

## PLAGUE IN THE AMERICAS (*Continued*)

### XI. MEXICO

Mexico is the only North American country besides the United States known to have suffered an invasion of plague, although suspicious diseases were reported from other areas (see General Review). She is one of the few countries which has definitely succeeded in eradicating it.

The country lies between 14 and 33° N. Latitude and 86 and 118° W. Longitude, and has an area of about 768,000 square miles and a population of about 19,478,791. There is a central table-land about 6,000 ft. above sea level, bordered by sandy coastlines with a fertile belt between, at an altitude of about 3,000 ft. Toward the south the country becomes semi-tropical and tropical. The climate ranges from hot in the tropical and coastal areas to temperate and bracing on the plateau. North of 28° there are four seasons; south, a wet and a dry season. The plague areas included a region on the Atlantic coast in which the temperature during the plague season ranged from an average of 75 to 85° F, and one on the Pacific coast where the temperature was about 68° F or somewhat higher.<sup>1</sup>

Mexico has had a total of about 868 cases, 590 deaths, from plague, in 1902-03 and 1920-23, in some 17 foci radiating from three seaports (Mazatlán, Veracruz, and Tampico). The first outbreak was by far the most severe.

The first cases of plague in the Republic are believed to have occurred about October 20, 1902, in Ensenada de Todos los Santos (pop. 1,400), Baja California, and Mazatlán (pop. 18,000), State of Sinaloa.<sup>2</sup> The first reports were received in December. The President of the *Consejo Superior de Salubridad*, Dr. Eduardo Licéaga, ordered anti-epidemic measures to be taken, and that the cases be reported as suspicious of plague on bills of health, and sent a bacteriologist (O. González Fábela) to Mazatlán. In the meantime (Dec. 22) he telegraphed the Surgeon General of the United States (Walter Wyman) of the existence of a disease "similar to plague" in Mazatlán,<sup>3</sup> and on Dec. 31, after word from the bac-

<sup>1</sup> Goehicou, Alfredo E.: "La peste bubónica en Tampico en 1920-1921," Trab. pres. al VII Cong. Médico Nacional, Monterrey, Dec. 1927 (from a copy presented to the Pan American Sanitary Bureau by the author, in 1941); and Loaeza, Antonio A.: "Le climat du port de Mazatlán dans ses relations avec la peste bubonique," C.R. XIII Congrès Int. d'Hygiène et de Démographie, Brussels, 1903, v. 7, pp. 135-137.

<sup>2</sup> On Dec. 8 it was reported that the President of the San Diego, Calif., Board of Health had received information from a physician in Ensenada to the effect that 10 fatal cases of a suspicious disease had occurred there since the middle of October, the first in a Chinese and the rest in Mexicans, the last death being on Dec. 5. Rats were being found dead. P. A. Surgeon S. B. Grubbs, of the U. S. Public Health Service, was sent to Ensenada (with a letter of introduction from Dr. Licéaga) and found that 12 fatal cases had occurred to Dec. 17. An autopsy of the fatal case of the 16th was highly suspicious. The last case apparently occurred about the 25th, with a total of 15 C 14 D. Grubbs was unable to find dead rats to examine, but learned that rat epizootics had occurred in two stables near human foci. He was puzzled by the deaths of 13 and 14 pet rabbits in the two epizootic foci, since at the time rabbits were not considered susceptible to plague. (*Pub. Health Reports*, U. S., Jan. 16, 1903, pp. 72-80). Dr. Licéaga received the news of the epidemic in Mazatlán Dec. 13, and since he had been informed by U. S. Public Health Service officers, though unofficially, of the long existence of plague in San Francisco, and of the suspicious reports from Ensenada, he immediately suspected the disease was plague.

