the widespread diffusion of the swine-plague bacilli is due to secondary invasion following infection with the hog-cholera bacilli. This, however, does not remove the grave significance of the swine-plague bacilli, which certainly cannot be ignored in the studies in this country of the diseases known as hog-cholera or swine-plague.

While differing in some points from the conclusions reached by the workers on this subject in the Bureau of Animal Industry, great pleasure is taken in recording the essential harmony of the observations here made with the facts which they have observed in their painstaking and creditable investigations of this difficult subject as reported since the year 1885.

Through the kindness of Dr. F. S. Billings, Professor Welch has had the opportunity of examining a number of cultures from diseased swine in Nebraska, chiefly direct cultures from the spleen. These in nearly all instances were pure cultures of the hog-cholera bacillus. Much confusion has resulted from Dr. Billings's attempt to identify this organism with that of Schweine-Seuche.

The former has had the opportunity of examining cultures of Schweine-Seuche and also of the Scandinavian swine-pest, obtained from the Hygienic Institute in Berlin. The organism in Schweine-Seuche cultures is apparently identical with the swine-plague bacillus which he has isolated. The organism in the swine-pest cultures is a different species of bacillus, and appears to resemble closely, if it is not identical with, the hog-cholera bacillus.

It is regarded of importance that the future study of swine affected with hog-cholera or swine-plague should be accompanied with a more thorough bacteriological examination of each case than has hitherto been customary. The mere production of a direct stab-culture from one organ, such as the spleen, or the mere inoculation of an animal with material from one organ, affords very incomplete and unsatisfactory information. So long as the relations of the two organisms — the hog-cholera bacillus and the swine-plague bacillus — to the diseases of swine are not thoroughly clear, it seems necessary to make Esmarch or plate cultures from the blood, the intestine, and the principal organs of the body, and also to inoculate animals with material from the lungs, spleen, intestine, etc. A single case thoroughly investigated according to modern bacteriological methods is of more value than many cases in which only stab-cultures have been made from one or two organs, or in which reliance is placed solely on the results of inoculating animals. Little reliance can be placed upon the results of experimental inoculations of swine with the suspected organisms of hog-cholera and of swine-plague in regions where the disease prevails, unless very strict precautions are taken in the selection and care of the experimental animals.

RUMINATION IN THE HUMAN SUBJECT.

IN the *London Medical Recorder* for Nov. 20, 1889, Dr. Ireland summarizes the contents of a paper on this curious phenomenon by Dr. Sievers in the *Finska Läkaresällskapets Handlingar*, No. 5, 1889.

This author first gives a *résumé* of the different opinions upon rumination since 1618 (when Fabricius ab Aquapendente published the first case of this affection) until the present time. He recalls that since the appearance of the classical work by Adrien Dumur on the "Paralysis of the Cardiac Orifice or Merycism," the most recent authors see in this affection a nervous moving of the stomach accompanied by more or less diminution of the tone of the cardiac orifice. He thinks, however, that the true nature of rumination has not yet been thoroughly studied. Like Johannessen, to whom we owe the most detailed examination of this subject, Dr. Sievers says, that, before drawing any conclusion, the details should be more minutely studied. But while the researches already made do not explain satisfactorily the nature of rumination, they furnish us with very important facts for the therapeutic treatment.

Dr. Sievers publishes three cases of rumination which he observed in private practice at Helsingfors. Besides these, so far as he knows, there are only three other cases of rumination mentioned in Scandinavia, and reported by Johannessen in *Zeitsch. für klin. Medicin*, Bänder X. and XII. In the first case described, the patient, aged twenty-seven, who had been a governess and sick-nurse, belonged to a very nervous family, though none of them suffered from insanity or any other grave disorder. She had previously enjoyed good health. She always ate very quickly, and did not properly masticate her food. It is now ten years since she commenced to ruminate her food, after a sea-voyage lasting from three to four days, during which time she had not defecated, owing to want of convenience. Five, ten, or thirty minutes after eating, the food is collected in little balls in the mouth in order to be subjected to a second mastication. The patient seems quite at ease during rumination. After an ordinary dinner the rumination lasts from an hour and a half to two hours. If she moves about, or even if she is disturbed, rumination begins sooner, and is more active. Trying to restrain the process brings on such distress that the patient is compelled immediately to give in. During rumination she prefers to be seated. She leans forward, and at every mouthful which returns she lowers her head.

On scrutinizing the abdomen during the act of ruminating, one notices a dimple-like depression under the ribs. This is accompanied by an uneasy sensation passing from right to left. This does not extend farther than about the cardiac orifice. The patient feels a slight shock, and the food returns to the mouth. The stomach was found to be moderately distended with air. There was no retardation of digestion, and no excessive secretion of gastric juice; but there was found to be unusual acidity of the contents of the stomach, owing to the increased production of hydrochloric acid. No lactic acid could be detected. For this patient Dr. Sievers prescribed a teaspoonful of Carlsbad salts before dinner and supper, and a teaspoonful of bicarbonate of soda after each meal. The diet was to consist of milk, eggs, meat, and a very little bread. Under this treatment there was a gradual improvement; and at the end of five weeks the rumination had entirely ceased, nor did it return after she had discontinued using the alkalies.

