A veterinary survey of regions adjacent to the Pan American Highway has contributed much information of value to the fund of international veterinary knowledge. This survey, which unearthed new information and corrected obsolete data, was conducted in 1944–45 by Colonel J. H. Kintner, Major W. S. Bentham and Captain S. B. Hitchner, all of the Veterinary Corps, U. S. Army, assigned to the Pan American Sanitary Bureau. Their report shows the progress of veterinary medicine in Mexico, Panama and Colombia. Naturally the report has not covered every possible animal disease and veterinary public health problem in these areas but it presents one of the most comprehensive over-all pictures of this sort ever assembled.

This paper will touch upon the outstanding problems of each of these countries and will emphasize points for consideration in future investigations. Although the primary purpose of the survey was to prevent the spread of disease among animals, ideas presented for future surveys will stress preventing transmission of animal disease to man.

**Mexico.**—Mexico is the most important animal producing area surveyed and has the best veterinary public health and animal disease control program of the various countries covered by the survey. It has been thought for a number of years that brucellosis was the most important veterinary public health problem of Mexico. This idea was disproved by evidence which points toward bovine tuberculosis and the tick fevers as the chief offenders. To those who are acquainted with animal disease problems in Latin American countries, it is not surprising to find that anthrax, blackleg and hemorrhagic septicemia (pasteurellosis) are prevalent, but it is surprising to note that they are the leading animal diseases reported in many districts. This is especially true of anthrax which in some cases accounts for more than 20 percent of all reported diseases. In another state hemorrhagic septicemia was reported as responsible for 55 percent of all disease present. We can understand the prevalence of this disease more readily when we remember its wide occurrence in the United States and the difficulty involved in controlling it as an epizootic.

It will be of great interest to find out if the disease, derriengue,¹ will spread to other countries through unknown vectors and if man or animals other than the bovine and equine will prove to be susceptible.

¹ Dr. Harold N. Johnson of the Rockefeller Foundation in his investigations of derriengue identified the disease as rabies. The virus was isolated from vampire bats. The disease has been spreading over a wide area very rapidly and may have entered the United States. (Ann. Rep., Rockefeller Found., 1944, p. 97.) Derriengue is also called derrengadera, rediengue, tronchado and some workers classify it as an Enzootic encephalomyelitis.
Would it not be more valuable to make diseases such as derriengue, international research problems before they become international disease problems? A Pan-American research group of the interested countries might embark on an intensive investigation of such diseases.

The veterinary survey group, upon the completion of its extensive study of animal diseases in areas adjacent to the Pan American Highway in Mexico recommended that the following steps be taken to improve the livestock industry and the public health.

(a) A treaty be drawn up between Mexico and Guatemala for sanitary control of international shipments of animals and animal by-products. (b) A rational veterinary association be organized. (c) The present regulations governing infectious diseases of animals be revised. (d) A rabies control program be publicized. (e) A full investigation of derriengue be made. (f) Plans be initiated to eradicate bovine tuberculosis.

The knowledge and “esprit de corps” of the veterinarian would be much improved if national and regional meetings were held. The formation of a veterinary public health section in the Pan American Sanitary Bureau would also be a valuable asset. A veterinary section in the Bureau would give all the countries of North and South America an opportunity to exchange opinions and views at regular intervals and would provide a permanent organization to coordinate and stimulate action on present national and international veterinary problems.

Various methods for the control of animal diseases in Mexico have been described and the question now arises as to how animal diseases can be prevented from spreading to humans. The transmission of such diseases can be prevented in a measure by high standards of meat inspection, milk and dairy plant operations, and sanitation in other food manufacturing industries and food dispensing establishments.

The incidence of salmonellosis, mastitis, dermatomyositis, and parasitic diseases of animals that are transmittable to man and the number of these diseases that have been reported in man must also be considered.

Guatemala.—The Survey Group’s report on Mexico strongly recommended that a livestock sanitary treaty be drawn up immediately to prevent the spread of animal diseases between Mexico and Guatemala. It would be necessary for both countries to keep veterinary inspectors at the frontier to put such an agreement into effect. Since Guatemala has only five veterinarians at present, the chief burden of carrying out such a treaty would rest upon Mexico until Guatemala could acquire additional graduate veterinarians.