<sup>3</sup> "In accordance with the resolution of the Washington Convention." (*Pub. Health Reports*, U. S., Jan. 16, 1903, p. 79.)



terologist, the two cities were officially declared plague-infected.<sup>4</sup> The source of the infection was thought to have been a vessel from San Francisco.<sup>5</sup>

While 8,000 or 9,000 persons fled the city of Mazatlán, many of them evading inspection at the quarantine stations which had been set up on land routes, and carrying the disease to other localities,<sup>6</sup> physicians and government officials hastened to offer their services for duty in the infected port. The Governor of Sinaloa arrived the 20th. Five fourth-year medical students requested and received permission to go to Mazatlán, where they labored with "coolness, self-denial, and patriotism" under the direction of the local physicians and those sent from other areas to aid in the combat.<sup>7</sup> A *Junta de Salubridad* (Board of Health) and *Junta de Caridad* (Board of Charity) were organized January 5, the latter soon taking over the duties of both, and rendering valuable financial and other cooperation.<sup>8</sup>

<sup>4</sup> The disease was at first thought to be a rare and malignant form of malaria. And two physicians from an English cruiser, after studying cases and an autopsy, declared on Dec. 18 that the disease was not plague. (Butrón y Ríos, Antonio: "Epidemiología, datos históricos, sobre la peste bubónica de 1902 a 1903 en el Edo. de Sinaloa, México," 270 pp., Andrés Botas, México, D. F., 1916, p. xiv.) On the other hand, Dr. José Dávila, Quarantine Officer of the port, had expressed the opinion that the disease was plague, by the 24th or earlier. (*Pub. Health Rep.*, U. S., *supra*.)

<sup>5</sup> See General Review. Vessels from San Francisco received free pratique in Mazatlán, inasmuch as they arrived with clean bills of health. U. S. officials favored the theory that plague was carried to Mazatlán and Ensenada by Chinese from China who transhipped to a coasting vessel at San Francisco without inspection; Mexican authorities, in addition to this possibility, considered that it might have been brought in goods from China thus transhipped, or by persons or goods from Chinatown, San Francisco. San Francisco quarantine officers, in turn, declared that even transhipped persons and goods had to pass through the regular inspection and baggage examination. (*Pub. Health Rep.*, U. S., Feb. 6, 1903, p. 187.)

<sup>6</sup> For example, Oso (pop. 717), the most distant point (169 km) from Mazatlán reached, was infected by a family which left the latter city Jan. 24, 1903, arriving in Elota on the 27th. One member, a girl, became ill, and they fled on to Oso, arriving about Feb. 3. The girl died there, as did her mother, grandmother, and three other persons in the town.

<sup>7</sup> The Governor, Gen. Francisco Cañedo, remained in Mazatlán during the epidemic. A number of those assisting later wrote up their experiences, among them: A. Butrón y Ríos (*supra*), O. González Fabela: "Something about the Bacteriological and Clinical History of Plague," Reports and Papers Amer. Pub. Health Assoc., 31st meeting, 1903, Vol. XXIX, pp. 255-8; "A Successful Antiplague Campaign in Mexico," in "Report of International Plague Conf., Mukden, China, Apr. 1911," Manila, 1912, p. 256; Dr. Francisco Lavín, Director of the Belvedere Lazareto at Mazatlán: "La peste bubónica en Mazatlán"; Dr. P. Di-Bella Mier; "La peste bubónica en Mazatlán"; Dr. Antonio C. Guzmán (sent, with Di-Bella Mier, by the Governor of Tampaulipas to help with the epidemic; "Peste bubónica"; Dr. P. G. Bustamante (in charge at Siqueros); "La peste en Siqueros"; Dr. Martiniano Carvajal (Report on plague in Villa Unión, published by the Junta de Caridad de Mazatlán); and the medical student Agustín Hernández Mejía, who made the epidemic the subject of his thesis. Although none of these papers except those of González Fabela and Butrón y Ríos were available for consultation, the latter makes frequent references to them in his exhaustive report. Other local and out-of-town physicians and individuals also rendered valuable services.

