

PLAGUE IN THE AMERICAS (*Continued*)

IX. URUGUAY

Uruguayan waters were, according to the generally accepted theory,¹ the scene of the dramatic entry of bubonic plague into South America, though the country itself was not invaded until later.

Lying between 30 and 35° South Latitude and 53 and 59° West Longitude, and subject to the influence of the ocean breezes and the warm Atlantic current, Uruguay is blessed with a temperate climate. The average annual temperature is 62.6 F, with the lowest temperature, 35 F; the relative humidity is 77%, and the annual rainfall 43 inches. Spring lasts through October and November; summer, from December to March; autumn, April and May; winter, June to September. The topography of the country is gently rolling, with only mild elevations. In the 72,153 square miles of territory live some 2,146,000 persons. The northern part of the Republic is largely given over to stock-raising, and the southern, below the Rio Negro, to farming.²

The story of the *Zeier*, out of Rotterdam with a cargo of rice which was transshipped at Montevideo to the *Centauro*, and of the epidemic of plague in Asunción, Paraguay, subsequent to the arrival of the latter vessel there in April, 1899, has been told elsewhere. (See General Review.) There were apparently no reports of either dead rats or human cases in Montevideo at that time. The first known plague infection in Uruguay was observed in rats, in January, 1901, and a follow-up investigation located a human case.³ The source of the original infection was not known.⁴

There were three other cases (September and October) in Montevideo in 1901, two of them fatal. The disease reappeared in Montevideo every year through 1929, except for 1910, 1922, 1924-25, and 1928, with a total of 133 cases, 58 deaths.⁵ There were about 24 cases, 3

¹ See General Review.

² Schiaffino, Rafael: "Public Health in Uruguay, 1901-1941," *Bol. Of. San. Pan.*, Dec. 1942, p. 1307; and other sources.

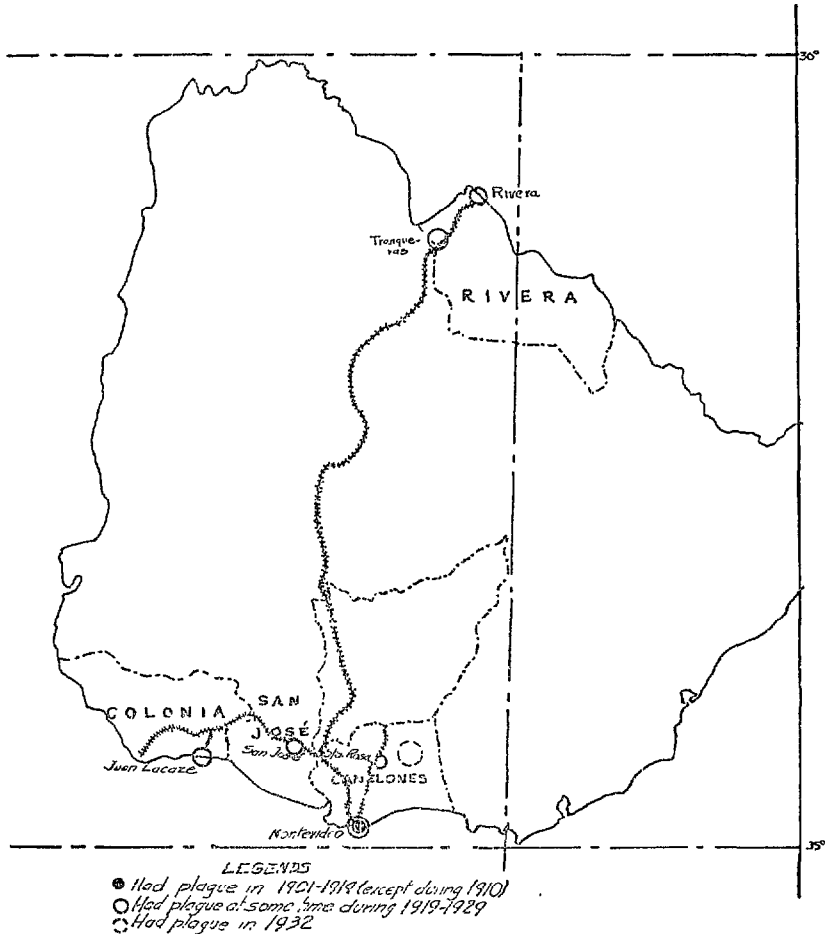
³ The *Consejo Nacional de Higiene* (National Health Council), of which Dr. E. Fernández Espiro was President, was notified January 21, 1901, that dead and stupefied rats had been seen in the Customs warehouses, the information being furnished by Dr. José Remasso, a Police physician, who had received word of the circumstance from his brother-in-law, an employe of the Customs. Cooperating with the *Consejo*, Dr. Felipe Solari of the Institute of Experimental Hygiene made the bacteriological examinations and discovered that the rats had plague. Inquiry among Customs authorities revealed that rat mortality was greater than usual. A search was made for possible human cases, and an employe absent because of illness was visited. He had seen dead rats and had thrown some of them in the water. His illness began the 10th and his physician suspected typhoid fever. The case followed a slow course, without gland swellings at first, and it was not until the 26th, when the patient's condition was acute, that bacteriological examination permitted a diagnosis of plague. The patient died January 27, and autopsy corroborated the diagnosis. (Fernández Espiro, E.: "Historia de la peste bubónica en Montevideo," "I Cong. Med. Nac.," Montevideo, 1916, Tomo IV, pp. 238-93.)

