectus*.) (2) Occasionally, and only at a certain period of its evolution, may the lesion be considered traumatic or produced by the action of some caustic poison. (3) One of the cases presented the possibility of its being considered as a carbuncle (malignant pustule; see Case 1). (4) In the beginning, the most common mistake is to confuse the early edematous and erythematous aspects with erysipelas. (5) The possibility of a firearms wound (gun-powder burn) was mentioned in the discussion of one of these cases.

Treatment is practically unknown, since medical attention is usually given after the action of the poison has terminated. In cases where it has been possible to make early observations, a one percent solution of permanganate of potassium has been injected intradermally around the bite. However, since the action of permanganate of potassium has been questioned in the treatment of snake bites,[19] the author does not feel justified in arriving at any conclusions but, notwithstanding, he believes that the ulcers of patients treated by this method are obviously smaller. Since insomnia is the only general symptom that appears, its treatment is purely symptomatic. The local pain is little influenced by sedatives, including morphine.

19. Bannerman, cited in Stitt's Practical Bacteriology, Haematology, and Parasitology, 9th ed., p. 591 (Philadelphia: P. Blakiston & Son and Co., 1938); Rogers, *ibid.*

When the ulcer becomes atonic, one should try the reactivation of its borders; in those cases where the skin has sloughed off in large sections, skin grafting gives splendid results. Suppuration is treated in the customary manner. Ulcers that are covered over with a vaseline compress suppurate less than those completely bandaged.

Case Histories

Case No. 1. A 32-year-old male, sent by the Workmen's Compensation Bureau at Antofagasta in 1928 and examined jointly with Dr. Tirado.

The patient arrived on foot; he showed no signs of being ill. Personal and family antecedents had no bearing whatsoever on the present condition. He related that, while in his workshop and when he had bent down to pick up some tools, he felt a sharp prick on his left eyelid. He immediately realized that he had been stung by some insect and quickly crushed it against his face; he noticed that the insect was a spider, lead-grey in color. The place where he had been stung swelled to such proportions that he could not open his eye; the pain was more like that of a burn but so acute that he could not sleep for two days, at the end of which the swelling began to subside and the area to acquire a violaceous coloring. On the second day, a yellowish blister appeared in the center of this swollen area, now hard and almost black in color and extending from the corner of the eye to the left temple. This blackened area later became an eschar about 3 cm. in diameter and, on sloughing off, left an ulcer of ragged edges and irregular depth, showing easily bleeding granulations. During the period in which the blister was forming, some physicians diagnosed the condition as a malignant pustule (anthrax).

Examination revealed the absence of any generalized manifestations; the lesion described above was all that could be noted. Blood and urine analyses showed no abnormalities. No record was left regarding the course of the ulcer or the time it took to heal.

Case No. 2. S. S. de C., a 21-year-old married woman, seen at Antofagasta on January 20, 1933.

Personal antecedents were of little importance except for the diseases common to childhood. The patient presented a spider bite on her left forearm and told how this bite had been followed by a sharp pain which later developed into a neuralgia of the whole arm; that the bite had become ecchymotic and then assumed a dark violet discoloration. During the first two days, there was edema, induration, and localized inflammation. Shortly thereafter, all physical signs disappeared, with the exception of a relatively small blister.

There were no generalized symptoms, except the insomnia caused by pain. The course of the ulcer could not be followed.

Case No. 3. M. P., a 32-year-old widow, seen at Antofagasta on June 13, 1933.

According to the patient's story, she was bitten on her right arm by a blackish spider at the moment of retiring. The localized pain and burning sensation, which accompanied the bite, were intense. There was no blister, but the erythema and edema extended over a large area, the redness later turning into a dark violet color. Still later, the eschar dropped off and left a painless ulcer some 13 cm. in diameter, which delayed about 80 days in healing. There were no other generalized signs with the exception of insomnia and neuralgia of the right arm.

Case No. 4. C. C., 47-year-old male, seen at Antofagasta on October 24, 1933.

There were no personal or family antecedents bearing on his present condition. On the above date, while putting on his coat, he felt an intense pain in his right arm, just as if a needle had been pushed into it. This pain disappeared a moment after to be replaced by a burning sensation. The site of the lesion became inflamed and numb.

Three days later, the edema disappeared; in its place there developed a small, hardened area that acquired progressively a violet discoloration. At the end of a week's time, an ulcer about one half a cm. in diameter appeared in the center of this area; in spite of its small size, it delayed some 20 days in healing. The patient did not show any general symptoms, not even insomnia.

Case No. 5. E. P., a 16-year-old female, living on Blanco Encalada Street, No. 31, Antofagasta.

On the 9th of February, 1934, the patient had felt a sharp pain in her right arm, as if someone had pricked her; she noticed that it had been caused by the bite of a blackish spider, about 2 cm. long, which she had not been able to trap. The back part of her arm, right over the elbow, presented a reddened spot, slightly raised, similar to a mosquito bite. A little while after, she had felt a persistent and acute pain like that produced by a burn. The skin around the bite had become hard, swollen, and red, and by night-time the spot had begun to take on a violaceous coloring. The pain produced sleeplessness. The patient entered a hospital on the following day.

Clinical examination revealed no abnormal signs or symptoms. Personal and family antecedents had no direct bearing on the present condition. Patient's right arm presented an edema that extended

from the shoulder to the elbow, exclusive of these. The swollen portion was of the consistency of putty. The skin around the bite was dry, parchment-like, and violet colored; the outer edge of the edema was even harder, more elevated and deeper in color. By the second night of hospitalization, the swelling had extended down to the forearm and hand, but not to the fingers. The pain had increased and did not respond to analgesics; the patient could not sleep. By the third day, the blackish spot was some 6 cm. in diameter, and the edema persisted. By the fourth, the gangrenous spot appeared covered by a huge blister. The pain had subsided somewhat, but the patient still could not sleep. On the seventh day, the blister was opened by a surgeon, uncovering a necrotized zone about 10 cm. in diameter. When this necrotized skin sloughed off, it revealed the aponeurosis of underlying muscle layers. By now the pain had ceased altogether; the ulcer itself was quite painless, but its healing proved to be a slow process. On March 20, Tirsh skin grafts were successfully planted. Complete recovery, however, delayed some three months, leaving a scar formed by concentric rings of varying degrees of pigmentation, the outer ones being slightly more pigmented than the normal skin while the inner ones were of a reddish color. The grafts appeared like small islands of normal skin.

Case No. 6. R. I., a 27-year-old female, seen at Antofagasta on February 11, 1934 (Fig. 1).

Patient stated that on the above-mentioned date she had felt a sudden sting on the inner part of her left arm, near the axilla; she had just finished carrying the "sommier" of her bed out into the sun. On investigation, she saw a blackish spider which fell to the floor when she tried unsuccessfully to catch it. In the beginning, the bite had had the appearance of a mosquito bite, surrounded by a reddish, papular, and very painful area; by afternoon her arm showed a red edematous zone, extending down to the crook of the elbow, the whole area being painful like a burn. On the following day, the reddened area had almost disappeared and was limited to a circumference of approximately one cm. surrounding a darker one in the center of which a small black spot had appeared; the whole arm was painful by now, and the swelling had extended to the forearm. In this condition the patient had arrived at the Emergency Service of the "Hospital del Salvador," where she was treated with injections of permanganate of potassium in a one percent solution.

During the following days, the black spot became more defined and turned even blacker in color; its periphery became narrower, harder, and raised. The skin had a leathery appearance and was

insensitive; there was great subcutaneous induration. Patient was afebrile, nor did she show any organic or functional disturbances of any kind. Ten days later, a dry eschar (10 cm. in diameter) dropped off and left the muscle layers uncovered. Healing of the ulcer took approximately 90 days without any too great discomfort to the patient.

Case No. 7. Elsa R. M., a 6-year-old girl, seen at Antofagasta on February 14, 1934 (Fig. 2).

Patient stated that on the above-mentioned date she had noticed a small blackish spider, somewhat larger than a fly, running up her left leg; that when she tried to brush it off, she had felt a sudden sting somewhat like a pin-prick; that as the pain had persisted and the site of the lesion had become red and swollen, she had been taken to the hospital.