<sup>8</sup> The *Junta de Caridad* of Mazatlán collected 13,250 pesos in a single day; the Secretary of Government sent 20,000, and the Government of the State of Sinaloa another 20,000, so that 53,250 were available to begin anti-plague work. A national *Comité de Socorros* (Welfare Committee) was established, with headquarters in Mexico City. A total of 436,774.76 pesos was received for the control campaign, including 114,942.86 from other places in Sinaloa and other States; 280,000 raised by the National Committee; and 8,531.90 donated by residents (including Mexicans) in other countries (United States, Spain, Germany). A total of 350,008.86 pesos were spent for direct combating of plague, including sanitation, building of the lazaretos, isolation of contacts (29,546.92 pesos, probably representing subsidies and cost of new clothes) disinfection and incinerations (147,151.19, including indemnities); sera and vaccines (17,386.56); medical services in Mazatlán (21,327.83); for the Oso focus, 8,930.67; for Siqueros, 25,442.66; for Villa Unión, 12,942.35; for Confiite, 100.32; etc.; 20,000 were returned to the State of Sinaloa, and the rest was used for building of a new isolation hospital (the old one was burned after the epidemic was over), quarantine station, and other sanitary works. (Butrón y Ríos, *supra*, p. 263.) González Fabela (Report to International Plague Conf., 19th, *supra*, p. 256) estimated that in Mazatlán about 1,000 pesos (\$500.00 U. S.) were spent for each fatal case.

Cases and contacts were isolated in special hospitals (*lazaretos*) and barracks (contacts received new clothes and a monetary subsidy to compensate for their confinement); house-to-house inspections were made daily to locate new cases; large-scale vaccination was instituted; plague foci were either disinfected or burned (with compensation to owners); eight sanitary stations were set up on the roads and trails leading from Mazatlán for examination of travelers, and both maritime and land passengers were required to present certificates of vaccination against plague and to undergo medical inspection and baggage examination and disinfection before leaving the area; and rats and fleas were destroyed.<sup>9</sup> No plague appears to have been carried from Mazatlán by ship,<sup>10</sup> although, as already mentioned, it was carried by land to other foci.

The Mazatlán epidemic lasted from the supposed date of Oct. 20 (19 cases 8 deaths suspicious of plague from Oct. 20 to Dec. 13), 1902, to Mar. 17, 1903, when the last case occurred, and the total number of cases and deaths has been reported as 475 C 331 D (69% mortality; Butrón y Ríos); 434 C 335 D (77% mort.; González Fábela) and 351 C 296 D (84% mort.; highest number of cases in a week, 65; of deaths, 50; Licéaga).<sup>11</sup> In addition, there were about 15 C 14 D in Ensenada; from 26 to 34 C 9 D in Villa Unión, and from 20 C 9 D to 33 C 12 D in Siqueros, together with about 21 C 17 D in nine other small towns (Agua Caliente, Callejones, Cañadas, Los Cerritos, Chicuras, Los Conchis, El Confite, Oso, and Walamo). All of these foci were secondary to Mazatlán or had been infected in their turn from a focus originating from the port city, the last cases in the secondary foci occurred in May.

The next outbreak of plague in Mexico occurred on the other side of the country, in Veracruz (pop. 60,000). The first clinically diagnosed case occurred April 19, 1920, and the last was July 20 of the same year, with a total of about 57 cases, 36 deaths (mortality 63.5%).<sup>12</sup> Plague rats were reported in 1921 and 1922, the last apparently June 30, 1922.<sup>13</sup>

Tampico (pop. 110,000), the next plague focus, was in all probability infected by rats from Veracruz at some time between April 1920, when

<sup>9</sup> Phosphorus paste, fruit and tallow poisoned with arsenic or strychnine, traps, and the Danysz virus were used. (Butrón y Ríos, *supra*, p. 21.)

<sup>10</sup> Licéaga, Eduardo.: "Transactions II Conf. San. Int.," Washington, 1905, p. 384; "La peste bubonique au port de Mazatlán," Mémoire présenté à la Conf. Int. Sanitaire, Paris, 1911, Imp. A. Carranza e Hijos, México, 1911.