The most important animal diseases in Guatemala are anthrax, tick fevers and bovine tuberculosis. Anthrax losses became so high in 1940 that vaccination was made compulsory. In 1944 over 400,000 animals were vaccinated and all imported animals were required to be vaccinated before entering the country. Vaccination for blackleg (Clostridium chauvoei) is also required by law and this has kept the losses at a minimum.

The government of Guatemala has issued regulations to control the tick fevers (Anaplasma marginale, Babesia major, B. argentina and B. bigemina) by requir-
ing that dipping vats be constructed to kill cattle ticks before cattle may move about the country.

Bovine tuberculosis is increasing rapidly in the dairy sections of the country. Government tests made during the 1937-41 period show 7.6 percent positive reactors while the Survey Group in 1944-45 found 22.8 percent of the animals tested giving positive reactions. This threefold increase during the past 4 years illustrates the rapid spread of the disease. The municipal abattoir in Guatemala condemned a large number of animals and animal parts because of tuberculosis. If each part reported condemned in the 1937-41 period is considered as one animal, the number of animals infected is 2,900 or 7 percent.

The survey group recommended that fellowships in veterinary medicine be established and that an eradication campaign for bovine tuberculosis and brucellosis be initiated. The group also recommended a tick control program. It would be wise to find out as soon as possible whether derriengue is present, and if it is, whether it is masquerading as encephalitis or rabies.

No information is given in the survey reports of any of these countries on the incidence or occurrence of tetanus. A future survey group might conduct investigations to find out if this disease is present.

**Honduras.**—The animal industry of Honduras has grown rapidly in recent years but as there is no veterinary service the disease problems have grown even more rapidly, with a consequent loss of profit to the animal industry.

The spread of bovine tuberculosis in Honduras is an example of what occurs when there is no adequate veterinary service. It is doubtful if bovine tuberculosis was present in Honduras twenty years ago. The disease probably gained entry through the importation of breeding stock and has been increasing ever since.

The tick fevers, anthrax, blackleg, and calf dysentery are the other important diseases of Honduras. The government takes only limited measures to control these animal diseases. With no veterinarians in the country it is difficult to get accurate reports on the incidence of disease and verification of diagnosis. Rabies is present as well as brucellosis, infectious stomatitis, infectious keratitis, forms of foot rot, torsalo (Dermatobia hominis)\(^2\) and tenchola.\(^3\)

\(^2\) The Dermatobia hominis botfly inhabits tropical America from Mexico to Argentina. The fly may lay its eggs on clothing of man who may become infected but in most instances the eggs are attached in bunches to bloodsucking insects. The larvae in these eggs are ready to hatch in about six days but they do not emerge until their carrier lands on an animal suitable for its feeding purposes. The larvae then leave the eggs and penetrate into the animal's skin. As each larva grows it produces a swelling on the animal which has an air pore and which is very painful. After five to ten weeks the larvae reach maturity and descend to the ground where they pupate and after another five to ten weeks the flies emerge from the pupal stage to begin the life cycle over again. Cattle, sheep, dogs, cats, rabbits and other animals may be afflicted with Dermatobia hominis.

\(^3\) Tenchola is characterized by an increase in the size of the mouth, occurring either on one or both sides, although usually one side is affected. The cause is thought to be mechanical, as the condition is more common in long grass sections. Some observers believe the disease is transmissible and is due to a fungus.
The Veterinary Survey Group recommends for Honduras: (a) The employment of a professional veterinarian and the organization of a veterinary service. (b) A control program for bovine tuberculosis. (c) Revised regulations for the control of animal diseases. (d) The eradication of torsalo.

The recommendations for employing a competent veterinarian and instigating a disease control program are obviously urgent. The quota of available veterinarians might be raised by the following arrangement. Selected graduates of the Pan Ameritan School of Agriculture might be given fellowships to veterinary colleges in North or South America with the understanding that they would return to Honduras at the completion of such an education.

Suggestions to be followed in future surveys are the same for Honduras as they are for Mexico and Guatemala except in regard to derriengue, which is unknown in Honduras. Investigation by a competent group of veterinarians and entomologists into ways of controlling Dermatobia hominis should begin as soon as possible.