⁴ See the story of the *Highland Prince*, in General Review.

⁵ Baycé Carbonell, Pedro: "Evolución de las enfermedades infecto-contagiosas en Montevideo," "Cong. Méd. del Centenario," 1932, Vol. IV, pp. 179-185. Vidal y Fuentes suggested that Montevideo was repeatedly re-infected through the grain and forage traffic. (Vidal y Fuentes, Alfredo: "Morbosidad y

deaths in the rest of the country (Santa Rosa, Dept. Canelones, 14 cases, 5 deaths, 1919; Rivera, 4 fatal cases, 1919-21, 1929⁶; Dept. San

PLAGUE IN URUGUAY



mortalidad infecto-contagiosas en la República O. del Uruguay, años 1913-16," Montevideo, 1918, p. 43.) However, Fernández Espiro, in his report to the III International Sanitary Conference (Mexico, 1907), while reporting that 1901 and 1902 cases had come in contact with possibly contaminated foreign goods, stated that "since then all investigations which have been made to discover if new cases could be attributed to the reimportation of the plague germ, have been fruitless, because it could not be proved that the sick had acquired plague through the receipt of handling of contaminated objects. This circumstance gave rise to the supposition that perhaps the disease had been able to maintain itself in rats, and to spread from them to persons. Whether or not this is so, plague has not become epidemic in Montevideo, as it has become elsewhere, nor has it formed foci of greater or less importance, nor has it spread to other localities. . . . The majority of cases were peones of the Customhouse, or employed . . . where sacks of grain, in which rats are accustomed to enter, are often received." ("Actas, III Conf. San. Int.", 1907, p. 252.) He also gives the provisions of the 1904 convention (See below).

⁶ Etchepare suggested that the infection may have been imported. One case, in Tranqueiras, was preceded by an epizootic in rats. (Etchepare, J. "Anotaciones referentes a la estadística sanitaria del Uruguay, 1887-1921," *Bol. Cons. Nac. Hig.* (reprint, 1922.)