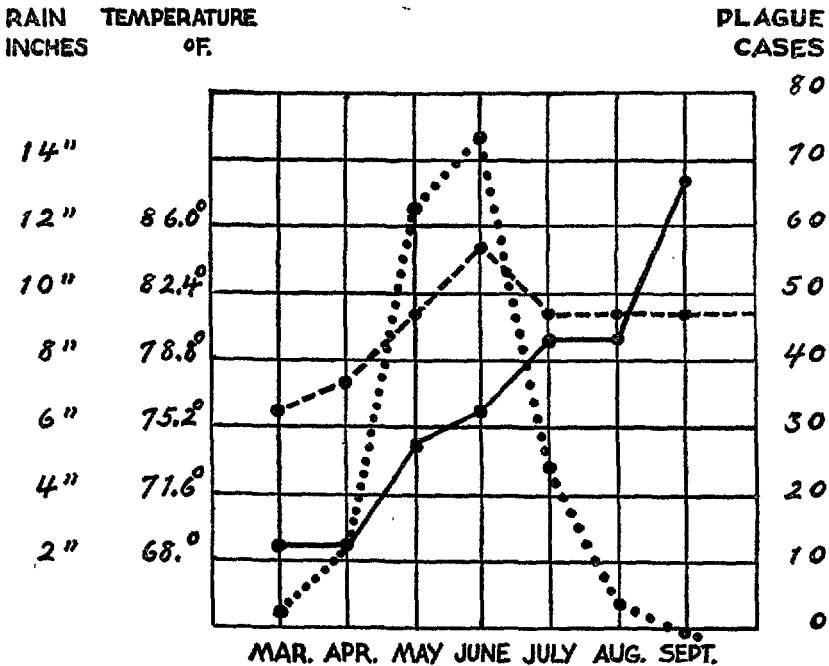
<sup>11</sup> Possibly the lower totals represent clinically or bacteriologically diagnosed cases and deaths; whereas the higher totals may include cases and deaths not seen by a physician but almost certainly plague. Licéaga reported that his death figures were probably more accurate than case figures because burial was not permitted without a certificate.

<sup>12</sup> Gochicoa, *supra*, Note I. M. Pérez Aguilar ("Breve estudio sobre la peste bubónica y prácticas empleadas en la campaña contra la misma," *Rev. méd. Veracruzana*, June 1, 1935, p. 1512) gives 58 cases for Veracruz. Gochicoa attributes the outbreak to the importation of infected rats from New Orleans, where the disease had appeared in 1914 and 1919. It may have been more than mere coincidence that this occurred after the period of sanitary deterioration and uncertainty which followed the Civil War and the retirement of the veteran Licéaga.

<sup>13</sup> *Pub. Health Rep.*, U. S., 1921-1923.

the disease appeared in the latter port, and June, when a quarantine was placed against it by Tampico and vessels were deratized.<sup>14</sup> Four sporadic cases occurred, one each in June, July, August, and September,

## PLAGUE AND CLIMATE IN TAMPICO, MEXICO.\*



TEMPERATURE -----  
 RAINFALL \_\_\_\_\_  
 CASES OF PLAGUE .....

\* FROM THE GRAPH IN A.E. GOCHICOA'S "LA PESTE BUBÓNICA EN TAMPICO EN 1920-1921," 1927.

and infected rats were found in the last two foci. The daily capture and examination of these animals showed that the epizootic was slowly circling the city, without extending northeast into the modern (and

<sup>14</sup> Gochicoa, *supra*. It was found after cyanide fumigation that coasting vessels in particular carried hundreds of rats. The first case of plague in Tampico, discovered June 13, occurred in a squalid quarter next the docks, in an individual who had just arrived in port a few days before, having been a stowaway on a vessel from Veracruz. Furthermore, the cargoes of these ships included grain, fruit, packing boxes, etc. The second case was a watchman in the Municipal Corral where the carts of the street cleaning department were kept, next door to the city dump to which wastes gathered in the clean-up campaign (concentrated on the infected zone) were brought. The man fell ill July 10. Rats were then trapped, and 7 out of 30 captured at the dump were found infected.

fairly rat proof) residence section or south into the business section.<sup>15</sup> Human cases finally appeared in March, 1921 and a real epidemic ensued. There were 183 cases in all in Tampico and suburbs from June, 1920 to August 17, 1921, with 127 deaths (mortality 69.3%). The last sporadic cases of human plague were in March 1922 or 1923<sup>16</sup>; of rodent plague, Mar. 25, 1925 (in a market).