El Salvador.—El Salvador is the cross roads of cattle traffic in Central America. Most of the cattle from Honduras and Nicaragua destined for Guatemala and Mexico pass overland through El Salvador. This large animal traffic has resulted in tremendous annual losses from disease. There is only one veterinarian in the country to provide public health and clinical advice on the control of animal disease.

Nowhere in Central America are animal diseases more rampant. This is reflected in the large number of animal diseases which have been transmitted to humans. In the cattle center of Sonsonate 10 human cases of anthrax were admitted to the hospital during January 1945 and it was not known how many cases occurred in rural areas where people had no access to medical care.

The annual mortality of anthrax, the most serious animal disease in El Salvador, runs into the thousands. It is assumed that the area is contaminated with an especially virulent strain of B. anthrax. Many ranches vaccinate semi-annually and still continue to have heavy losses. This condition may be due to the faulty handling of the vaccine as illustrated by improper refrigeration.

Tick fevers, blackleg, hemorrhagic septicemia, hog cholera, tuberculosis and brucellosis are other serious zoonoses present in El Salvador. Approximately 20% of the cattle tested for tuberculosis were positive reactors. The municipal abattoir reported that 5% of the animals slaughtered showed tuberculosis lesions and in the milk sheds of this region 10% of the animals had positive agglutination for Brucella antigen.

The recommendations of the Veterinary Survey Group merit the closest scrutiny by the authorities of El Salvador. They are: (A) Expansion of veterinary services. (B) Compulsory annual anthrax immunization, in some areas twice annually. (C) All animals entering from Honduras be immunized for anthrax before entering El Salvador. (D) A bovine tuberculosis eradication program be instituted. (E) A brucellosis control program be carried on. (F) Tick eradica-
tion be initiated. (G) The inspection of all animals entering El Salvador be made by members of the Veterinary Department. (H) A veterinary, bacteriology and research laboratory be part of the experimental station. A moderate expenditure for veterinary services necessary in carrying out a program of this sort would pay large dividends in increasingly healthy animals.

In view of the large number of animal diseases being transmitted to the human population, an intensive short clinical course should be given physicians to acquaint them with these animal diseases. The public should be educated to the potential dangers of anthrax, bovine tuberculosis, brucellosis, hog cholera (salmonellosis), and rabies as human diseases. The sanitary standards of meat, milk and food inspection should be surveyed with the object of improving these services.

Nicaragua.—The animal industry of Nicaragua is second only to the coffee industry. A large portion of the animal traffic in the country is directed toward the ports of exportation. Recently the government employed a veterinarian to organize a veterinary service and plan a veterinary school. The only veterinary service now available in this country is provided by the agriculture school graduates, who after the completion of a three year course are known as practical agriculturists and expert veterinarians. The diagnosis and reporting of animal diseases under these conditions cannot be considered as completely satisfactory but it is better than the situation in some of the other countries where no veterinary facilities exist.

Anthrax, tick fevers, blackleg, hemorrhagic septicemia, hog cholera, and renguera or taranta are the more important diseases occurring in Nicaragua. No animal reactors to tuberculosis were found and only one dairy herd near Managua proved to have cattle infected with brucellosis. These cattle were imported from Costa Rica where this disease is known to exist.

The Veterinary Survey Group makes the following suggestions for Nicaragua:
(A) Organization of a professional veterinary service. (B) Fellowships for students who desire to study veterinary medicine. (C) Establishment of a central veterinary laboratory, (D) Adoption of regulations and quarantine measures necessary to control animal diseases and traffic, (E) Regulations to control the sale and standards of veterinary biologics. (F) Regulations to maintain the apparent absence of bovine tuberculosis. (G) The inauguration of a program to eradicate brucelloses. (H) The promotion of a tick control program. It is seldom that a country has the opportunity to control these two serious diseases, bovine tuberculosis and brucellosis, with so little effort.

Additional suggestions concern closer observation of the food handling industries and research into medical statistics to determine the incidence of food borne diseases.

The disease known as "renguera" or "taranta" merits immediate attention to determine the vector, cause and pathogenesis of the disease. It may be related to the derrinique of Mexico, to the encephalomyelitis of Colombia, or to the paralytic rabies of Brazil. The newly suspected diseases of every country should be placed under close observation by the Pan American Sanitary Bureau. The
newly discovered diseases today are often the international problems of tomorrow and can often lead to serious economic losses.