José, 1 fatal case 1919-21; Juan Lacaze, port, Dept. Colonia, 3 fatal cases, 1929), the last recorded cases being one in March, 1932, in the Department of Canelones, and one in October of the same year, also somewhere in the interior.⁷

Rats.—The appearance of plague in rats before the occurrence of human cases has been observed in repeated instances in Uruguay, and

*Plague in Uruguay**

Year	Cases	Deaths	Locality
1901	4	3	Montevideo
1902	8	6	"
1903	3		"
1904	7	5	"
1905	2		"
1906	6	2	"
1907	19	7	"
1908	23	8	"
1909	4	1	"
1910	0	0	"
1911	4	4	"
1912	4	1	"
1913	9	2	"
1914	2		"
1915	1		"
1916	7	2	"
1917	2	2	"
1918	3	2	"
1919	20	10	Montevideo, 6 C 5 D; Dept. Canelones, 14 C, 5 D.
1920	3		Montevideo
1921	4	3	"
1919-21	4	4	Dept. San José, 1 fatal case; Dept. Rivera, Rivera, 2 fatal cases, Tranqueras, 1 fatal case.
1922	0	0	
1923	4	1	Montevideo
1924	0	0	
1925	0	0	
1926	2		"
1927	1	2	"
1928	0	0	
1929	9	6	Montevideo, 5 C 2 D; Rivera, 1 fatal case; Juan Lacaze, Dept. Colonia, 3 C 3 D.
1930	0	0	
1931	0	0	
1932	2		Canelones, 1; Republic, 1.
Total	157	71	

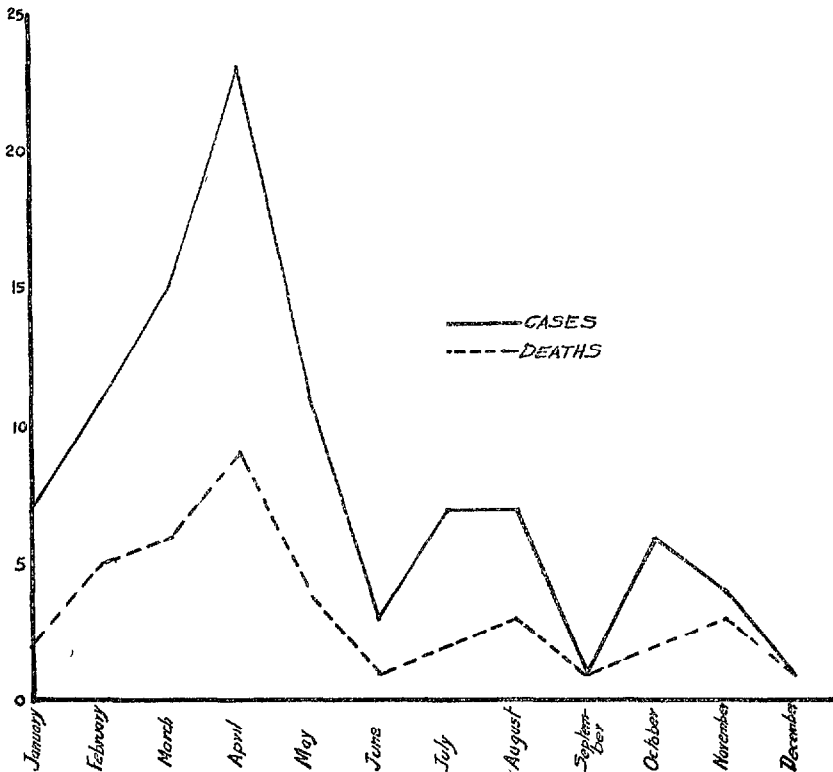
* From the tables and reports of Fernández Espiro, Bayó Carbonell, and Zunino Nogués (see text), and *Bol. Cons. Nac. Hig.*

on one occasion there was an epizootic (September 1913) without human repercussion, a circumstance attributed to prompt destruction of rats

⁷ Zunino Nogués, Juan: "Evolución de las enfermedades infecto-contagiosas en los departamentos del interior y litoral de la República durante los últimos 30 años, 1900-1929," "Cong. Med. del Centenario," 1932, Vol. IV, pp. 185-214. Cases since 1929 have been taken from reports in *Bol. Cons. Salud Pú.* (Nov.-Dec. 1932, p. 1426; Jan.-Mar. 1932, p. 256). However, neither case appears in a table of contagious diseases in Uruguay 1931-32 (*Ibid.*, Mar.-Apr. 1933, facing p. 580).

and fleas in the area.⁸ There do not seem to be any reports available on the dominant kinds of rats.