Patient was examined six hours after the accident. A general examination revealed no abnormal symptoms, with the exception of a slight tachycardia probably due to the anxiety of the child. Her whole leg was reddened and edematous. At the site of the bite there could be seen the small markings left by the insect's stingers, slightly elongated and broader at one end and somewhat resembling quotation marks. Patient was given one percent injections of permanganate of potassium.

By the following day, all pain was gone, and only a slight burning sensation remained. The erythema was concentrated around the site of the bite, forming a plaque the borders of which were slightly more raised and harder than the surrounding portions of the arm; in its center a blister had formed. Five days later, this blister opened spontaneously, showing in its base necrotized tissue, insensitive to touch. The surface appeared darker, leathery, and also insensitive, except for a small inflamed zone around its periphery, presenting the characteristics of an erysipelatous lesion.

By the eighth day, the necrotized tissue had sloughed off, leaving an ulcer 7 to 8 cm. in diameter. The healing of the ulcer resembled that of a simple wound, with no further trouble to the patient during the three months and a half that elapsed before the affected epithelium regenerated.

Case No. 8. J. F. L., a 5-year-old child living at Bellavista Street No. 910, Antofagasta, seen on February 26, 1934 (Fig. 3).

On the above-mentioned date he was seated at lunch at home, when he suddenly felt a sharp prick on the back of his right hand near the base of the small finger, caused by a black spider, a bit larger than a fly, which could not be caught. A small reddish spot,

extremely sensitive to touch, and a swelling that increased rapidly were observed. By the following day, the skin around the bite had turned a dark violet color. On the third day, various blisters had formed, running into each other until they had covered the entire back of the patient's hand during the ensuing days. On the fifth day the blisters were opened, and a serous liquid, slightly albuminous, containing eosinophiles and a scanty amount of other cellular elements, was collected.

The base of the wound showed a dry eschar, parchment-like and painless; when removed four days later, it uncovered the underlying muscle layers. The borders were irregular, slightly hard but not painful. Healing took about two and a half months. There were no complications nor was there further discomfort for the child, who was unmolested except for the initial pain and insomnia.

Case No. 9. V. A., an infant one year and 4 months old, seen at Antofagasta on March 2, 1934 (Fig. 4).

Patient's nurse explained that while this baby was sleeping on the above date in the public gardens of the "Mercado Modelo" of Antofagasta, he had been bitten on his left arm by a reddish "araña de pimiento" (pepper spider), which had left its stingers clearly marked on the child's arms; that the bite had become quickly red and edematous, the edema spreading until it had covered the entire upper arm, shoulder, neck, and chest.

During the first two days, the child developed a high fever, insomnia, restlessness; he had trouble in swallowing and was in intense pain; he cried continuously and tried to scratch his arm. However, by the third day, the erythema and the edema had become circumscribed to the arm alone. The color of the skin progressively turned black around the bite and violet around its periphery.

Various blisters appeared all over the lesion, at which time the pain lessened and the insomnia disappeared. By the tenth day, the gangrenous tissue sloughed off, leaving an irregular ulcer, with ragged edges, approximately 22 cm. long by 6 cm. wide. The ulcer was painless; its edges were slightly edematous, hard, and red. It healed slowly, and complete recovery of the damaged tissues took all of four months. Even though the initial symptoms were somewhat alarming, especially the patient's inability to swallow and the threat of asphyxia, in addition to his high fever, it should be noted that the rest of the illness passed without other general manifestations.

Case No. 10. B. A., a 45-year-old female, living in *Calle 14 de Febrero*, No. 1920, Antofagasta, seen on March 2, 1934.

Patient revealed that, on the above date, she had been awakened from her "siesta" by a sharp, penetrating pain in her left leg, immediately followed by a burning sensation, continuous and unbearable.

Physical examination made a few hours later did not show any abnormal general symptoms. However, on her left leg there appeared an inflamed spot some 5 cm. in diameter, raised and localized in a hard, edematous area somewhat of the consistency of putty. The burning sensation and pain, which reached to the tip of her toes, kept her from sleeping. By the following day the leg was completely swollen; in the center of the inflammed area there was a small blister at the site of the bite. On the third day, a new blister appeared next to the first one, both of which burst spontaneously, exuding a yellowish serous liquid. At the site of the first blister an eschar formed; the same thing happened over the second blister and others that had made their appearance by the fourth day.

Somewhat later, the edema receded, limiting itself to the upper posterior portion of the leg and forming a red, raised zone, 12 cm. to 15 cm., in the center of which another zone, 8 cm. to 10 cm., with multiple parchment-like eschars, could be seen. During subsequent days, the leathery eschars began to drop off, leaving small ulcerations that healed rather rapidly. A month later, the patient was well again, without having had fever or other general symptoms of any kind.

Case No. 11. R. Sh., a 50-year-old male, living on Washington Street, No. 227, Antofagasta, seen on March 5, 1934.

Around six o'clock of the above-mentioned date, while walking through the heart of the city, patient felt a sharp, burning prick on the first phalanx of the small finger of his right hand. Thinking that it was merely a mosquito biting, he paid no attention to it. However, on the following day, an inflamed spot had appeared at the site of the bite, slightly swollen, with lateral ramifications, and a pearly blister in its center. By afternoon, the finger was badly inflamed and edematous. On March 7th, the blister flattened out, and the surrounding flesh acquired a blackish tinge. When it opened, the blister exuded an opalescent liquid. Some drops of permanganate of potassium, in a one percent solution, were injected around the lesion on this day.

During subsequent days, a small eschar 3 to 4 mm. in diameter formed. As patient did not return for any further treatment, there is no record of the course of the ulcer.

Case No. 12. M. A., male, approximately 30 years old, seen at Antofagasta on March 6, 1934.

Patient related that he had been awakened on the above day by an intense burning sensation on his right hand, which he could not explain. At 2:30 of that afternoon, he came to the Emergency Service of the "Hospital del Salvador" for medical attention.

Patient presented neither signs nor symptoms of general involvement. His temperature was normal. The back of his right hand showed a generalized edema. The center of this edematous zone revealed two tiny linear markings that could correspond to the stingers of a spider and around which a one percent solution of permanganate of potassium was injected. By March 7th, the swelling had gone down and the pain had lessened. By the 9th, the edema had disappeared completely, and one could hardly see the hard nodule still remaining at the site of the lesion, which also disappeared during the following days.

Case No. 13. N. V., a 7-month-old baby girl, living on Manuel Rodríguez Street, No. 573, Antofagasta, seen on March 10, 1934.

No record exists as to the circumstances in which this child was bitten. On March 10th the little girl was brought for medical attention; according to her relatives, she had been stung while in the cradle without anyone realizing the reason for her continuous crying. On March 13th, there had appeared on the back of her neck a blister centralized in a darkened area, which was hard, swollen, and with reddish borders. According to her mother, patient had been restless, had cried constantly, showed that she was in pain, and would neither eat nor sleep. Patient was treated with injections of permanganate of potassium. There is no record of the course of her condition, but symptomatology was typical of cutaneous arachnoidism.

Case No. 14. (Case of Dr. G. Rodríguez). The age of this patient is unknown, but the course of his illness was followed in Tocopilla during the month of April 1934.

Patient was a young person, who had been bitten on the upper third portion of his left arm by a spider. Immediate symptomatology was not recorded, though no general disturbances were observed. When the patient was seen in the doctor's office, he presented an almost circular ulcer of some 6 to 7 cm. in diameter, having all the characteristics described in previous cases. Its healing was slow and left a shrunken and cheloidal scar. The various stages in the healing process could be observed in the concentric circles of the scar, varying in pigmentation.

Case No. 15. M. O., a 33-year-old woman, seen at Antofagasta on April 19, 1934.

On this date, patient had been bitten by a spider; under what circumstances she could not make clear. However, she had felt a burning sensation at the site of the lesion, followed by erythema and an extensive edema that covered her whole arm. Shortly thereafter, the edema began to recede, the skin to turn violet in color. A blister appeared over the bite. In course of time, the skin over it dried and sloughed off, leaving a painless ulcer about 2 cm. in diameter, which delayed some twenty days in healing completely.

