in other forms of interstitial pneumonia. In all these cases it will be remembered that the changes in the lymphatics are very marked. How they are interdependent it is somewhat difficult to say, but the fact remains that the two conditions, *i.e.* slight catarrhal proliferation, altered shape of the epithelial cells, with some degenerative changes and irritation of the lymphatics, especially of a subacute or chronic character, are almost invariably co-existent.

In cases of catarrhal pneumonia, especially when of a specific type, interstitial changes invariably ensue, and if the process become sufficiently chronic, the interstitial changes give rise to so great an increase in the amount of fibrous tissue, that it assumes the position of primary importance in the eye of the observer. This is especially the case in such diseases as chronic tubercular catarrhal pneumonia, and it appears from what one can observe in chronic pleuro-pneumonia to be the case here also.

(*To be continued.*)

AN EPIZOOTIC AMONG PIGS IN FRANCE.¹

By MM. RIETSCH, JOBERT, and MARTINAUD.

SINCE the month of July last the piggeries of Marseilles and the neighbourhood have been ravaged by an epidemic, which the veterinarians do not seem ever to have observed here. According to our information it has been imported by pigs coming from Oran and landed at Marseilles on the 25th of June. The first cases were declared among the African pigs on the 10th July, but our researches could not be commenced until the first days of August.

In the great majority of cases during summer the affection was essentially an intestinal one. The duration is generally ten to twelve days after the first symptoms of the malady, rarely several weeks, sometimes three or four days only. Almost always it terminates in death. Some of the animals have diarrhœa, some are constipated; fever is not constant; cough is still less frequent. One observes some feebleness of the hind limbs, whence an uncertain and staggering gait. Appetite persists often up to the end. The skin may be red in places, especially on the limbs and on the ears. Pigs of more than a year old present a much diminished receptivity; the African race offers a very great resistance.

At the autopsy it is not rare to find the kidneys, the liver, the spleen, and even the lungs altogether healthy in appearance; but frequently one observes on the liver some spots, and on the kidneys characteristic punctiform hæmorrhages. When the affection has been of long duration, the digestive tube is the seat of characteristic and serious lesions. The stomach has its walls ulcerated, the small intestine is punctated; at from 0·20m. to 0·25m. from the ileo-cæcal valve, one observes ulcerations extending into all or some of the patches of Peyer, which are the points of origin. The valve is very often itself ulcerated. The ileo-cæcal appendage, the cæcum, and the colon present some ulcerations, either circular, when they are already old, or

¹ Translated from *Comptes Rendus de l'Acad. des. Sc.*, tome 106, pages 296 and 1096.

under an acuminate or furuncular form, like the entero-colitis of hot countries.

These ulcerations attain up to 7 or 8 cm. in diameter and even more; they form veritable rings of a grey aspect, friable, and contracting notably the calibre either of the large or of the small intestine.

At the level of these ulcerations, when they have invaded the whole of the bowel, the mucous crypts have disappeared, the closed follicles are opened, or destroyed in part or entirely.

In the rectum it is easy to follow the development of the ulcers. At certain points visible to the naked eye one sees in the normal condition a depression of the mucous membrane, an actual fossette, at the bottom of which a microscopic examination reveals the presence of one or several closed follicles.

This fossette was formerly taken by Bohm for the opening of ducts of closed follicles, which he considered like utricular glands, furnished with an opening above. This is an error. In this fossette open some utricular glands, situated above the closed follicles, and larger than the glands of Lieberkühn. In the dead pigs that we have examined, one found in these points no trace either of the glands or of the closed follicles, and the cavity which they formerly enclosed contained a whitish caseous material, formed of bacilli and of *débris* of epithelium of the walls of the glands, and of follicles.

The muscular tissue itself does not escape. Further, it is seen that this cavity has become the point of departure of more or less extensive ulcerations. In pigs that have been long ill we have observed some ulcerations on the inferior face of the tongue, and on the inner surface of the lips. The reaction of the stomach in these cases, and also that of the intestine, is decidedly alkaline.

Inoculations in gelatine, made from the kidneys, spleen, and liver, have never given rise to any growth. The pulp of these organs introduced under the skin of mice and of rabbits did not produce any effect. With the lungs the negative results have been a little less frequent, at times the animals died at from the seventh to the tenth day. With the *fæces*, the intestinal mucous membrane, and the ulcerations, we have constantly obtained colonies of the same bacillus, often pure or almost pure; a similar result has also been given on several occasions by the lung, rarely by the spleen. This bacillus is motile; its pure cultures inoculated under the skin of mice with the platinum needle do not ordinarily kill these animals until after ten days, without oedema at the point of inoculation, as is the case also with the pulp of the organs. Rabbits have not shown themselves very sensitive. Of ten adult mice inoculated by the mouth, two only died after fifteen days. Ten young mice treated in the same manner all died, the first after thirty hours, the others from the fifth to the thirty-third day. A young pig received on several occasions some pure culture in its food; it died fifty-four days after the first, and twenty-two days after the last, administration of the culture. Its intestine showed the characteristic ulcerations.

MM. Cornil and Chantemesse have recently studied a contagious pneumonia of pigs in the neighbourhood of Paris, and they have also been engaged with the epidemic at Marseilles. They have concluded that these two maladies and that of Löffler and Schütz are identical, attributing the difference of symptoms to diverse methods of the

introduction of the virus. We have during the last weeks observed at Marseilles a certain number of cases in which the pulmonary lesions predominated, but these were very exceptional during the warm season.