Fleas.—A study made of 174 fleas found on 87 rats in 1928 in Montevideo revealed an *X. cheopis* index of 1.05 (in port rats the *cheopis* index was 1.66), with a distribution of 52.81% *cheopis*, 14.36% *C. fasciatus*, and 32.70% *L. musculi* among species of fleas. Rats in the business and residential sections had less than one flea apiece; and of the 87 rats, only 15 harbored *X. cheopis* (1 to 16 per rat).⁹



Monthly Incidence of Plague in Montevideo, 1901-1915.
(From the figures given by Fernández Espiro. See text.)

Seasonal distribution.—According to the survey by Fernández Espiro, the majority of cases (58.3%) of Uruguayan plague have occurred between January and May, and principally in March and April; that is, during summer and autumn; there have also been cases during the rest of the year, mostly in July, August, and October (See graph).

⁸ Fernández Espiro, E., *supra*, p. 275.

⁹ Gaminara, Angel: "El índice de pulgas en las ratas de Montevideo; exposición preliminar," *Bolet. Cons. Nac. Hig.*, May 1923, pp. 205-208.

Summer and autumn are the seasons when rats are most abundant and when the grain trade is most active.¹⁰

Kinds of plague.—Fernández Espiro, reporting on plague in Montevideo from 1901 through 1915, observed that the most common form was bubonic, with the bubo generally located in the groin. Secondary pneumonic plague appeared in several instances, as did cutaneous forms, but there were only two cases of primary pneumonic plague (August, 1911, one suspicious case, one bacteriologically confirmed; there were also two suspicious deaths from "bronchopneumonia," in February 1907, with post-mortem diagnosis of plague, and March, 1908).¹¹ In the interior of Uruguay, the bubonic form was predominant, with one case of pneumonic and two of septicemic plague in Juan Lacaze (1929).¹² The mortality for Montevideo from 1901-1915 was 40.62% (96 cases, 39 deaths); and from 1901-1929, 43.7 (133 cases, 58 deaths). For the interior, 1919-1932, it was 54.1 (24 cases, 13 deaths); during the Santa Rosa epidemic, 1919, it was 35.7 (14 cases, 5 deaths).¹³ The persons most frequently attacked by plague were peons or laborers employed in the Customs warehouses, mills, bakeries, graneries, fodder storage sheds, stables, and distilleries.¹⁴

Control.—The first Uruguayan measures against plague consisted in the formulation with Argentine health authorities of sanitary restrictions to be applied against vessels from Portugal, after the outbreak of plague in Oporto in 1899. These were modified by subsequent agreements including that reached at the International Sanitary Convention held in Rio de Janeiro in June, 1904. There were provisions for the observation and disinfection of vessels arriving from suspected or infected ports, for the examination of passengers, and for the non-admission of certain types of merchandise.¹⁵ On February 3, 1900, the National Council of Hygiene adopted a domestic plan of defense which included investigation of illnesses and deaths of persons not under medical care, rat extermination, establishment of a plague ward in the Isolation Hospital, disinfection and deratization of infected houses, and supervision

¹⁰ Fernández Espiro, *supra*, p. 274.

¹¹ *Ibid.*, pp. 245-287.

¹² Zunino Nogués, *supra*.

¹³ *Ibid.*; and *Bol. Cons. Nac. Hig.*

¹⁴ Fernández Espiro, *supra*, p. 287.