Case No. 16. O. de la F., an 18-year-old girl, seen at Antofagasta in 1934 (Fig. 5).

The facts surrounding the actual biting were not known, for the patient only came for medical attention during the last stage of the ulcer development. However, she related that she had felt the sting but could not give details of it. A short while after, she had felt a burning sensation in her right arm; it became red and swollen right up to the elbow. During the following days, the erythema began to turn dark; the skin of the affected area became insensitive, hard, and was limited by a raised reddish ring.

Towards the end, without the usual blister appearing, the eschar that formed dropped off in a single crust, leaving underneath a round ulcer some 3 cm. in diameter. The healing of the ulcer took approximately 15 days. There were no general signs or symptoms of illness, except for the insomnia during the first day of the accident.

Case No. 17. J. H., a 16-year-old young man, seen at Ovalle in 1937.

The clinical record of this patient is incomplete. The only thing known is that, because of a spider bite on his right thigh, at the moment of dressing, an ulcer was produced at least 5 cm. in size, which delayed some time in healing. The ulcer was the outcome of a blackened eschar that sloughed off spontaneously.

Case No. 18. Patient of Dr. Vivanco, of Tocopilla.

The above-mentioned doctor reported the case of a patient showing a blackish eschar as the result of a spider bite. The eschar sloughed off, leaving an ulcer that delayed in healing. All other details of the case are unknown.

Case No. 19. E. S., a 23-year-old woman, seen in Santiago in January 1938.

Patient related how she had been bitten on her right hand by a spider while cleaning out a room in which old and unused furniture was stored.

The bite, seen some six hours later, showed the light markings apparently made by the insect's stingers right in the center of a red, edematous area, which pained as if it were a burn. The edges of this

inflamed area were circumscribed by a broad and raised circle, somewhat more inflamed than that around the lesion. The pain was acute and could be felt to the tips of the fingers. On the following day, after a sleepless night, patient presented an edema over all of the forearm and right hand. The affected area was now violet in color, with a blackish center that embraced all the back of the hand. After injections of permanganate of potassium had been administered around the lesion, the skin could be seen to become paler wherever the solution had been injected.

By the third day, the edema was limited to the back of the hand only, and by the fourth, this area was no more than 4 cm. in diameter but of a shiny black color. The skin was parchment-like. By the seventh day, the borders of this area had separated so that the underlying muscle layers could be seen. On the twelfth day, a surgeon pulled off the eschar in a single piece, leaving the typical ulcer. Healing was very slow, so skin graftings were made. After 165 days, all that remained was a scar formed by concentric rings of different pigmentation, with the outer ones intensely pigmented.

Case No. 20. A. M., a man 42 years old, seen at Antofagasta in February of 1938.

Patient was a workman who presented a small ulcer which, according to his information, had been caused by the bite of a small insect. The physician who attended him found a violet-colored spot on the index finger of his left hand. The spot turned black and later presented a small pearl-like blister, which dried and fell off, leaving a small ulcer of 0.5 cm. in diameter. The ulcer took more than 10 days to heal. The patient, however, could not determine the cir cumstances in which he had been bitten but claimed that pain had been slight.

Case No. 21. A. R., a man 37 years old, seen at Antofagasta in the year 1939.

The only record of this patient is a photograph of an ulcer of his left arm, some 12 cm. long by some 6 cm. wide, in the process of healing. The only details known are that he was bitten by a spider, followed by the usual edema, black discoloration, and eschar.

Case No. 22. A young man of unknown age, seen at Antofagasta in 1935 and presenting an ulcer of his left arm.

Case No. 23. A 10-year old girl, living in the interior of the Providence of Coquimbo in 1936 (?), showing an ulcer of her left leg.

Case No. 24. Patient from Talca. The only detail known is that this case was similar to those seen by the author in 1934.

Case No. 25. M. I. M., a woman 25 years old, who came from an "hacienda" in the vicinity of Santiago, seen in 1939.

Patient believed that she had been bitten by a spider, while moving some sacks in the pantry of her house. She presented a painless ulcer of her left forearm, partially covered by a smooth, painless, leathery crust, blackish in color. According to patient, she had had extensive edema, and her whole arm pained her. The inflammation became localized, the skin, violet in color, and thereafter a blister appeared, which afterwards turned into an ulcer some 7 cm. in diameter.

The similarity of the clinical picture in all the foregoing cases, together with the experimental production of the typical lesion with the glandular poison of this species, has left no doubt whatsoever as to the etiologic role the insect plays in the accidents so far described. These experiments will be described in a future paper.

Viscero-Cutaneous Arachnoidism

Even though the author knew that in the south of Chile, and all along the *Valle Central*, some cases of cutaneous arachnoidism with serious general involvement occurred, none of the information collected showed their general symptomatology. On the other hand, the cases observed in 1936 led to the conclusion that this type of cutaneous arachnoidism was a separate, well-defined entity, absolutely apart from that produced by the bite of the species, *Latrodectus mactans*.

In 1936, through the courtesy of Drs. A. Neghme and G. Gasic, the author observed a genuine case of viscero-cutaneous arachnoidism; in 1939, through the collaboration of Dr. Juan Ibaceta who had taken part in the 1934 studies, he was able to see a second case of this type of arachnoidism. The suspicion which he had harbored in the beginning—that these cases might have been caused by the bite of another species of spider—was put aside in 1939 by an examination of the spider in the last named case, which proved to be a *L. laeta*.

At the moment, there is no satisfactory explanation why in a few cases only does the poison from this spider produce generalized symptoms. The hypothesis that an autointoxication is produced through the absorption of proteins from the damaged tissues is not acceptable, since those cases showing a more extensive necrosis also show, as a rule, an absence of general signs and visceral symptoms. Another hypothesis is that the action of the poison is not always the same but this, even though it may be true, has not yet been proved

experimentally. It is evident that the poison of *L. laeta* undergoes changes in its activity, depending, perhaps, on numerous factors. However, in every case its action has been that of a coagulating and necrotizing poison, which seems to act exclusively on the skin.

Some observations seem to indicate that large doses of the poison could probably exercise a degenerative action on the parenchyma of the viscera, when it flowed into the blood stream. For this reason, it is possible to formulate a hypothesis to the effect that the cases of viscero-cutaneous arachnoidism may be produced by direct inoculation of the poison into some blood vessel of the skin. However, this could not be true in more than 3 percent of the cases.

The clinical records of the two cases of viscero-cutaneous arachnoidism are given below. In the first case, though the hepatic signs may not have depended on the poison of the spider, a hepato-renal symptomatology was apparent. In the second, there was a renal lesion only. The possibility that in this last case the renal manifestations may have been produced by a streptococcic infection of the wound is discarded because of the ineffective action of the anti-erysipelas serum, given to the patient at the very start. Furthermore, renal disturbances in both patients appeared to be of the same glomerulo-nephritic type.

Case No. 26. Observed in Santiago on September 18, 1936.

The patient in question was a young man of undetermined age, with alcoholic antecedents for both father and brothers; patient himself was a consuetudinous alcoholic, too. He had a history of blenorrhagia in 1930 and, possibly, a pleural empyema (post-pneumonic) in 1935, which was treated surgically; jaundice during 10 days at the beginning of 1936, and a dysenteric picture for June of this same year.

After some 15 to 20 days of continuous drinking, patient noted around the 15th of September that his urine was slightly billious. On the 18th, under circumstances he could not remember, he had been bitten by a spider on the outer part of his left elbow. The insect measured some 2 cm. and was of a dark yellowish color. Patient washed the affected part with soap and water, but the pain increased and, little by little, there appeared a violent swelling, with erythema, and a burning sensation.