By the end of April, 1921, the suburbs of Arbol Grande (29 C 18 D, 62.4% mortality) and Villa Cecilia (37 C 24 D, mortality 64.8%), both of which consisted mainly of wooden houses with wood or earth floors, were infected. The disease skipped the Llanos del Golfo region where, because of floods, the houses are raised high above the ground, and have no rats.

The control campaign in Tampico was based on compulsory reporting of cases; home inspection; information from the public regarding human cases or unusual rodent mortality; capture and examination of rodents from all parts of the city; placing of "test" guinea pigs in suspected localities to see if they got plague; and examination of all bodies before burial. Isolation of cases and contacts was usually in the home, only indigents being hospitalized; it was found that this helped to avoid panic and concealment of cases. The houses were de-fleaed and de-ratized, and no cases of person-to-person contagion were seen, or any second case in a family or in a deratized and sanitized area. Rat destruction was not intensified during the human epidemic and most favorable flea season (February to June), for fear of releasing infected fleas. Vaccination and serum-therapy were employed. Railway cars, baggage, and ships were fumigated with cyanide to prevent exportation of infected animals, and persons leaving the city were examined and given plague vaccine.

Despite all vigilance, however, two patients in the incubation period managed to leave Tampico, one falling ill of septicemia plague in Ciudad Victoria, Tamaulipas, and the other of bubonic, in Torreón, Coahuila. Neither gave rise to other cases.

It also seems certain that the Cerritos plague was brought from Tampico during the early days of the epidemic there.<sup>17</sup> Cerritos (pop. 2,000), and nearby Carbonera, in the State of San Luis Potosí, on the Tampico-San Luis Potosí railway, had about 80 C 60 D from July, 1920 to February 1921; the epidemic was discovered in October.

A plague rat was reported in Progreso September 10, 1921.<sup>18</sup>

<sup>15</sup> At the beginning of October funds for antiplague work were cut off, but examinations continued to be made of rats brought in by Yellow Fever Service personnel: 23 suspicious rats were found among 380 examined in Oct., 67 in 1,135 in Nov., 9 (including one definitely plague) in 598 in Dec., 2 (one plague) of 274 in Jan. 1921 and 20 (10 definitely plague) of 365 in Feb.

<sup>16</sup> Gochicoa says 1922: *Pub. Health Rep.* give 2 C 1 D for Mar. 23, 1923.

<sup>17</sup> Corn and caged domestic animals were the principal articles carried by rail to the Cerritos region. (Gochicoa, *supra*.)

<sup>18</sup> *Pub. Health Rep.*, 1922.

The disease does not seem to have appeared anywhere else in Mexico, and it apparently completely vanished from the country after 1925.

**Rats and other rodents.**—The most common rats in Tampico are *R. decumanus (norvegicus)*, followed by *R. rattus*, *R. Alexandrinus*, and *M. musculus*. The percentage of infection was highest in *norvegicus* and *rattus*, and very low in *musculus*.<sup>19</sup> The constant association of plague and rats in Mexico has already been described. No infection of wild rodents has been reported, and domestic pets (for instance, the Ensenada rabbits) appear to have been victims rather than vectors of the disease. However, in March, 1921, the first case of pneumonic plague in Tampico occurred in a boy who slept on the wooden floor (under which dead rats were found) of his home, in which two pet guinea pigs died of plague.<sup>20</sup>

**Fleas.**—In Tampico the predominating flea at all seasons is *X. Cheopis*. As many as 33 have been found on a single rat, and an average of 6.47 fleas per rat was found on 36 live rats captured in that port. One *Ct. canis*, 1 *Ct. felis*, and 1 *P. irritans* were also found. The flea season in Tampico lasts from February to June, after which they decline in numbers.<sup>21</sup> The fleas involved in the Mazatlán-Ensenada outbreak in 1902-03 do not seem to have been classified, but it was observed that in one town, Oso, the fleas were unusually large.<sup>22</sup>

Gochicoa described the finding of plague bacilli in encysted chiggers (*niguas*)—*Sarcopsylla penetrans*—in a plague case apparently not exposed to rats or rat fleas.<sup>23</sup>

**Seasonal incidence.**—Plague in the Mazatlán-Ensenada area occurred from October to May, the season when, according to Loaeza, the temperature averages about 20° C (68° F), rising rapidly toward the end of that period, to reach 86 F in July; the plague months were said to be fairly dry, although the humidity in that area is usually high.<sup>24</sup> In Tampico, although the first cases had occurred in June, the disease was epidemic only from March through July, during which the temperature rose from 76 F (March) to a peak of 85 F (June), rapidly dropping thereafter, and the rainfall increased from about 2 inches to almost 14 inches (in September). July is the beginning of a season of great heat and torrential showers, lasting until about February, when

<sup>19</sup> Gochicoa, *supra*.