¹⁵ The first Convention was entered into August 21, 1899 by José Penna, of the Department of Health of Argentina, and Fernández Espiro, then head of the Uruguayan Council of Health, and declared Oporto infected and the other Portuguese ports and ports not taking adequate precautions, as suspicious; vessels carrying a health Inspector were to receive free pratique, after disinfection, no matter what their origin; those without an Inspector were to be disinfected and subject to five days' observation if coming from suspicious ports, and 10 days' if coming from infected ports; in the case of infection on board the observation period was to be from 10 to 15 days depending on whether the cases had occurred before or during 15 days after arrival; provisions were made for disinfecting cargo and correspondence; and Argentine and Uruguayan vessels were not to be refused entry but special consultative measures were to be taken if they arrived infected. This agreement was called off November 15, 1899 by Dr. E. Wilde of the Argentine Department of Health, and replaced by one signed by him and by Dr. Joaquín Canabal, then head of the Uruguayan council; vessels from infected ports were to be subject to 10 days' observation after disinfection

of contacts.¹⁰ The maritime sanitation regulations of March 19, 1900 required captains to clean and disinfect their vessels when necessary,

and those from suspicious ports, to 5 days'; infected vessels were to submit to 15 days' observation after disinfection, and the entry of fresh hides, fresh carcasses of animals, wool, horse-hair, feathers, personal or domestic effects, and used clothing, was not permitted unless their disinfection was practicable.

This convention was replaced ten months later by one signed in Buenos Aires September 19, 1900, by Dr. Carlos G. Malbrán, head of the Argentine Department, and Fernández Espiro, again head of the Uruguayan Council, reducing the observation period to four and five days for vessels from suspicious or infected ports, counting from their departure, provided they carried a health inspector who testified to the good health of the passengers and had disinfected their baggage; vessels without a health officer were to be submitted to four or five days' observation beginning after their disinfection on arrival; infected vessels (having had either plague cases or rat epizootic) were to undergo a 10 day observation following disinfection on arrival; one article of the convention exempted cargo and correspondence without restriction, and another required disinfection of all equipment, mail, objects of personal use, etc.; and an additional article required the disinfection of *vessels* and of sailors' and passengers' *baggage* at the port of *departure* when there was an exotic disease in either of the contracting countries, and the health authorities reserved the right to appoint officers to supervise the execution of these measures. This convention was accepted by the National Health Council of Paraguay, whose head, Dr. Facundo D. Insfrán, signed the agreement.

These provisions governed the sanitary relations of the three countries until June 12, 1904, when modifications were introduced by the International Sanitary Convention meeting in Rio de Janeiro: vessels calling at infected or suspicious ports were obligated to adopt precautions against the entry of rats on board, and for their extermination; health inspectors were to prevent the embarking of individuals showing signs of plague; they were to note any occurrences on board, including the presence of rats, and were empowered to practice sero-vaccination on passengers and crew desiring it, should plague cases appear, and to isolate cases; vessels carrying out these precautionary measures were to be given free pratique, without prejudice, however, to the imposition of five day surveillance of crew and passengers; in the contrary case, passengers could also be allowed to disembark, subject to surveillance, and the rats were to be exterminated before the vessel was unloaded. If the vessel were infected, patients were to be disembarked and isolated; the other passengers were to be given plague serum and kept under surveillance, while those refusing vaccination were to be kept under observation in specified localities. The same measures were applicable to members of the crew wishing to disembark. After disembarkation of the passengers and before unloading, the rats were to be destroyed. Land quarantine provisions called for abolition of the sanitary cordons and quarantines of other eras, permitting the naming instead of a limited number of entry points on the frontier, where measures similar to those for maritime travelers could be applied to land passengers and baggage. Fernández Espiro reported to the III Pan American Sanitary Conference that the system of surveillance (*vigilancia*) of passengers after they left the ship had been substituted for the old system of observation (isolation of passengers either on board ship or at another locality) as the result of experience indicating that it was an extreme measure, and that "capital importance" was being given to the spread of plague by rats. ("Actas, III Conf. San. Int.," Mexico, 1907, p. 56.)

The 1904 Convention was later amended and modified by the various parties, and on April 12, 1914, another International Sanitary Convention was drafted in Montevideo, but it failed of ratification by Brazil and Argentina and was never put in force. It embodied much the same provisions in regard to plague as did the 1904 convention, and Uruguay continued to apply them. (Fernández Espiro, "Historia de la peste, etc.," 1916, pp. 277-281. The full text of the various agreements is given in "Convenciones y Acuerdos Sanitarios del Uruguay," by Luis D. Brusco, 1919, pp. 150-283; with commentary.)