On the following day the upper arm, the forearm, and the hand were all badly swollen and very painful; the inflammation reached to the axilla. His first morning urination was dark, staining his clothes. Patient displayed anorexia, adynamia, general weakness, and epigastric pain with pyrosis, belching, and vomiting. It was at this point that he came to the Emergency Ward where two injections were given him. An hour later, his urine was almost black, and patient had chills, cephalalgia, and coughing with a muco-purulent expectoration. By September 20th, his skin and mucous membranes had attained the typical color of jaundice. His depositions were soft and of a dark color.

On being admitted to the hospital on September 22nd, patient had a temperature (inguinal) of 38° C. and a pulse rate of 104 per minute. Dyspnea, anxiety, and a profound adynamia were apparent: he was hardly able to stand. His upper left forearm was still swollen but cyanotic by now and very painful and tender, yet the principal sensation was that of a burn.

On the 23rd, however, patient awoke without fever, well rested, and with a clear mind. His pulse was 98; his blood pressure: maximum 10, minimum 6: respirations, 22; weight, 47 kilos. The clayish-yellow color of the skin and mucous membranes was more intense, but there were no other abnormal signs in head, face or neck. There was bronchial breathing over the middle third of the left lung and diminished vesicular breathing over the lower half of the right. The heart was normal. The abdomen was not painful to palpation. The upper limit of the liver was at the level of the seventh rib, but its margin was not palpable. The spleen could not be felt nor localized by percussion. The genitals were normal. Nothing abnormal in the extremities, except for the edema in the left upper arm extending from the axilla to the hand. There was hypersthesia of the skin, except in the upper two thirds of the forearm where there was anesthesia over an extensive violet-colored zone that had developed. On the postero-lateral aspect of the elbow, and at the level of the bite, a small hemorrhagic, blackish lesion could be detected. A lymph node the size of a pigeon egg was palpable in the left axilla. The arm could be used normally.

Laboratory examinations:

Blood Count—

Hemoglobin	33%
RBC	2,080,000 per cmm.
WBC	13,500 per cmm.

Basophilic pigmentation of the RBC, anisocytosis, poikilocytosis, and intense polychromatophilia.

Differential:

Polymorphonuclear neutrophils	61%
Basophils	5%

Eosinophils	1.5%
Lymphocytes	26.5%
Monocytes	9.5%
Plasmocytes	0.5%

Urinalysis—

Albumin	4g. x 1,000
Urobilinogen	Abundant
Biliary pigments	Negative
Biliary acids	Negative
Chlorides	1.4 x 1,000
Urea	20.17 x 1,000
Sediment	Renal

epitheliums, RBC, and granular casts

On September 24th, urinalysis revealed no RBC; Weber reaction was negative. A blood count on this date gave the following reading:

RBC	1,750,000 per cmm.
WBC	15,200 per cmm.
Normoblasts	1 x 200 WBC
Reticulocytes	46,000

Anisocytosis, poikilocytosis, and polychromatophilia persisted.

Differential:

Polymorphonuclear neutrophils	58%
Basophils	1%
Eosinophils	0.5%
Lymphocytes	18%
Monocytes	22.5%

By September 25th, after two days without fever, patient awoke with a temperature (inguinal) of 37.5° C. The swelling on his left arm had diminished. However, the violet discoloration had become more intense at the elbow and surrounding the blackish spot that marked the site of the lesion. His urine was abundant and normal in color by now. (Bilirubinemia—3 Van den Berghe units; cholesterinemia—1.50% (26/9).

By the 29th, the edema had almost disappeared and was limited to the vicinity of the lesion. This ecchymotic spot was perfectly outlined and painless, even though a neuralgic pain persisted in the rest of the arm.

Laboratory readings for the 30th were as follows:

Hemoglobin	30%
RBC	2,130,000 per cmm.

WBC	10,200 per cmm.

A slight polychromatophilia still persisted at this time.

Differential:

Polymorphonuclear neutrophils	65%
Basophils	0.5%
Eosinophils	5%
Lymphocytes	24.5%
Monocytes	5%

By the 2nd of the succeeding month, patient could be said to be in a satisfactory state. The lesion on the forearm was circumscribed to a violaceous zone where the skin had become black, dry, hard and parchmentlike, but painless. The eschar began to drop off in large pieces, revealing layers of muscles underneath. The edges of the ulcer that formed were raised and hard, and the tissue in its immediate vicinity looked pasty.

The treatment given the patient was: on admission to the hospital, adrenalin, liver extract, and isotonic glucose solution by hypodermoclysis together with a potion containing sodium citrate and stovaine. This last medicine was suspended as soon as vomiting disappeared. The adrenalin was later replaced by suprarenal extract, but the liver extract and the glucose were continued until September 30th. The diet was rich in proteins, fats, and carbohydrates.

He was released on October 7th. The time in which the ulcer healed is unknown, as is also unknown the type of spider biting.

Case No. 27. A woman 24 years old, a teacher, seen in Antofagasta by Dr. Juan Ibaceta on February 28, 1939. The spider was caught and sent to the author for identification.

There were no personal antecedents of any importance. On February 28, 1939, while lying in bed, patient felt a sharp prick on the back part of her right thigh. On touching the spot, she felt something which she killed outright with a violent blow of her hand; it turned out to be a spider. After the sting, patient felt a slight burning sensation until the second day, when the pain became intense and a violet-colored spot appeared around the lesion. The physician who attended her noted that there was an extensive hard infiltration around the area, with considerable hyperesthesia. Suspecting erysipelas, because of the reddish ring that circumscribed the damaged area, he applied an injection of anti-erysipelas serum.

On the following day the patient, who had been feverish and in a generally weakened condition, woke up feeling much worse, with a

temperature of 40° C., a feeling of great prostration, toxicity, paleness, and an intense thirst that drove her to drink almost four liters of water during the day. The urine was bloody; it contained, besides, red blood cells, albumin, and abundant granular casts. At the site of the lesion, the edema extended in all directions; the inguinal glands were swollen and painful to the touch. The hematuria lasted for two days more and the fever remained at the same level for three. The fever lasted for fifteen days altogether, but it had begun to go down by the seventh.

The inflamed zone had by now turned from a violet color to almost black and, in its center, a large blister containing a rose-colored liquid appeared; under it there could be detected an expanse of escharred tissue which, on sloughing off, revealed quite a large ulcer. From this moment on, the patient's general condition was normal. However, the ulcer healed very slowly. A month later, at which time the regenerative process started, it covered almost the entire back of her thigh. Treatment was based on cardiac stimulants, glucose solution, vitamin C, and disintoxicants.

On March 3rd, the Chief of the Health Service at Antofagasta forwarded the specimen, sent by Dr. Ibaceta, to the Health Department. On March 10, 1939, it was received in the *Laboratorio de Investigaciones Científicas*, under the author's direction. An examination revealed the following:

No. 2, April 11, 1939. The spider has been classified as a *Loxosceles laeta*, adult, male. Experimentation with the dry gland poison did not give as positive a reaction as on other occasions; the spider was dead when it arrived at the laboratory, therefore the toxicity of its poison was somewhat diminished by exposure during eight to ten days in the prevailing temperature; its necrotizing action was proved, however.

Experimentation consisted of tests for: necrotizing action on the skin; hemolytic action and immunizing effect of the serum of convalescents (guinea pigs). Findings were: by intradermal inoculation of guinea pigs: formation of a typical gangrenous spot, though small (0.5 cm. in diameter), with intensive and persistent subcutaneous induration, but no necrosis; absence of hemolytic power by intradermic or intravenous injection; very little immunizing effect from the serum of convalescents *in vivo* though neutralizing effect on the poison *in vitro*.

(signed) Dr. A. Macchiavello, Chief of Laboratory

Since the author has never been able to demonstrate any hemolytic power on the part of the glandular poison of *L. laeta*, many are the hypotheses that could be formulated to explain this phenomenon.

For example, hemolysis may be the property of certain varieties or sub-species only, or the poison may perhaps be directed at the hepatic and renal parenchyma, as Vellard suggested, rather than a direct action on the red blood cells.