<sup>20</sup> Gochicoa advanced the speculation that the virulence of the germ might have been increased by its passage through the guinea pigs, and that fleas from both rats and guinea pigs could have attacked the boy. (This is the theory most in favor at present regarding the development of pneumonic plague.) His mother and two sisters, who slept in beds, did not get plague.

<sup>21</sup> Gochicoa, *supra*.

<sup>22</sup> Butrón y Ríos, *supra*, p. 57.

<sup>23</sup> The patient had two *nigua* cysts on the left foot. Three days after the insects fastened themselves on him, he fell ill with plague, and a bubo appeared in the left groin. The patient was a clerk, who slept on a bed high above a wooden floor which was itself sufficiently high above ground not to shelter rodents; no dead rats were found in the house or under the floor, and no one else in the house got plague. The *nigua* also attacks rats. (Gochicoa, *supra*.) He refers to his earlier paper on the *nigua* and plague, in *Rev. Méd. Tampico*, Nov. 1921.)

<sup>24</sup> Loaeza, *supra*, Note 1.

the warm, dry period begins. (See Graph.) Plague in Veracruz ran from April to July.<sup>25</sup>

**Kinds of plague.**—The great majority of plague cases in Mexico were bubonic, accompanied by a mortality rather high in the Americas for this form of plague (63–77%). Four pneumonic cases were reported in El Oso and 5 in Siqueros, all fatal, during the original 1902–03 outbreak. Of 156 cases studied in Tampico by Gochicoa, 131 (84%) were bubonic, 20 (13%) septicemic, 3 (2%) pneumonic, and 2 carbuncular. Butrón y Ríos mentions a few gastrointestinal (4), typhoid-like, cardiac, and septicemic (7) cases, and one ambulatory case. A few instances of secondary pneumonic plague have been reported. With regard to the localization of the bubo, Gochicoa stated that of 131 bubonic cases studied, 71 (54.2%) had inguinal, 47 (35.9%) axillary, and 13 (3.9%) cervical buboes (children, 6, 4, and 5 respectively).

**Vaccination.**—Vaccine and serum were immediately ordered from Paris upon news of the outbreak of plague in Mazatlán, and supplies arrived toward the end of February, 1903. The National Institute of Bacteriology also manufactured Haffkine serum.<sup>26</sup> A total of about 16,732 persons were vaccinated in the Sinaloa area, with Yersin serum (physicians, personnel, contacts, before arrival of the vaccines) or Haffkine or Besredka vaccine, but it is not known how many later developed plague.<sup>27</sup> None of the 1,137 vaccinated with the Haffkine product in Mazatlán fell ill; data are not available for the 12,104 who received the Besredka (which had its first large-scale test during this epidemic). In Villa Unión and vicinity, 2,894 persons were vaccinated with Besredka vaccine (of whom one fell ill with plague, 2 days after the vaccination) and 681 with Haffkine (of whom one fell ill 7 days later). The Haffkine vaccine was the least popular, because of its reactions.<sup>28</sup> During the 1920 epidemic in Veracruz, approximately 55,000 persons were vaccinated with vaccine made by the National Institute of Bacteriology (now National Institute of Hygiene) from a culture taken from a Veracruz patient. Results of the vaccination are not known, although the quick domination of the epidemic (which ended in 6 weeks) was attributed to it.<sup>29</sup> In Tampico, of 156 cases of plague, 15 persons

<sup>25</sup> Gochicoa, *supra*.

<sup>26</sup> González Fabela, *supra*, Report to International Plague Conf., 1911, p. 256.