This rather extensive summary is included as giving a picture of international plague control measures in the early part of the present century in Latin America. The 1904 provisions are similar to those of the Washington Convention of 1905, except that passengers on infected vessels were to be submitted to observation rather than surveillance; Argentina, Paraguay, and Uruguay did not ratify the latter convention. Uruguay was, however, signatory to the Pan American Sanitary Code, adopted in Habana in 1924, which, following ratification by all the American Republics, now governs inter-American procedure. The interpretation of Paragraph 5 of Article XLI of the Code as not prohibiting measures which the local health authorities deem necessary in special cases, was agreed upon in response to a question raised by Uruguay. ("Actas, VIII Conf. San. Pan.," Lima, 1927, pp. 88, 121, 127.) (For the history of inter-American public health cooperation in general, see the series by Moll in *Bol. Of. San. Pan.*, 1940-42.)

¹⁰ The aid of Police physicians was to be sought in the reporting of deaths without medical attention; landlords were asked to report tenants who were ill and without medical care, which was to be provided free through the Department of Public Assistance (notices were also posted to this effect); the extermination of rats in barracks, commissariats, jails and schools, was resolved upon; the origin of rats found dead was to be investigated; a plague ward, open 24 hours a day, was to be established in the Isolation Hospital, etc. Compulsory reporting of plague was required by an Ordinance of February 2, 1900; and another, of May 4, 1902, required written reports by physicians of cases showing swellings of unknown origin. (Fernández Espiro, *supra*, pp. 281-283.)

to report dead rats, etc. However, the only known infected vessel arriving in Montevideo was the *Highland Prince*, of which mention has been made elsewhere, and whether plague evaded the sanitary measures applied to this vessel, or made its way into the country on some unsuspected one, remains unknown.¹⁷ On March 13, 1907, stricter regulations on rat extermination were adopted.¹⁸ In following years the wharves were cleaned under government supervision; about 1912, a rat-catching and extermination squad was organized, and the using of rat-guards on ship cables was made compulsory.¹⁹

The appearance of plague-infected rats was the signal for an intensified campaign against these rodents, and the successful control of an epizootic without any repercussion in human cases, has already been described. (See Rats.) Since the disappearance of plague from the country, preventive work has apparently undergone a number of fluctuations. The trapping and examination of rats has revealed a low degree of flea infestation, as for instance in 1937 following the visit of Dr. John D. Long, Traveling Representative of the Pan American Sanitary Bureau, when 1,479 rats were killed by poison, traps, and dogs, and of 31 live rats examined, only 7 had fleas (15 fleas in all). About the same time cyanide fumigation apparatus was secured, and also equipment for the disinsectization of trains.²⁰

Vaccination and serum-therapy.—Baycé Carbonell reported that “preventive vaccination and serum-therapy” were among the measures employed in combating an outbreak in 1929 (along with deratization, disinfection, and isolation).²¹ Serum and vaccine prepared by the Institute of Experimental Hygiene were used in connection with at least some of the cases in the interior of the country.²² With regard to the use of serum, Fernández Espiro stresses the need of early application, remarking that “Whenever aid arrived late because the cases were not known immediately, it has been useless to resort to serum, because it would not stop the infection. On the other hand, definite improvement and cure of patients has been secured when it has been possible to examine them early and make the first injection at the time the clinical diagnosis was made. These good results have been observed chiefly in the last four years, during which there were 16 cases. Only three of these died: two after receiving serum too late, and one without receiving serum due to a mistake in diagnosis. Since that time it has been our practice to make a preliminary injection of 40 cc of serum before removing the patient to the Isolation hospital.” He further stated that serum treatment “has given encouraging results, not only in the cases mentioned, but also in many others who have received the injections from the beginning and during the course of the disease.” Injections

¹⁷ See General Review.