At any rate, the general reactions that appeared in the above cases did not alter the local picture of typical cutaneous arachnoidism, or gangrenous spot. The visceral reaction was revealed principally in the kidney (glomerulo-nephritis), while true hepatic reaction remained somewhat doubtful since the jaundice might have been the outcome of the great hemolysis. Given the type of anemia appearing in one of these cases, the hematuria may be attributed either to the cutaneous lesion itself, to the nephritis, or to the hepatitis, but above all, to the hemolytic action of the poison. However, since this last aspect has never been proved experimentally, it may be suggested (1) that the poison requires certain special conditions for hemolytic reaction, (2) that it acts through a complex mechanism in which parenchymatous alterations of certain viscera, especially the kidneys, and perhaps the liver, take place, and (3) that the hemolysin acts only on human red blood cells but not on those of the guinea pig, just like the arachnolysin of *Esperia diadema* which acts on the red cells of man and of the rabbit but not of the horse or the guinea pig. At any rate, this is a point that should be given further study.

While from the clinical point of view a separate classification of the cases of simple cutaneous arachnoidism from those of a viscero-cutaneous type is justified, from the etiologic viewpoint such a classification is not valid. Direct passage of *L. laeta* poison into the blood stream may be the cause of this visceral syndrome, but the statement is made without prejudging the physiopathologic mechanism of the poison's action.

NERVOUS ARACHNOIDISM

In Chile, nervous arachnoidism is the result of the bite of *Latrodectus mactans*. There is no doubt that all of the symptomatology attached to such accidents is produced by a sudden and acute poisoning of the nervous system, especially the vegetative. These observations will add nothing to Puga Borne's excellent and rigorous study on the subject, or to the recent monograph prepared by Gajardo Tobar. Only as a subject for comparison is the clinical record of a patient seen in Santiago given below.

CASE No. 28. J. V., a country boy, 18 years old (Case No. 28,419—*Hospital del Salvador*).

While reaping wheat on the morning of January 18th, patient felt a sudden, sharp prick on his left elbow. He noticed, still clinging to his arm, a small spider commonly referred to as "poto colorado" (red anus). Patient knocked the insect off with a quick movement of his hand, but while trying to find it among the brush on the ground, he felt all the strength leave his body. There followed intense pain at the site of the bite, slowly spreading first, to the shoulders and then, very rapidly, towards the chest and abdomen, producing acute precordial and epigastric oppression. Then the pain became generalized, involving all the joints and muscles. There was profuse perspiration and slight cephalalgia, while the adynamia was so intense that he lost his balance and had to be helped by a companion. By the time he arrived at the Emergency Station, and later at the hospital, all of the above described symptoms had increased. The muscle tremors resembled an intense chill and recurred every twenty minutes, lasting from half to one minute; he still perspired profusely; there was marked lacrymation, and he felt a tremendous anxiety and a sensation of impending death.

The above symptoms were checked on admission. Patient could not walk because of general pain and the weakness of the legs. However, the sensorium was clear; his face swollen and perspiry; the conjunctivae were red and teary; the tongue was damp and coated; micropoly-adenitis of neck; the thorax, abdomen, genitals were normal. The back part of the elbow showed an erythema, some 10 cm. in diameter, at the site of the lesion, where the skin appeared red and infiltrated.

On January 19, the day following the accident, patient was still having tremors, accompanied by profuse sweating and lasting about half a minute. His cephalalgia had diminished, as had, also, the pain. Temperature fluctuated around 38° C., with but slight variation. The above symptomatology was still apparent on the 20th, though the cephalalgia had diminished further. The redness had disappeared around the bite, leaving no zones of anesthesia. The muscular contractions, resembling chills and tremors with perspiration, persisted even to the night of the 21st but, by the 22d, they were considerably alleviated, though the headache lasted until the 24th.

On the fourth day after the accident, a urinalysis showed 0.04 g. per 100 of albumin; urobilinogen had increased; there was a concentration of chlorides, and some red blood cells were found in the sediment. Uric acid showed as 0.055 g. per 100. On January 25th a blood count revealed:

Hemoglobin	91%
RBC	5,020,000 per cmm.
WBC	14,300 per cmm.
Platelets	175,000 per cmm.
Color index	0.91%
Differential:	
Polymorphonuclear neutrophils	75.5% (Slight pathologic granulation of neutrophils)
Lymphocytes	14.5%
Monocytes	10%

Three days later another blood count gave: RBC—6,640,000; WBC—5,600; platelets—405,000 per cmm. Differential: Polmorphonuclear neutrophils—58%; basophils—25%; eosinophils—3%; lymphocytes—21.5%; monocytes—13.5%; Turck cells—1%. An x-ray of the chest was normal.

ANALYSIS OF THE SYMPTOMS IN CUTANEOUS ARACHNOIDISM

Bite. Of the 16 patients who gave information on this point, 15 actually felt the spider stinging. One patient was asleep when the accident occurred. The sensation produced was compared in some cases to that of a sharp pin-prick; in others, to that of a mosquito bite. Observation of the bite allows it to be classified as a spider's by the parallel wound corresponding to the stingers of the insect, which varied according to the latter's size.

Reaction. The immediate local reaction was of a burning sensation, followed by reddening and edema.

Burning sensation. This was felt either immediately or at varying times after the bite—from a few minutes to an hour, though the interval was usually short. At the beginning the sensation was that of irritation, but it increased progressively until it became almost unbearable like a bad burn. The erythema then appeared.

Erythema. Each one of the 18 cases studied presented this local sign. The reddening appeared early as an erythematous and papular area around the lesion. It then extended rapidly along with the edema, the latter, however, spreading beyond the erythematous area. At the latter's boundaries, there could oftentimes be seen a surrounding ring that rose above the rest of the area, was more sen-

sitive to the touch, and more intensely red. The inflammatory process was not necessarily progressive; after two or three days it commenced to diminish, usually becoming circumscribed to an area smaller than the original one. The zone of erythema was usually as large as that of edema.

Edema. Although limited in the beginning to the immediate area of the bite, the edema extended quickly until it usually covered all of the affected limb, and always an area much greater than that of the zone of inflammation. The edema was rather hard, of a pasty consistency, although softer and fluid in those portions of the affected limb farther away from the lesion. Three to five days after the accident, the edema gave rise to an induration of the subcutaneous tissue under the parchment-like skin. Edema of varying degrees was present in all cases. In an infant less than a year old, the edema was so severe that it affected the deeper tissue planes of the neck, upper arm, and thorax, provoking a rather troublesome dysphagia. In some instances the edema lasted throughout the second week, followed by a slowly progressive induration of the tissues.

Necrosis. As the coagulation necrosis progressed, the skin underwent considerable changes, beginning with a mere reddening and ending with the formation of a dry, black eschar. The various changes were the discolored spot, the blister, and the eschar.

Discolored spot. Ordinarily, although the skin acquired a dark color, it did not always turn black at the end. The original reddening was little by little displaced by a violet discoloration that began at the center, and in the vicinity of the bite, and extended to the surrounding area. At the same time the center became darker and darker until, in certain cases, it turned almost black, with a shiny slatish cast. The pigmented zone was never as extensive as the initial erythema; it was generally limited to the area of necrosis. Even though a violaceous tint might appear centrally a few hours after the accident, the extension of this discoloration required several days. Among 23 cases, giving information on this sign, 22 developed a black zone of discoloration.

Blister. On the third day, or a little later, the epidermis separated from the dermis, producing a blister that was not necessarily located right over the bite. This blister was rarely bloody; it usually appeared singly but quite large in comparison to the size of the wound. Occasionally, more than one blister formed; even less frequently, several appeared in series. Of 17 cases, only 11 developed blisters. In less than 20 percent of them the blisters were multiple. Once the blister ruptured, one could see the necrotized tissue underneath.

Eschar. After the lesion became circumscribed by an indurated, blackish area, necrosis and gangrene set in at varying periods but rarely before a week had elapsed. The affected skin, now dry and parchment-like, separated from the more healthy portions. The sloughing-off process sometimes occurred all in one piece but at others, in several fragments. The ulcer was the final result of this necrotizing process. Out of 22 cases, only in one did ulceration not take place.