The second case was a priest sixty years old. He had always ruminated. His father, now eighty-eight, did the same. The process commenced after a meal, and lasted from two to three hours. He never tried to stop it, and does not think he could, as it goes on independently of his will. He did not desire medical treatment with a view to remove it.

The third case was a Jewess, thirty-five years old, of a highly neurotic family. Her father also ruminated; and one brother out of the family of nine occasionally did the same. She herself has ruminated from childhood. The food returns of itself. The act causes her no uneasiness, which would not be the case if she tried to resist it. She did not desire medical treatment. The contents of the stomach were found to be very acid.

In *La Psichiatria* (Fasc. III.–IV.) there is a paper on "Rumination," by Dr. Cantarano. He had opportunities of studying this affection in four idiots, two imbeciles, and three patients deeply demented. No uneasiness seems in these cases to have followed the process. Dr. Sievers, among other contributions to this curious subject, refers to the papers of Alt (*Berl. klin. Wochensch.*, 1888, Nos. 26 and 27) and of Boas (No. 31 same journal); and in the *Archives de Neurologie* (VII. 1884) the reader will find an interesting paper on "Merycism," by Drs. Bourneville and Séglas.

HIGHWAY IMPROVEMENT.

IN an address on highway improvement delivered before the Carriage Builders' National Association at Syracuse, N.Y., recently, Col. Albert A. Pope of Boston said that the best roads in the world to-day are those of England, France, and Germany, their excellence being due to the fact that those countries were the first to awaken from the long sleep of the dark ages, and that the growing rivalry between them necessitated attention to their roads, for the proper prosecution of both their military and their mercantile interests. In each country the roads early came under the national supervision, the results of which are seen in the most splendid highways in existence, costing the least to maintain, and in every way the most satisfactory and economical for those who use them.

No country has a greater road mileage in proportion to the population than the United States, according to Col. Pope; but while, with characteristic American push and hurry, the more extensive means of communication and intercourse have been provided, we

have suffered the consequence of a lack of any general system of public policy covering the location, construction, and maintenance of roads. American roads are far below the average: they certainly are among the worst in the civilized world, and always have been, — largely as a result of permitting local circumstances to determine the location, with little or no regard for any general system, and haste and waste and ignorance in building.

Among the benefits attendant upon the proper construction and maintenance of roadways, the speaker mentioned the following. Good roads attract population, as well as good schools and churches, and they improve the value of property; so that it is said a farm lying five miles from market, connected by a bad road, is of less value than an equally good farm lying ten miles away from market, connected by a good road. A larger load can be drawn by one horse over a good road than by two over a bad one. Good roads, consequently, encourage the greater exchange of products and commodities between one section and another, besides being of great value to railroads as feeders.

As one solution of the road problem, Col. Pope outlined the following plan. A commissioner of highways might be provided for, in the Agricultural Department, with a corps of consulting engineers, and suitable appropriations made for the prosecution of a general supervising work. Under the charge of this commission, full systems of maps should be prepared; based largely, perhaps, upon the working of the state and county boards, showing more or less completely, as circumstances would permit, the highways of the country.

For co-operation with this central bureau, and the prosecution of the work in the most thorough and practical way, each State should have its highway commissioner, charged with the highest interests of the State in the way of maintaining its system of roads under the most approved methods and for the general public welfare. Then the best practical results could probably be attained by the division of the State into highway districts, consisting of counties, or perhaps townships, each of which should have its overseer, in full charge of the opening and construction of new roads in his district and the proper maintenance of all, responsible for the expenditure of the regular appropriations for these purposes. These districts could then be divided into smaller ones under sub-overseers.

The importance and the value to any country, any section, and every citizen from the highest to the lowest, whether tax-payers or tramps, of well-constructed and properly maintained roads, are not easily estimated, but clearly are greater than of many affairs which are continually receiving the time and attention of the people in their homes, counting-rooms, public meetings, and legislative halls. It is a matter to be considered side by side with our splendid and always improving system of public education, the assessment of our tariff duties, or the appropriations regularly made for river and harbor improvements.

R. A. PROCTOR MEMORIAL FUND.

THE English magazine *Knowledge* calls attention to the announcement in many of the London papers stating that the monetary affairs of the late Mr. Proctor have now been wound up by his administrator, and that the total sum available as provision for his widow and the seven children (four of whom are daughters, and one a little boy, a permanent invalid from hip-disease) is under £2,000. To the small income which this will produce there is to be added £100 per annum from the Civil List; which is, however, granted only during Mrs. Proctor's life.

