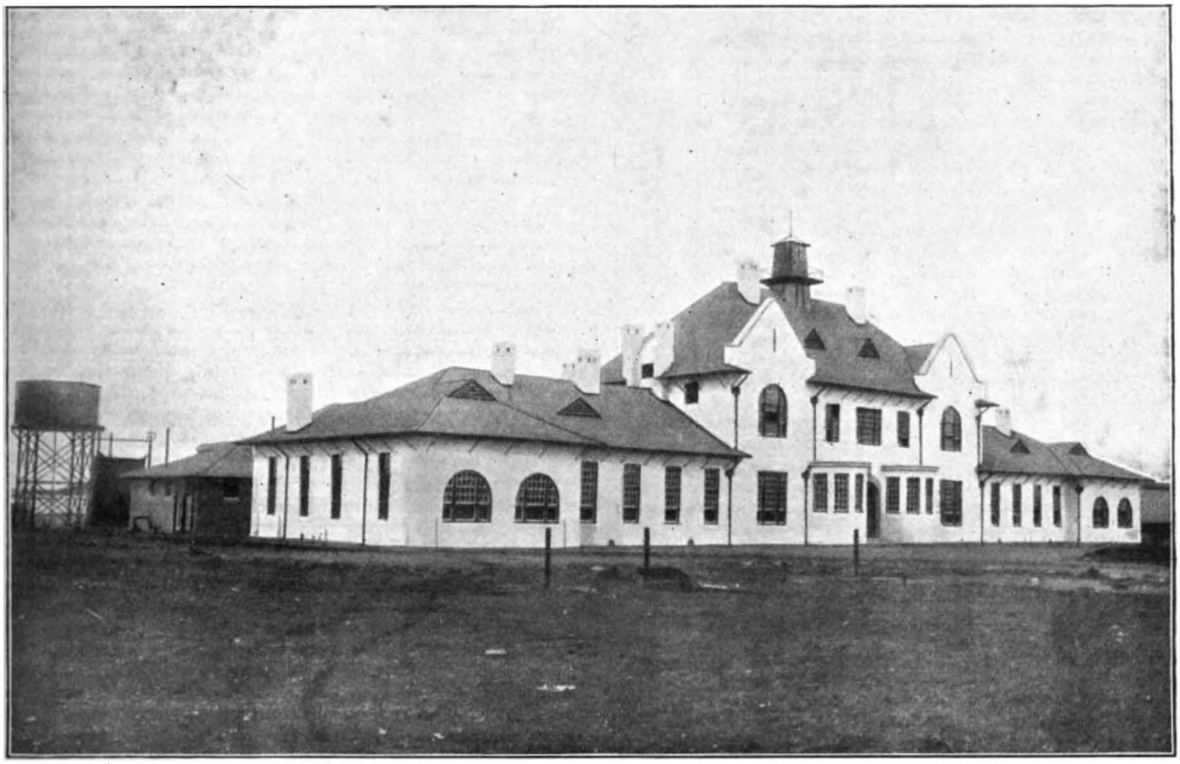
VETERINARY RESEARCH IN THE TRANSVAAL.

THE present veterinary bacteriological laboratories of the Transvaal Department of Agriculture are situated eight miles to the north of Pretoria, on a farm comprising altogether some 2000 acres of land. They were ready for occupation on October 1, 1908, but, before this time, research in South Africa had to be conducted under less favourable conditions. In 1898, a three-room building of wood and iron lined with brick formed the laboratory, and the equipment of this was "sadly deficient." Calf vaccine lymph was made here, but the preparation was suspended when the late war broke out in the latter part of 1899. In 1901, the laboratory, after having been used during the war as a stable, had now added to it a rinderpest station for the manufacture of serum, and by 1905 it had grown into a heterogeneous collection of buildings, mostly constructed from old wood and iron, from buildings destroyed during the war. Not only were the buildings unsuitable, but they were also unhealthy, enteric fever constantly occurring among the staff, so that in 1906 it was decided to establish the present laboratories.

It may be of interest to consider the work done in these earlier years.

In 1896, rinderpest devastated S. Africa, thousands of cattle dying, and preventive inoculation was introduced. In 1898, at the old laboratory at Daspoort, calf vaccine lymph was made to vaccinate the Kaffirs when a serious outbreak of small-pox took place among them. In 1901–3, rinderpest serum was made in the Daspoort laboratory. In 1905, experiments were made which eventually resulted in the discovery of a serum for inoculating mules against horse-sickness. In 1902, at the close of the war, the introduction of East Coast fever, a new and devastating disease, took place; the disease was, however, at once studied, and means devised for preventing its spread.

A consideration of this work, then, shows what a practical character there had always been in the research work in the old laboratory, and we shall see that this is equally true of the new ones.



Front View of the Veterinary Bacteriological Laboratories at Onderstepoort, Pretoria.

The present building comprises some three dozen different rooms, suitably fitted, each for its own particular object.

In the pathological laboratory, 1362 specimens were reported on in one year, and here is studied the histological pathology of various diseases, especially horse-sickness, East Coast fever, and other piroplasmoses.

In the zoological laboratory, the study of the entozoa of the sheep is a matter of great practical importance to the sheep-farmer. In another room, mallein, tuberculin, quarter-evil vaccine, and pleuro-pneumonia cultures are prepared. Three rooms are reserved exclusively for the preparation of rabies vaccine. In yet another room, the vaccine for blue-tongue and a horse-sickness serum are prepared. Of the former, 200,000 doses, and of the latter 1000 tubes, are sent out annually.