Ulcer. Its size depended on the area of necrosis. Of 24 cases, 23 ulcerated. In 4 cases the ulcer was not measured, but the dimensions of the remaining 19 were as follows: 5 of 2 cm.; 4, 2 to 5 cm.; 7, 10 to 15 cm., 2, 10 to 15 cm., and 1 with more than 15 cm.

The largest of the ulcers observed by the author measured 6 x 22 cm. Usually, these ulcers had the same proportions as the discolored spot but much smaller than the original zone of erythema. The edges of the ulcers might be either smooth or rough. At their base could be seen the layers underlying the skin, especially muscle and aponeurosis; rarely was the base mamelonated and bleeding. The eschar itself was insensitive, though the edges of the ulcer were hypersensitive. The ulcers showed normal sensibility without spontaneous pain.

Tissue repair. Generally speaking, the healing of the necrotized tissue was slow and halting so that, at the end, the new skin presented a series of concentric rings. The first skin to heal was always hyper-pigmented. Among 12 cases, in which the healing process was closely followed, the average time was 68 days. As the average diameter of the ulcers was 7.5 cm., one might conclude that each cm. of diameter took around 9 days to heal. It was necessary to graft skin in some cases, or to stimulate the margin of the ulcers. The slowest healing ulcer was only 4 cm. in diameter but took 165 days.

Secondary infections from pyogenic bacteria were not frequent and could be controlled easily with the current methods of disinfection.

Site of the lesion. As a rule, the bites were found on the uncovered and easily accessible parts of the body. According to the table given below, 70 percent of the lesions were localized on the upper extremities, with almost 50 percent of these on the arms. This was easy to understand. People usually hang their clothes on hooks and in closets, where spiders can well hide. The insect naturally tries to escape as soon as it feels any movement in the clothes; it naturally travels upwards (they travel down only when there is a possibility of

reaching the floor). On feeling the spider, the person reacts quickly and tries to kill it; the spider defends itself by stinging. Lesions are not as numerous on the lower extremities, as these are better protected.

Region of the Body	*Right*	*Left*	*Total*
Head			2
Arm	4	4	8
Forearm	0	4	4
Hand	4	1	5
Thigh	1	0	1
Leg	0	3	3

General symptoms. Excepting the two cases of viscero-cutaneous arachnoidism, all others showed no general symptoms, save: insomnia which was noted in 10 out of 16 cases. There were diffuse neuralgias in one; anxiety, anorexia and restlessness in another, and in still another, fever and disphagia plus restlessness and anorexia. The two cases with general manifestations of same inportance were children 7 and 16 months of age, respectively. In the febrile case, the fever could have been produced by the absorption of toxic products from the skin (as is the case in certain types of burns), and the dysphagia, by the edema. The insomnia and the restlessness were the results of the pain alone, not of nervousness. In a word, this condition is merely a local accident in the opinion of the author.

In the two cases of viscero-cutaneous arachnoidism, the symptoms were possibly due to renal involvement (glomerulo-nephritis) and perhaps though this is doubtful, to a hepatic disturbance. The blood picture seemed due to a sudden hemolysis. However, since it has not yet been possible to prove experimentally such a hemolytic action in experimental animals, it may be postulated that the hemolysin was (1) selective in its action, or (2) it forms in the insect only under certain conditions, or (3) the poison acted on the renal and hepatic parenchyma, the hematuria and hemoglobinuria being secondary to its action on these organs. At the moment, no satisfactory explanation can be given, as the local lesion is the only aspect that has been reproduced experimentally, and only two patients have presented such general reactions as described above.

DISCUSSION OF SOME CASES OF CUTANEOUS ARACHNOIDISM DESCRIBED IN THE LITERATURE

Matus, 1927. The symptomatology, similar to what has been described above, proves that, even though infrequent, there have been cases of cutaneous arachnoidism in the *Valle Central* of Chile.

Escudero, 1935. This case is of interest because of the errors made in the interpretation of the etiology of cutaneous arachnoidism and of the laboratory experiments.

Escudero described a fatal case of arachnoidism of 48 hours' duration, with alarming general manifestations, such as hematuria, cyanosis, bilious vomiting, etc. The spider involved could not be caught, therefore Escudero limited his experiments to other insects collected in the patient's house which, according to his family, were "as like as possible" to the one that had stung the patient. Neither did Escudero follow up personally the course of the patient's illness; his only proof was obtained after death. In any case there seems to be little relation between what really happened to the patient and what was observed in the experiments.

Escudero's observations may be summed up as follows:

1. In accordance with the family's indications, the patient was supposedly stung by a specimen of *L. laeta*. In order to prove that *L. laeta* could provoke hemolysis in the affected individual, Escudero injected rabbits, intravenously, with an emulsion of the cephalothorax of *Loxosceles*. Naturally, the rabbits presented a hemolysis and a hemoglobinuria because of the arachnolysin present, which is quite different biochemically from the glandular poison of the spider. Hypodermic injections produced generalized hemorrhages and ecchymoses. The results were negative in guinea pigs.

2. An emulsion prepared from the macerated abdomen of the species, *L. laeta*, and injected intravenously, did not produce lesions, which is also the case with *Dysdera maxima*. When rabbits are stung by this species, the ecchymotic lesions that are produced are never fatal.

The 32 experiments described by Escudero brought out one thing only: that the arachnolysin contained in the cephalothorax of the insect is a hemolytic poison for rabbits but not for guinea pigs. Logically, this had nothing to do with the glandular poison of *L. laeta*. Influenced by the results obtained in his experiments, Escudero supposed that the fatal accident in question was due to this spider, something which is wholly improbable. Both the symptomatology and the course of the case were more like nervous arach-

noidism produced by the bite of a *Latrodectus*, a species that can be very easily mistaken for the *Loxosceles* with its black abdomen.

It was perhaps Escudero's inexperience with arachnoidism or the lack of medical literature on the subject that led him to say: "The primary importance of this case lies in the fact that a physician has come in close contact for the first time in Chile with a death attributed to the sting of a spider that had been considered as non-poisonous in Chile and in other countries (p. 346)." Before affirming the foregoing, it would have been necessary for Escudero to study some of the investigations on *L. laeta* widely circulated throughout the country. Dr. Porter, the distinguished Chilean scientist, was consulted in 1934 relative to certain aspects of the investigations being carried on at that time and helped with the classification of the spiders, which classification was later published in his important review.

In conclusion, there are no proofs to enable one to accept Escudero's case as due to *L. laeta*. His statement to the effect "that these spiders have a hemolyzing poison that is capable of producing death in a child, in some cases" is untenable. His experiments with arachnolysin did not show the action of the glandular poison; in addition, the glandular poison of *L. laeta* is essentially necrotizing and not hemolytic. The supposed priority regarding the pathogenicity for man of the *L. laeta* is disproven by the bibliographic references given.

Gallinato, 1936. This case presented before the *Sociedad de Pediatría de Santiago* was typical of the cutaneous arachnoidism produced by *L. laeta*. Gallinato's mistake consisted in utilizing the spider for experimentation before it was properly classified. Furthermore, he committed the same experimental error as Escudero, since he utilized arachnolysin from the cephalothorax instead of the glandular poison. In order to explain the difference between the symptoms presented by the patient and those developing in experimental animals, he elaborated an explanation that was both unsatisfactory and unnecessary. Although the spider was never classified, Gallinato did not hesitate to identify a series of *L. laeta* that was shown him, among other specimens of different species, as similar to the one involved in his case. This would seem to indicate that the spider in question may have belonged to the species named and that the symptoms in the patient were correctly interpreted.

SIMILARITIES AND DIFFERENCES BETWEEN CUTANEOUS ARACHNOIDISM, PRODUCED BY *Loxosceles laeta*, AND NERVOUS ARACHNOIDISM, PRODUCED BY *Latrodectus mactans*

The similarity between these two types of arachnoidism is limited to the initial period—from the time of the bite to the appearance of general manifestations.

The local lesion is always the same in both—two slight parallel cuts left by the stingers of the spider, which may be somewhat ecchymotic and papular. The stinging produces immediate pain; in both types the stinging resembles a pin-prick. However, in nervous arachnoidism, a painless period sometimes follows the actual bite, but this never or seldom occurs in cutaneous arachnoidism. In both, the subsequent painful sensation is that of an irritation or burning, but in cutaneous arachnoidism it is so intense as to be unbearable. Again in both, the sensitivity of the skin is affected, and the pain shifts from the center of the lesion to its periphery.