Costa Rica.—The cattle raising industry of Costa Rica is almost entirely a dairy industry. Most of the beef has been imported from Nicaragua in the past. However, the government is attempting to correct this discrepancy by taxing the importation of feeder and fat steers. Most of the 80,000 dairy cows of Costa Rica are located near the four largest cities.

The veterinary service of the country is provided by one government veterinarian and another recent graduate veterinarian who has set up a private practice. They are assisted by a number of persons who have been graduated from the agricultural school with the title of “practical agriculturist and expert veterinarian.” The principal duties of the latter group are the vaccinating of animals and conducting sanitary inspections.

Anthrax, tick fevers, hemorrhagic septicemia, and brucellosis are the animal diseases most prevalent in Costa Rica. Anaplasmosis has been known in the country only since 1941 and it has already become one of the more serious enzootics. It has been found not only in cattle but also in hogs and probably other domestic animals. The disease, Torsalo, which is the larval development of the Dermatobia hominis botfly, is a serious problem on the central plateau of Costa Rica. No suitable treatment or repellent is known for this parasite which attacks cattle, dogs, wild animals and man.

Tuberculosis is not believed to exist in Costa Rica but brucellosis is becoming a serious problem. The local veterinarian lay inspectors have made tests which indicate 30% of the dairy cows are infected. The Veterinary Survey Group made similar tests and found 12% positive and 14% suspicious. Rabies has not been reported in Costa Rica in recent years.

The survey group recommends that the Costa Rican government focus its attention on the following points: (A) Reorganization of the veterinary service. (B) Regulations for the control of animal diseases and veterinary biologics. (C) Recruitment of students interested in veterinary medicine. (D) Meat and milk inspection conducted under a professional veterinarian. (E) Expansion of milk pasteurization facilities. (F) Initiating a compulsory bovine tuberculosis testing program.

When a country is so fortunate as to find itself free of bovine tuberculosis and rabies it should make every effort to maintain this status. The establishment of a milk pasteurization industry in the large cities requires immediate attention and arrangements to send designated students to the United States to study the dairy industry and dairy plant operation should be made. Other food handling industries might well be surveyed and recommendations made for their operations. Investigations could be set in motion to find out whether other animal diseases such as mastitis, salmonellosis, and tetanus occur in Costa Rica.
Panama and Canal Zone.—Panama is fortunate in having 20 graduate veterinarians. Of these, six are employed by the Republic, six by the Health Department of the Canal Zone, three by the Panama Railroad, four are on duty with the U. S. Army, and one is employed by a private corporation. The veterinarians employed by the Republic are doing various types of work ranging from experimental station duties to meat inspection in Panama City. The veterinarians in the Canal Zone are largely occupied with public health duties and the operation of a large dairy. Animal traffic is heavy in the Canal Zone. Cattle are imported from El Salvador, Nicaragua and Colombia and horses are brought from all over the western hemisphere to the nearby race track. When these animals come from areas in which foot and mouth disease (aphthous fever) is known to occur they are washed with a 1:1000 solution of bichloride of mercury. Tests conducted by the U. S. Department of Agriculture and reported in the Bureau of Animal Industry Bulletin indicate that sodium bifluoride is more valuable for disinfecting for foot and mouth diseases than bichloride of mercury.

Anaplasmosis and piroplasmosis (the tick fevers) are the most widespread diseases in Panama. Piroplasmosis is prevalent among the native horses and occasional U. S. Army horses on maneuvers have contracted the disease. Blackleg and hog cholera are serious diseases in all parts of the Republic. Torsalo is a serious problem here as it is in some of the other Central American republics. Trypanosomiasis of cattle (T. vivax) came into Panama and the Canal Zone from Colombia in 1940. It is already a serious enzootic on the Pacific slope of Panama.

Trypanosomiasis (T. Evansi) has been reported in horses since 1909. Cattle are natural reservoirs of this disease which is transmitted by flies and vampire bats. The mortality rate resulting from this disease among horses is very high but because of the low value placed on horses few are ever treated.