<sup>27</sup> Practically the entire populations of the small foci around Mazatlán were vaccinated (for instance, Aguacaliente, 279; Siqueros, 1,039, etc.)

<sup>28</sup> In order to encourage people to be vaccinated, the physicians would vaccinate themselves and prominent citizens in the public square. For instance, in Villa Unión, the local priest, the Director Político, his family, and Drs. Butrón and Carvajal were thus vaccinated. The medical student, A. Hernandez Mejía, was vaccinated with Haffkine vaccine on January 30 and February 11, and a little later, while autopsying a bad case of plague, injured his right thumb, but did not get plague. (Butrón y Ríos, *supra*, pp. 40, 80.)

<sup>29</sup> Cervera Ernesto: *Rev. Méd. Ejér. Nac.*, February 1936, p. 32. He cites the thesis of Dr. Julián González Méndez, ("Medidas contra la peste," Mexico, 1922) in regard to the epidemic, as does Gochicoa, *supra*, who also refers to a paper by M. Cañas ("La peste bubónica en Veracruz: Tres comunicaciones leídas en el Consejo Superior de Salubridad," 1920.) Neither was available for consultation.



had been vaccinated with Haffkine vaccine (11 had been vaccinated less than 8 days before falling ill, and four became ill within 13 days to three months after vaccination).<sup>30</sup> Bermúdez states that he knew of an instance in Tampico in which all but one of 10 or 15 persons living in the same house were vaccinated, and the unvaccinated person was the only one who got plague.<sup>31</sup>

**Serum-therapy.**—Lavin, Director of the isolation hospital at Mazatlán, using Yersin serum sub-cutaneously, found it gave practically the same results as his "artificial serum,"<sup>32</sup> and considered its curative value less than its preventive value; he also felt that it increased the septic condition of the patient. The mortality in the isolation hospital for all types of treated cases was 61.53% (in contrast with the 69.54% general plague mortality for Mazatlán). Di-Bella Mier reported seeing better results with Yersin serum in Siqueros, observing that the product was probably fresher.<sup>33</sup> And Butrón y Ríos, using large doses (the total amounts received ranging from 20 to 530 cc, and usually lying between 200 and 400 cc) of Yersin serum intravenously brought the mortality for treated cases in Villa Unión down to 13.33%, at a time when the mortality was averaging 42.85%.<sup>34</sup> Gochicoa reported that the results of serum treatment in Tampico were not encouraging: 19 deaths in 24 cases so treated (78.9%); and 100 in 132 cases not so treated (75.75%). Excluding the pneumonic, septicemic, and carbuncular cases, the figures were: serum-treated, 18; deaths 13 (72.2%); without serum, 113, deaths 83 (73.3%). Yersin serum was used intravenously, in amounts of from 50 to 100 cc daily.

**Control.**—The control methods employed have been discussed under the different epidemics. The role of rats and fleas was realized, and while in the Sinaloa outbreak, for instance, perhaps more emphasis was placed on vaccination than in some other countries, it was not at the

<sup>30</sup> Gochicoa, *supra*.

<sup>31</sup> Bermúdez, Salvador: "La campaña contra la peste bubónica," Tesis, 65 pp., Antigua Imprenta de Murguía, Mexico, 1921.

<sup>32</sup> A mixture of distilled water, 1,000.00; pure glycerin, 50.00; pure sodium chloride, 7.00; formalin, 20. Sometimes the sodium chloride was increased to 10.00 and the formalin omitted. The solution was contra-indicated in cardiac and gastro-intestinal forms, unless caffeine or sparteine were added. (Butrón y Ríos, *supra*, p. 43.)

<sup>33</sup> Cited by Butrón y Ríos, *supra*, p. 52. A. C. Guzmán believed, on the basis of Mazatlán results, that Yersin serum should be used during the first 3 or 4 days of illness and artificial serum and formalin thereafter. Dr. Bustamante, at Siqueros, successfully gave sub-cutaneous injections of 20 cc. of Yersin serum, regulating the frequency according to the severity of symptoms. Carvajal thought that an irido-choroiditis seen in one patient may have been due to serum; Butrón y Ríos disagreed. Hernández Mejía, in his thesis described 7 severe cases: in 6 Yersin serum alone was used, and 2 died (mortality 33%); in the other, yersin and artificial serum were used, the patient died. (*Ibid.*, pp. 47, 52, 238.)