The pain caused by *L. mactans* spreads rapidly but that produced by *L. laeta* is strictly localized; when it does spread, it tends to affect the whole damaged area only. The size of the lesion varies from a flea-bite in the former to an enormous area, in the latter. The edema, which is progressive in both types, is more important and more extensive in the second than in the first type.

Once the pain becomes generalized, the nervous and vascular signs appear; the involvement of the nervous vegetative system is evident in latrodectism. This does not occur in the simple type of arachnoidism even though the initial local lesion appears worse. From then on, the respective clinical pictures become completely different.

The absence of general symptoms in cases of cutaneous arachnoidism and the character of its local lesion indicate that the action of the poison is a purely coagulating and necrotizing one. In cases where *L. mactans* is the causative agent, everything indicates that the poison acts upon the nervous system, especially on the vegetative. A common symptom of both types is the insomnia produced by the pain of the sting. In viscero-cutaneous arachnoidism, the renal lesions—and possibly the hepatic, also—seem to be characteristic.

A differential diagnosis should be established between latrodectism and viscero-cutaneous loxoscelism. Besides the thirst, the difference between the other general symptoms is that in latrodectism they

are of a vascular and nervous nature, while in viscero-cutaneous arachnoidism, they are a consequence of the poisoning and hemolysis.

EPIDEMIOLOGY

It may be somewhat absurd to speak about the epidemiology of cases of cutaneous arachnoidism. However, the appearance of this condition at certain seasons, and the variations in its frequency, justify the use of the term and the application of epidemiologic methods to its study.

Geographical distribution. Cases of cutaneous arachnoidism are more frequent in the northern zone of Chile, from Antofagasta to Copiapó, Ovalle, etc. They are rare in the central area, but isolated cases have been mentioned as far as Talca. There is no knowledge of their existence to the south of the Maule. "Epidemics" have only occurred in Antofagasta and in Ovalle, but their cause is unknown.

Frequency. The number of cases studied is about 80: 9 reported by Puga Borne; 15 to 20 by Prado; 7 by Guzmán; 12 by Tirado; 1 by Matus; 1 by Gallinato; 25 by Macchiavello, and the balance by divers authors. This condition has been observed in Antofagasta since the beginning of the century, but it is not known whether cases existed prior to that time.

Seasonal and annual incidence. No annual cycle has been proved. Some years, there are rather numerous cases followed by successive years when not a case is reported for the whole country. The cases reported by other authors occurred in the spring and summer (two thirds of the total number). Of the 25 reported by this author, more than 20 occurred during October and April, or in the spring and summer. Seventy-five percent occurred during the first four months of the year. From February 9 to April 19, 1934, 11 cases were reported from Antofagasta, which may indicate a small summer and early autumn epidemic.

Climate. The above mentioned seasonal incidence would seem to indicate that the climate must exercise some important influence, but whether this influence is direct or indirect is not known. Perhaps the climate affects the biology of the Arachnida: (a) through special sexual changes taking place at determined times of the year; (b) because at such times the young insects are more poisonous; (c) because some natural enemy obliges the spiders to abandon their ordinary habitat; or (d), as suggested by Vellard, because the poison of these insects turns alkaline under the influence of the summer heat and, as a result, its toxicity is greater. The truth is that some

unknown factor exists which tends to bring about more intimate contact between these spiders and human beings, stimulating them to bite man, which they usually do not do, unless compelled. The part of the body affected shows that their biting is purely accidental.

Site of the lesion. From what has been said before, one may easily deduce that the site most frequently attacked by the spiders is one with which the latter most often come in contact—the arms and the legs. This will be better understood by examining the following chart, which describes how and when these accidents occurred:

Serial Number and Initials of Patient	*Place*	*Time*
1. (No name)	When picking up tools in workshop	During the day
2. S. S. de C.	At home (?)	During the day; exact time unknown
3. M. de P.	When going to bed; spider found in bed	At 10 p.m. approximately
4. C. C.	When putting on his coat	Between 6 and 8 a.m.
5. E. P.	Spontaneous bite	At noon
6. R. I.	When carrying a *sommier* on her shoulder	In the morning
7. E. R. M.	When spider was found on leg	In the morning
8. J. F. L.	While having lunch	At noontime
9. V. A.	While asleep in a city park	Between 10 a.m. and 3 p.m.
10. B. A.	When awaking from a siesta	Between 3 and 4 p.m.
11. R. Sh.	While walking in the city (Owner of lumber industry)	At 6 p.m.
12. M. A.	Awakened by bite	At 7 a.m.
13. N. V.	While in bed	?
14. J. H.	When putting on his trousers	At 7 a.m.
19. E. S.	When cleaning old furniture	Between 11.30 and 12 a.m.
20. I. M.	While moving sacks in the pantry	During the morning

In summarizing, of the 16 patients examined, 6 were doing housework or some similar type of work, at the time they were bitten; 5 were stung while in bed; 2 or 3 while dressing, but in more than 90 percent of the cases, the circumstances surrounding the actual stinging appeared directly related in some way to the place (either in the home or in the workshop), in which it happened. This condition may therefore be considered merely a household accident. The greater number of the accidents took place during the day, especially, in the morning.

Age. The age of the patients may be seen in the following table:

Age	*Male*	*Female*	*Total*
1 year	0	1	1
1–4	1	0	1
5–9	1	1	2
10–14	0	1	1
15–19	1	2	3
20–29	1	4	5
30–39	3	2	5
40–49	2	1	3
59	1	0	1
	10	12	22
Age unknown			3
			25

Sex. There was a slight preponderance of female patients. It may be said, however, that the incidence does not depend on the sex but on the place where these accidents occur. Since the site is mainly the home, it is easily understood why the majority of the accidents occurred among women.

Mechanism of the bite. It is possible to define to some extent some of the factors that help to maintain a close relation between man and these spiders, but the mechanism that induces them to attack is not known. The act of biting denotes the fear of the insect; it is a defensive reaction on its part. However, the reason why it bites at some given times of the year and not at others, and why at times it seeks refuge in places close to man, is difficult to explain. It is easy to suppose that, from time to time, some factor may exist which constitutes a threat to the safety of this species and that, while fleeing, it seeks refuge where it is not likely to be found, such as in beds, in closets, and so forth. Such a factor may be a stronger biological enemy.

It has also been supposed that there may exist a time in the biological cycle of these Arachnida when there is greater contact with man, even though such contact is purely accidental. In some cities, the air during the summer is filled with the so-called "hilos de la virgen" (virgin hairs) and, at times, the wind scatters hundreds and thousands of young spiders attached to these silver threads. In this case, though, one would expect more accidents to occur in the open, which is not the case.

Furthermore, it is also possible that at given times in their sexual cycle, the spiders may scatter more under the effects of a migratory *nisus*, perhaps looking for the occasion to become fertilized. It may be, too, that during such times they secrete a more powerful poison.

Lastly, it may be that at some time the activity of these arachnids is greater and, as a consequence, greater the opportunities for such accidents. None of these explanations, however, seem satisfactory, if one believes the phenomenon to be an occasional one, repeating itself at intervals of years.

Someone has suggested that heat may influence the glandular poison by turning it more alkaline. It is well-known that alkalinity increases its toxicity. Warm weather could possibly force the spiders to look for a cool refuge so as to prevent a rapid dessication that may be damaging to their biology. At any rate, perhaps the only and more important reason that can explain this phenomenon hinges on the fact that the accidents observed occurred during very hot spells of weather, which are not usual in the cities where these observations took place. There is really no satisfactory explanation for it all, but that these series of accidents are a fact is illustrated by the 11 cases observed in Antofagasta (1934) during two months, or less.

Dwellings and arachnoidism. It may be worthwhile to point out the parallelism that exists between these cases and the type of home in which the accidents occurred. The greater number of patients lived either in old frame houses or straw or mud huts, where cleanliness was almost always absent and, at best, never perfect.