Tuberculosis and rabies are almost unknown diseases in Panama and the Canal Zone. Brucellosis is a more serious problem in this area although not much is known on the incidence of this disease. The Survey Group found that about 10% of the 1,954 cattle, tested positive for brucellosis. Anthrax and hemorrhagic septicemia are now rarely reported in Panama although they have been serious diseases in the past. Spirochetosis in cattle is detected occasionally in blood smears during routine examinations for trypanosomes.

The Veterinary Survey Group at the completion of the survey recommended that the following steps be taken: (A) The veterinary service be expanded. (B) Livestock sanitary laws be revised. (C) No uncooked garbage feeding be allowed. (D) Local salt be used for stock. (E) The animal quarantine be strictly enforced. (F) The present tick control program be expanded. (G) A bovine tuberculosis program be initiated. (H) An investigation of red water disease be made.
The investigation of "Red Water" disease will be anxiously awaited by all research workers. "Red Water" disease is an entity of unknown etiology. Hemoglobinuria with a loss of condition are the usual symptoms. Mortality is not thought to be high. There has been no thorough investigation of this disease, though there is some conviction that it is a form of piroplasmosis.

Determining the incidence of mastitis (streptococcus and staphylococcus) and salmonellae is a subject that might be dealt with in future surveys. The sanitary standards of food handling industries and the incidence of human diseases attributable to animal diseases should also be investigated. The reports of the Veterinary Survey Group made no reference to botulism. As botulism is a very important animal disease in the western states it is surprising to find no report of it in Central America.

Colombia.—Colombia is the northernmost country of South America and is divided into fertile valleys and temperate plateaus by mountain ranges. The latest count of the animal population shows it to be in excess of 19 million animals. Colombia has done considerable work in developing new breeds and strains of cattle adaptable to tropical conditions. It has also imported good dairy sires and by means of artificial insemination has made rapid improvement in its dairy herds.

The veterinary service of Colombia is responsible for the supervision of all animal disease control and improvement programs. There are 170 of these veterinarians distributed in the National Department of Animal Industry, state veterinary services, faculty of the veterinary college, biological manufacturing, public health departments, the Army and general practice.

Colombia has a very good Veterinary School which is part of the National University of Bogota. This school was founded in 1921 and offers a 4 year course of study in veterinary medicine. In 1946 a five year veterinary curriculum will be inaugurated.

Anthrax is not a serious problem although it does occur in some of the cattle raising areas. Most cattle owners in the contaminated areas vaccinate their herds annually which keeps losses relatively low.

Blackleg is the seventh most frequently occurring disease of Colombia in spite of the fact that most calves are vaccinated for protection against it. It has been found that imported aggressins are not as satisfactory as locally prepared aggressins.

The tick fevers (anaplasmosis, piroplasmosis, babesiasis) constitute a major cattle problem in Colombia as they do in other tropical areas. Piroplasmosis usually found in horses is also present in dogs in this country. The government is inaugurating an extensive tick control program which must be rigidly enforced to be effective.

Equine encephalomyelitis was first reported in 1932. Since then severe outbreaks have occurred in which an estimated 20,000 to 25,000 horses died. The mortality rate from this virus has been very high. Although the virus has not been definitely typed it is thought that there are two distinct strains in Colombia. One of these strains, identified in Venezuela, is known as the Venezuela virus. The most effective vaccine for this disease is made with a combination of these two viruses. The vaccine made from strains found in eastern and western United
States is not nearly as effective. The vectors are thought to be mosquitoes of the Aedes genus and it is not known if man is a susceptible host.

Hemorrhagic septicemia which can be controlled by vaccination is found in the mountain areas where there are drastic changes of temperature.

In order to control hog cholera which has become a major disease problem since it was introduced into the country in 1942, vaccination by means of virus and serum, and crystal violet vaccine is being carried on.

Paratuberculosis (John’s disease) has become a widespread disease in Colombia in the past twenty years and Salmonellosis is rapidly being recognized as a serious problem among calf diseases.

Trypanosomiasis is an important disease problem in cattle and horses, although T. vivax infection in cattle has declined in recent years. Trypanosomiasis murrina is one of the most prevalent diseases found in horses. It is exceeded in prevalence only by encephalitis and strangles (Streptococcus equi). T. evansi is the most serious infection in horses. The mortality rate in horses due to trypanosomiasis exceeds 50% and survivors are usually chronic cases. The disease is transmitted by flies and it is thought that bats are possible vectors.