<sup>34</sup> *Ibid.*, pp. 53, 54. He records that he was encouraged in his daring to use the serum intravenously by Dr. Licéaga's telegram stating that "early intervention, increased doses, and intravenous injections, may save a greater number of patients" ("*la intervención prematura, el aumento de las dosis y las inyecciones intravenosas podrían salvar mayor número de pacientes. . .*")

expense of the campaign against vermin.<sup>35</sup> The present Mexican laws provide for rat-proofing and rat-destruction,<sup>36</sup> and rats are captured and examined in key port areas.

**Research.**—The brief appearance and rapid eradication of plague in Mexico probably account for the fact that not much has been done in the way of research on this disease, except for epidemiological and bacteriological investigations during the outbreaks.

<sup>35</sup> It is of interest to recall that a resolution was proposed by the Mexican representative (a distinguished Uruguayan physician, Dr. Julio Etchepare), to the VI Pan American Sanitary Conference (Montevideo, Dec. 1920) recommending that care be taken to protect patients suffering from communicable diseases in which the germs might be found in the blood, from sucking and biting insects, in order to prevent further spread of the disease. His suggestion was incorporated in the report of the Executive Committee of the Conference as a recommendation that particular attention be paid to the extinction of rats, flies, mosquitoes, and other insects involved in contagious disease; this recommendation being adopted by the Conference as Resolution XVIII. ("Actas," pp. 157, 180.)

<sup>36</sup> *Diario Oficial*.

**Beauperthuy.**—Although Luis Daniel Beauperthuy was born in Guadeloupe (August 25, 1808), educated in Paris, and died in Demerara (September 3, 1871), Venezuela is proud to claim him as one of the founders of her parasitology, for his writings on that subject were the fruit of his many years of observation and study while a physician in the State of Cumaná. He believed as far back as 1853 that yellow fever and malaria were transmitted by *nematocerae* [sub-order of Diptera, including the mosquitoes], and marshalled arguments to support his case, although he was under the impression that the insects brought the infection from the swamps, and apparently did not visualize man-to-man transmission by this means. In a day when the causes of disease were largely ascribed to miasmas or "emanations," Beauperthuy took the ground that they were due to parasites—"microscopic insects" or to "destructive septic germs." He began his career as a "traveling naturalist" for the Paris Museum of Natural History, and closed it as Director of the Leper Hospital at Georgetown, British Guiana. In the opinion of Agramonte, "the fact that this man in the early forties traveled through the wilds of Venezuela investigating with a microscope the tropical diseases which came under his observation, makes him . . . sufficiently deserving of [a] high place . . . among the pioneers in the research of tropical medicine."—Carbannel, Diego: "La parasitología en Venezuela y los Trabajos del Dr. M. Núñez Tovar," Caracas, 1938, pp. xiii-xxvii; Agramonte, Aristides: "An account of Dr. Luis Daniel Beauperthuy," *Boston Med. & Surg. Jour.*, June 11, 1908, pp. 927-30; an article prepared by the Ministry of Health of Venezuela for Pan American Health Day.

**The child and the kindergarten.**—"I have heard it said here, as elsewhere, that the Kindergarten is preparing the man of tomorrow and the woman of tomorrow; but I belong to the group of physicians who believe that the Kindergarten has an immediate function: that it must concern itself with the *child of today*, without wondering whether he is a young George Washington, Cuauhtémoc, or Lenin. The child, in his own right, is a very interesting being, possessed of many valuable traits and surrounded by many dangers; he needs our most earnest and thoughtful attention. Naturally, if we take good care of him we will be keeping the way open for the development of future greatness, but let us never forget that he is a child who should be treated as such, and not as a future Juárez or a future Sister Juana Inés de la Cruz. For, if we are most concerned with the long-range viewpoint, it is very possible that we shall miss some very interesting phase of the present moment."—ALFONSO PRUNEDA: "El Jardín de Niños y la Salud," 2nd ed., Mexico, 1939, p. 27.