The £2,000 above referred to as the value of the residue after the settlement of all debts, some of which were waived, has been produced by the sale of Mr. Proctor's copyrights. Mrs. Proctor and the eldest daughter have, under a satisfactory arrangement with Messrs. Longmans, retained a small interest in the works now in Messrs. Longmans' hands, including the "Old and New Astronomy," which will shortly be completed. But the value of the interest retained (calculated on the basis of the sum given for the remainder of these copyrights by Messrs. Longmans) is included in the £2,000, as is also the money received for all the other copyrights, which were purchased on liberal terms either by Messrs. Chatto & Windus or by Messrs. W. H. Allen & Co.

The money given immediately after the death of the late Mr. Proctor by the Royal Literary Fund, and the proceeds of five lectures given by Mr. W. Lant Carpenter, as well as gifts from other friends, have enabled the family, who, owing to the suddenness of Mr. Proctor's death, were absolutely without resources, to weather through the first year. But these funds have now been exhausted, and a committee is in course of formation which the many friends of Mr. Proctor are invited to join. Subscriptions to the R. A. Proctor Memorial Fund, and communications, will be received by Mr. E. G. Mullins, manager of the City Bank, Bond Street Branch, London, England.

Since the date of the announcement in the daily papers, the following subscriptions have been received: William James Adams, Esq., 10s. 6d.; "E. A.," £2; Mrs. Barrett, £2; "J. A. B.," £1; Andrew Chatto, Esq., £5; H. P. Curtiss, Esq., £5; W. Henry Domville, Esq., £10; "W. D.," £2 2s.; "A Friend," £1; Professor Grant, £2 2s.; Lord Grimthorpe, £20; D. Hodgson, Esq., £1; Edmund Johnson, Esq., £1 1s.; Messrs. Longmans, Green, & Co., £20; J. Mott Maidlow, Esq., £3 3s.; Miss Martin, £2; G. H. Mellor, Esq., 10s.; R. Hay Murray, Esq., £5; "Planetoids," 10s. 6d; T. Shaw Petty, Esq., £10 10s.; Oscar Rohde, Esq., £3 3s.; T. C. Sandars, Esq., £5; William Schooling, Esq., £2 2s.; F. Stevens, Esq., £1 1s.; Col. N. G. Sturt, £5; Mrs. Stowe, 5s.; Walter Weblyn, Esq., £1 1s.; Philip Williams, Esq., £1: total, £113 1s. Others have promised.

A NEW METHOD OF PREPARING FLUORINE.

A NEW method of preparing fluorine has been discovered by M. Moissan. This discovery is the outcome of the success which has attended M. Moissan's efforts to prepare anhydrous fluoride of platinum. During the process of his memorable work upon the isolation of fluorine by the electrolysis of hydrofluoric acid containing hydrogen potassium fluoride, one of the most remarkable phenomena noticed was the rapidity with which the platinum rod forming the positive electrode was corroded by the action of the liberated gaseous fluorine. It was surmised that a fluoride of platinum was the product of this action, but hitherto all efforts to isolate such a body have proved unsuccessful. In fact, for a reason which will be discussed subsequently, it is impossible to prepare platinum fluoride in the wet way. M. Moissan has, however, as stated in *Nature*, been enabled to prepare anhydrous platinum fluoride by the action of pure dry fluorine itself upon the metal. It was found at the outset, that, when fluorine is free from admixed vapor of hydrofluoric acid, it exerts no action whatever upon platinum, even when the latter is in a finely divided state, and heated to 100° C. But when the temperature of the metal is raised to between 500° and 600° C., combination readily occurs, with formation of tetrafluoride of platinum and a small quantity of protofluoride. The moment the gas is mixed with a little vapor of hydrofluoric acid, the action is immensely accelerated, and then occurs readily at ordinary temperatures. The same rapid action occurs when platinum is placed in hydrofluoric acid saturated with free fluorine, which accounts for the disappearance of the positive terminal during the electrolysis.

In order to prepare the fluoride of platinum, a bundle of wires of the metal is introduced into a thick platinum or fluor-spar tube, through which a current of fluorine gas from the electrolysis apparatus is passed. On heating the tube to low redness, the wires become rapidly converted to fluoride, when they are quickly transferred to a dry stoppered bottle. If the operation is performed in a platinum tube, a large quantity of fused fluoride remains in the tube. The tetrafluoride of platinum (PtF_4) formed upon the wires consists either of fused masses of a deep red color, or of small buff-colored crystals resembling anhydrous platinum chloride. It is exceedingly hygroscopic. With water it behaves in a most curious manner. With a small quantity of water it produces a fawn-colored solution, which almost immediately becomes warm, and decomposes with precipitation of hydrated platinic oxide and free hydrofluoric acid. If the quantity of water is greater and the temperature low, the fawn-colored solution may be preserved for a few minutes, at the expiration of which, or immediately on boiling the solution, the fluoride decomposes in the manner above indi-