A vesicular stomatitis that closely resembles foot and mouth disease has been reported as being widespread in Colombia. It is the third most frequently reported disease of cattle although it is 18th on the mortality list. This disease is more virulent than the type reported in North America. It has been diagnosed in horses, hogs and, in some cases, in human beings.

Brucellosis is rapidly becoming a major disease problem. An extensive immunization program for the prevention of this disease is being pushed in all parts of Colombia. Since it was first reported 13 years ago, Brucellosis has spread rapidly.

Rabies is prevalent throughout the country. All persons receive anti-rabies treatment if they are bitten by a dog. There were 132 positive rabies diagnoses made by the Samper-Martinez National Institute of Hygiene in 1943. Paralytic rabies was first reported in cattle and horses in 1940. Further study on this disease is necessary to determine whether it is related to the paralytic rabies of Brazil and Argentina or possibly to the derriengue of Mexico. No human cases have as yet been reported. Since official testing for bovine tuberculosis was carried on only from 1931 to 1939, this disease now constitutes a difficult problem in Colombia. The incidence during the period of testing was about 2%. At the time of the survey, 1944-45, a test made of herds near Bogota showed that there were 16% positive reactors.

The Veterinary Survey Group after reviewing its findings submitted the following recommendations for Colombia: (A) Revised educational qualifications for the degree of Doctor of Veterinary Medicine. (B) Improved supervision of
veterinarians in field work. (C) Private practice be stimulated and protected. (D) Veterinarians to give the actual treatment instead of advising cattle handlers how to give treatment. (E) Bovine tuberculosis eradication be started immediately. (F) All animals entering “perias” be inspected for communicable disease. (G) Tick eradication be strictly enforced. (H) Inspection stations be constructed at all ports of entry.

The numerous animal diseases reported in Colombia are a challenge to research men. Three diseases of definite public health interest which merit immediate attention, are equine encephalomyelitis, paralytic rabies and vesicular stomatitis. A study of these diseases to determine their mode of transmission, identity of carrier agent, pathogenesis in animal and man, and what methods of control are most applicable would be extremely valuable.

A survey of food handling industries would be advisable in order to find out what problems exist and how they may be corrected. A study of medical statistics would also be of value to determine what animal diseases are transmitted to humans through animal products and through direct contact with the animals.

The seriousness of rabies calls for further study to formulate a plan for controlling the disease in dogs and other domestic animals.

The disease known as, Hematuria esencial, (essential hematuria) should also receive further attention to determine whether it is a parasitic or nutritional disease, and if the latter, what steps can be taken to alleviate it. The symptoms are similar to those of the “Red Water” disease of Panama, namely, hemoglobinuria and/or loss of weight and condition. Similar diseases have been reported in Florida, Michigan and Australia. In these cases the deficiency was due to a lack of the mineral, cobalt.

According to the plan of construction, the Pan American Highway will be continued down the west coast of South America through Ecuador and Peru and on to Chile and Argentina.

If this Veterinary Survey Group or another similar body is able to continue its studies of South American countries as the highway progresses, knowledge thus gained will contribute immensely to plans for improved animal and also human health in the Western Hemisphere.

ESTUDIO VETERINARIO EN MÉXICO, CENTRO AMÉRICA Y COLOMBIA (Sumario)

Este estudio de las regiones adyacentes a la Carretera Panamericana en México, Centro América y Colombia, ha aportado muchos datos valiosos con respecto a las zoonosis más frecuentes y la situación de la medicina veterinaria en los países estudiados. El A. han hecho recomendaciones precisas para cada país que permitirán formular planes encaminados a la solución de los problemas aquí expuestos.

Litiasis urinaria en Venezuela.—Tomando como base un decenio (1924-43) y después de realizar una serie de estudios en la casuística de 60 pacientes ingresados al Hospital Vargas con el diagnóstico de litiasis urinaria, concluye J. Brillembourg (Rev. Urol., 180, mzo. 1945) que en sólo 75 de ellos fue comprobado tal diagnóstico, haciendo notar el reducido número de casos (1.45 por mil), y contrastando esta cifra con la frecuencia con que parece presentarse en la clientela privada.