¹⁸ Fernández Espiro, *supra*, p. 284.

¹⁹ *Ibid.*

²⁰ Mussio Fournier, J. C.: “La sanidad en el Uruguay,” *Bol. Of. San. Pan.*, Apr. 1939, p. 313. (Taken from “Memoria del Ministerio de Salud Pública,” Oct. 2, 1936–June 1, 1938.)

²¹ Baycé Carbonell, *supra*.

²² Zunino Nogués, *supra*.

were subcutaneous in all cases.²³ Vidal y Fuentes also declared that "the success of treatment has been in direct relation with the rapidity of reporting, since in this case [i.e., cases reported early] the serum-therapy, which always proves truly effective, has always given results in the 'Dr. Fermín Ferreira' Hospital, where these cases are taken."²⁴

Research.—The work of the Institute of Experimental Hygiene, in examining rats and material from plague cases; and the epidemiological studies of rat fleas, have already been mentioned.

Martyrs.—At least two employees of the Uruguayan Department of health have died of plague in the course of duty: Juan Raimondi, who became infected after cutting himself while assisting at an autopsy, in 1911; and the *peon* Enrique Pérez, of the rat extermination service, in 1912.²⁵

Discovery of American trypanosomiasis.—In the course of a long campaign against malaria in the Rio Bicudo valley of Minas Gerais, Dr. Belisario Penna and myself were shown an insect called the *barbeiro* . . . "Once we had heard of the blood-sucking habits of this insect and of its proliferation in human dwelling-places, we became very interested in knowing its exact biology, and above all in ascertaining if by any chance it were, as I immediately supposed, a transmitter of any parasite of man or of another vertebrate. . . . Dissecting the insect, I found in the posterior intestine of each one numerous flagellates with the appearance of crithidias. . . . Previously I had found a new species of trypanosome in the monkey . . . and supposed the crithidias seen in the intestine of the *barbeiro* to be a phase in the evolution of the trypanosome. . . . I sent some of the insects to my unforgettable chief, Oswaldo Cruz, so that they should be allowed to suck healthy monkeys. . . . 20 or 30 days later when once again back in Manguinhos, I examined the blood of one of these monkeys . . . and found in it a trypanosome." After careful study it was found to be an entirely new species, and I gave it the name of *Trypanosoma cruzi* in honor of my chief . . . The *barbeiro* was identified by Dr. Arthur Neiva as *Triatoma megista* Burm. . . . "Returning to the triatoma-infested regions, it became my object to ascertain the vertebrate host of *Trypanosoma cruzi* . . . The difficulty of interpretation of the local clinical cases together with the supposition based on careful observation and lengthy research-work of the existence of a pathological condition that escaped identification with any established disease . . . became the starting point. . . . I searched for trypanosomes in those patients for whose disease I had found no interpretation. At first all attempts gave consistently negative results, a fact which was later explained by the absence of parasites in the peripheric circulation and their existence in the tissues of these patients . . . Finally I had the chance of finding in a feverish condition a child from a house in which I had found an infected cat . . . Among the chief clinical symptoms were: Axillary temperature 40 C; spleen . . . and liver enlarged; groups of peripheric lymphatic glands swollen, etc.; and a myxodermatoid infiltration, more pronounced in the face. . . . Examination between cover-glass and slide revealed the existence of flagellates in good number and the fixing and staining of blood films made it possible to identify . . . the parasite with *Trypanosoma cruzi*."—CHAGAS, CARLOS: "The Discovery of *Trypanosoma cruzi* and of American Trypanosomiasis: Historic Retrospect," *Memorias do Instituto Oswaldo Cruz*, Vol. XV, Fasc. I, 1922, reprint, p. 1.

²³ Fernández Espiro, *supra*, pp. 275-277.

²⁴ Vidal y Fuentes, Alfredo: "Morbosidad y mortalidad infecto-contagiosas en la República Oriental del Uruguay, años 1913-16," Montevideo, 1918, p. 43.

²⁵ Fernández Espiro, *supra*, pp. 267 and 269.