Prophylaxis. The rare occurrence of cases of arachnoidism and the lack of knowledge of the circumstances surrounding them forces one to admit that there is no basis for recommending prophylaxis. It would be easier to recommend the immediate persecution and killing of the arachnids, as soon as the first case appears in a locality. Indirectly, better houses and more cleanliness in the same might be advantageous.

SUMMARY AND CONCLUSIONS

The author describes a series of cases of cutaneous arachnoidism, better known in Chile as gangrenous spot, which are characterized by the appearance of an initial lesion caused by the bite of a species of spider, *Loxosceles laeta*. The bite is followed by a sensation of

irritation or burning and immediate changes in the surrounding epidermis, such as erythema, edema, and later on, the formation of a blister. After the blister ruptures, the area becomes gangrenous; the eschar is sloughed off and a superficial ulcer forms that does not affect the deeper tissues.

There are no symptoms, with the exception of localized pain, anesthesia of the gangrenous area, and hypersthesia of the tissues in the immediate vicinity. The general condition of the patient undergoes no change. There is no fever. However, the healing of the necrotic tissues takes place very slowly, and the final scar presents certain definite characteristics. In addition to the symptoms and signs of localized coagulation necrosis of the skin, there are rare cases of arachnoidism with certain renal lesions and, possibly, hepatic ones, too, with evidence of blood hemolysis, accompanied by hematic and urinary symptoms that make a diagnosis possible. The second type of arachnoidism has been called viscero-cutaneous arachnoidism.

Loxosceles laeta is the causative agent of gangrenous spot of Chile. This condition, with its clinical variant of viscero-cutaneous arachnoidism, represents one of the two types observed in this country. The one produced by the bite of *L. mactans* differs from the above types because it is a general poisoning, especially of the neuro-vegetative system.

L. laeta is a house spider. The reason why it is the cause of certain accidents at determined times is unknown. However, various explanations have been offered.

The author of this article was the first to discover the cause of cutaneous arachnoidism, pointing out *L. laeta* as the causative agent and describing the two different clinical types involved.

Symptoms Found in Cases of Cutaneous Arachnoidism Produced by the Bite of Loxosceles laeta[a]

Series No.	Name	Date	Age	Sex	Site of Lesion	Bite	Burning Sensation	Redness	Edema	Blister	Black Spot	Eschar	Size of Ulcer	Time in Healing	Insomnia
1	—	1928	32 yrs.	M	Left eyelid	++	+++	++	++	+	+++	+	3 cm.	?	+
2	S.S.de C.	1/20/33	21 yrs.	F	Left forearm	+	++	++	++	0	++	+	less than 2 cm.	?	+
3	M. v. de P.	6/13/33	32 yrs.	F	Right arm	++	+++	+++	+++	0	++	+	13 cm.	80 days	+
4	C. C.	10/24/33	47 yrs.	M	Right arm	+++	++	+++	++	0	++	+	0.5 cm.	20 days	0
5	E. P.	2/9/34	16 yrs.	F	Right arm	++	+++	++	+++	++	+++	+	10 cm.	90 days	+
6	R. I.	2/11/34	27 yrs.	F	Left arm	+	++	+	++	0	+	+	10 cm.	90 days	0
7	E. R. M.	2/14/34	6 yrs.	F	Left leg	++	+	+++	+++	+	++	+	7–8 cm.	105 d.	0
8	J. F. L.	2/26/34	5 yrs.	M	Right hand	++	+++	+++	+++	++	++	+	6–7 cm.	75 days	+
9	V. A.	3/2/34	16 mos.	M	Left arm	?	?	+++	+++	++	+++	+	22 x 6 cm.	120 d.	+
10	B. A.	3/2/34	45 yrs.	F	Left leg	+++	+++	+++	+++	++	+++	+	Several, in a zone 8x10 cm.	30 days	+
11	R. Sch.	3/5/34	50 yrs.	M	Small finger, r.h.	+	+	++	++	+	+	+	0.3–0.4 cm.	?	0
12	M. A.	3/6/34	30 yrs.	M	Right hand	0	++	++	++	0	0	0	No	—	0
13	N. V.	3/10/34	7 mos.	F	Neck	?	?	+	++	+	+	+	?	?	+
14	—	4/ /34	Youth	?	Left forearm	?	?	?	?	?	++	+	6–7 cm.	Long time	?
15	M. O.	4/19/34	33 yrs.	F	Left forearm	?	++	+++	+++	+	++	+	2 cm.	20 days	?
16	O. de F.	9/27/34	18 yrs.	F	Right arm	++	++	+++	+++	0	++	+	3 cm.	15 days	+
17	J. H.	1937	16 yrs.	M	Right thigh	?	?	?	?	?	++	+	5 cm.	?	?
18	—	?	?	?	?	?	?	?	?	?	++	+	Yes	?	?
19	E. S.	1/—/38	23 yrs.	F	Right hand	+	++	++	++	0	++	+	4 cm.	165 d.	+
20	A. M.	2/—/38	42 yrs.	M	Left index finger	+	0	+	+	+	+	+	0.5 cm.	10 days	0
21	A. R.	1939	37 yrs.	M	Left arm	?	?	?	++	?	+++	+	12 x 6 cm.	?	?
22	—	1935	Youth	M	Left arm	?	?	?	?	?	+	?	Yes	?	?
23	—	1936	10 yrs.	F	Left leg	+	?	?	?	?	?	?	Yes	?	?
24	—	?	?	?	?	?	?	?	?	?	?	?	Yes	?	?
25	I. M.	1939	25 yrs.	F	Left forearm	+	++	++	++	+	++	+	7 cm.	?	?
					Total in formed cases	16	16	18	19	17	23	22[a]		68 days	16
					Positives	15	15	18	19	11	22	21			10

[a]There were no general symptoms except for 1 case presenting neuralgia; 1 fever and dysphagia, and 1 anxiety.
[b]There were 3 other probable cases with eschars, but they were not positively confirmed.
Severity of symptoms:
O–absent
+–slight
++–moderate
+++–severe
?–no information

FIG. 1. Case 6. R. I., 27-year-old woman seen on February 11, 1934. Ulcer, 10 cm. in diameter.

GRAB. 1. Observación Núm. 6. R. I., mujer de 27 años, observada el 11 de febrero de 1934. Ulcera, 10 cm. de diámetro.

FIG. 2. Case 7. E. R. M., 6-year-o
7 cm. x 8 cm.

GRAB. 2. Observación Núm. 7. E
14 de febrero de 1934. Ulcera, 7 cm

FIG. 1. Case 6. R. I., 27-year-old woman seen on February 11, 1934. Ulcer, 10 cm. in diameter.

GRAB. 1. Observación Núm. 6. R. I., mujer de 27 años, observada el 11 de febrero de 1934. Ulcera, 10 cm. de diámetro.

FIG. 2. Case 7. E. R. M., 6-year-old girl seen on February 14, 1934. Ulcer, 7 cm. x 8 cm.

GRAB. 2. Observación Núm. 7. E. R. M., hembra de 6 años, observada el 14 de febrero de 1934. Ulcera, 7 cm. x 8 cm.

FIG. 3. Case 8. J. F. L., 5-year-old child seen on February 26, 1934. Ulcer covering entire back of right hand.

GRAB. 3. Observación Núm. 8. J. F. L., niño de 5 años, observado el 26 de febrero de 1934. La úlcera cubre completamente el dorso de la mano.

FIG. 4. Case 9. V. A., 16-months-old child seen on March 2, 1934. Ulcer, 22 cm. long x 6 cm. wide.

GRAB. 4. Observación 9. V. A., niño de 1 año 4 meses de edad, observadoel 2 de marzo de 1934. Ulcera, 22 cm. de largo x 6 cm. de ancho.

FIG. 5. Case 16. O. de la F., 18-year-old girl seen in 1934. Ulcer, 3 cm. in diameter.

GRAB. 5. Observación Núm. 16. O. de la F., mujer de 18 años, observada en el 1934. Ulcera, 3 cm. de diámetro.