Thanks to Mr Salmon, and Dr Frank, assistant to Professor Koch, we have been able to study comparatively the microbes of the three maladies. Up to the present we have arrived at the following results:—

Culture in gelatine by puncture.—At 18°–19° C. the microbe of Marseilles shows a notable development after twenty-four hours; at that time the puncture of Hog-cholera is hardly visible to the naked eye; that of *Schweineseuche* does not become visible until after forty-eight hours. The differences are maintained in this order, and after some days the Marseilles bacillus produces an opaque streak, yellowish-white to the naked eye; with a lens it is brown by transmitted light, and opaque white with a bluish tint by reflected light. The streak of the *Schweineseuche* organism is much more clear, thinner, less opaque, and composed of small almost colourless colonies. Hog-cholera is intermediate between the preceding two.

Culture in gelatine on plates.—The same inequality in development. Colonies but slightly characteristic, as is frequently the case with those that do not liquefy the gelatine; they show, however, some differences to which we shall return.

Cultures on serum, agar, agar-glycerine.—At 37°, 30°, 20°, and 16° C., here again multiplication is more rapid for the bacillus of Marseilles than for that of America. The coating formed by the first is white, opaque, thick, with bluish and red reflections, which are absent from the thinner and less transparent layer of Hog-cholera, that of Schütz being still more thin and hyaline.

Culture on potato by parallel scratches made on the same slice.—The coating thick, projecting, opaque, and yellowish for the Marseilles bacillus; layer much thinner for the American bacillus; development almost nothing for the German bacillus. These cultures could not be confounded with the cultures so characteristic of the bacillus of typhoid fever, to which that of the bacillus of the swine-pest of Selander has some resemblance.

Non-peptonised bouillon, prepared from the intestine of the calf.—No turbidity after three days at 37° with the bacillus of Löffler and Schütz. This bacillus, then, seems to require a much greater concentration of nutritive principles than the other two; for in the same conditions the Marseilles bacillus gives in twenty-four hours a turbid liquid with a surface pellicle and a deposit at the bottom, while the microbe of Salmon furnishes a liquid much less turbid.

Peptonised Bouillon.—At 20°, obvious turbidity in twenty-four hours with the Marseilles bacillus; much less turbidity with that of Hog-cholera; slight turbidity after forty-eight hours only with the Löffler-Schütz bacillus; at 37° the two first cultures are troubled in sixteen hours, the third remains limpid; after twenty-two hours it is turbid.

Inoculations.—These cultures, very unequally rich in bacteria, have served to inoculate rabbits.

At 4 P.M. subcutaneous injection of half a syringe of Pravaz of each liquid to two rabbits (thigh). The following morning at eight o'clock the two rabbits inoculated with the German bacillus are found

dead, with œdema at the point of inoculation ; the four others appear well, save that the two inoculated with the Hog-cholera present a tumour at the point of inoculation ; no local reaction with the bacillus of Marseilles. On the fourth day at 1 P.M. one of the Hog-cholera rabbits died, and the second is found dead on the fifth day at 8 A.M. On the sixth day one of the Marseilles rabbits dies with convulsions at 11 A.M. ; the other is still alive (after twenty-one days) ; it is thin and not feeding well.

The bacilli of Marseilles and of America are very motile, *the German organism is not*. In the same cultures the American bacillus is shorter and thinner than the Marseilles organism ; the German bacillus is still more slender and shorter.

We have here, then, three distinct organisms, no one of which is identical with the bacterium studied by Selander, which has caused the epizootic of Sweden and Denmark, and of which the culture on potato does not differ from that of the bacillus of typhoid fever.

THE BACTERIUM OF SWINE PEST.¹

By Staff-surgeon Dr SELANDER, Stockholm.

SINCE last autumn there has raged in Sweden and Denmark a very infectious and malignant disease of swine. It is known here as "swine-diphtheritis," there as "swine-pest." That it is identical with the German swine-plague (*Schweineseuche*) might be inferred from, among other things, the fact that, when the German Government had issued a prohibition against the importation of pigs from Sweden and Denmark, Dr B. Bang was sent from Copenhagen to Berlin to counteract the edict, bringing with him cultures of the micro-organism of swine-pest, which he delivered to the Imperial Sanitary Department to show the identity of the two swine diseases. These cultures were given to me for inspection. Dr Bang has been good enough to place at my disposal several of his cultures, and Director Köhler has very kindly given me permission to appeal to the record of my experiments which I delivered up to the Archives of the Imperial Sanitary Department on the 3rd of February.

After my return from Sweden I convinced myself thoroughly, by the inspection of material which Regimental Veterinary Surgeon Florman of Malmö had given to me, that the Swedish swine-plague is caused by bacteria which are identical with those that I inspected in the Imperial Sanitary Department, and which have really nothing whatever to do with the German swine-plague. Dr Bang has also doubts regarding the identity of both diseases, for in a small pamphlet he says—"In diphtheria bacteria are to be found which have a great similarity to these of swine plague, but I believe it will be shown by continued inquiry that although very similar they are essentially different in nature."

The culture with which I experimented was labelled—"Diphtheritis, spleen of rabbit 20/11/87." According to information obtained from Dr Bang, a rabbit was subcutaneously inoculated on the 18th November with spleen pulp juice taken from a pig killed while suffer-

¹ Translated from the *Centralblatt für Bacteriologie und Parasit.* III. Band, No. 12, 1888.