An entirely separate building is used for the preparation of calf lymph; three-quarters of a million tubes have been sent out into all parts of S. Africa during the last two years. The laboratory is evidently splendidly equipped with its centrifugal room, still room, serum store, animal room, operating theatre, post-mortem hall, museums, lecture rooms, &c., but we note one important omission, viz., a library, of which there is no account.

This, the commemoration publication, besides the historical account of the laboratory which we have abstracted, contains five papers. The first is by Dr. Arnold Theiler, the Government veterinary bacteriologist, and is on the very interesting and important subject of "Immunity in Tropical and Sub-tropical Diseases."

He gives an excellent and concise statement of the whole question. This article is worthy of a place in a commemoration number, but as regards the other papers, while in themselves good pieces of research work, there is no special reason for their appearance here. We miss any general account of the animal diseases of S. Africa, rinderpest, horse-sickness, heart-water, and so on; and we should have welcomed a general account and summary of the piroplasmoses and the mortality due to them. Nor do we find any general account of ticks, and the methods taken to combat them. We should have welcomed also a summary of the state of our knowledge on animal entozoa and their economic importance.

The volume presents evident signs of haste in issue from the press. Some of the papers teem with misprints, some are characterised by an almost complete absence of punctuation, while again, in many instances, the language used and the construction of the sentences are so slip-shod as to render them almost meaningless. The volume has a number of excellent illustrations of the staff of the various departments, but the glazed paper on which the book is printed is very trying to the eyes. We may note, too, that on the title-page and cover the laboratories are called "the Veterinary Bacteriological Laboratories," though in the introductory chapter they are termed the "Veterinary Research Laboratories," a better term, we think, for, as we have seen, the work is by no means confined to bacteriology. The laboratory has, we feel sure, under its distinguished head a great future before it, and we venture to offer our heartiest congratulations on its new career.

HALLEY'S COMET.

A LARGE number of publications dealing with observations of Halley's comet have appeared during the last week or two, and from them we extract a few of the more important results.

Prof. Barnard, in No. 4431 of the *Astronomische Nachrichten*, deals with the observations he made during the time when the comet was at its least distance from the earth. The observations in the early morning were greatly interfered with by clouds and smoky skies, but the conditions were better after May 17. Prof. Barnard pays particular attention to the observations made during the early mornings of May 18 and 19, and directs attention to a bright pillar of a luminous character seen near the south-eastern horizon. The main feature was the rather broad beam of light, resembling the beam of a searchlight, which stretched obliquely from the eastern horizon to the Milky Way in Aquila, a length of 107°. Between 2h. and 3h. a.m. this was very conspicuous, and Prof. Barnard describes its dimensions and position with respect to neighbouring stars, showing that it was considerably inclined to the ecliptic. This is evidently the phenomenon referred to generally as the tail, but to the observers at Yerkes there appeared the other mass of luminosity, apparently quite separate from the beam, that extended to the south-eastern horizon. Not having been able to observe the comet regularly prior to August 18, Prof. Barnard hesitates to make a definite proposition, but he suggests that this phenomenon was the main tail, whilst the bright beam was only a separate streamer. It involved the ecliptic, and observations on August 19 showed it to be a real phenomenon connected with the comet; at 2h. 20m. a.m. it showed a more definite upper edge, bounded, roughly, by the stars β and γ Piscium and η and ζ Aquarii, and it joined the brighter beam near γ Pegasi. Observations made earlier in May showed several streamers, of which the long bright beam seen on May 18 may have been one, and they also indicated that on May 18 the breadth of the main tail should have been much greater than the beam actually was. Should Prof. Barnard's surmise prove correct, the evidence for the earth's passage through the tail about May 19 would be greatly strengthened.

Curious sky effects during May 19 were also recorded, and were unusual enough to suggest a connection with the comet. At noon, and for several hours afterwards, a horizontal bar of brilliant prismatic colours, with the red uppermost, was seen in the south at an altitude of about 20°, and around the sun was a prismatic halo of 22° diameter.

After its passage, the comet was a brilliant object at Williams Bay, and to Prof. Barnard "it far exceeded all expectations as a spectacular display." On May 26 the tail could be traced to a distance of 63°, and for 25° of its length was very conspicuous. On May 20 the head was about ½° in diameter, and appeared like a nebulous star with a yellowish colour, but on May 24 it was recorded as bluish-white. On this date, however, there was apparently a double nucleus. To the naked eye and with opera-glasses there appeared a nucleus of sensible diameter and of a beautiful bluish-white colour, whilst in the 5-inch finder this was seen to be but an intense nebulosity surrounding a smaller, well-defined nucleus of eighth or ninth magnitude, and of a decidedly yellow colour. Thus naked-eye and telescopic observations on that date would refer to two different nuclei of opposite colours. For several nights about May 27 the tail appeared to diffuse northwards as high as Jupiter, and on a photograph taken on June 6 it is seen that the comet had discarded its tail, which was drifting away from it, and had formed a new one at a slightly different position-angle.

In the same journal Herr Sykora records an observation of the comet on the solar disc at 20·95h. (M.T. Tashkent) on May 19. A 13-cm. image of the sun was projected, and the comet was seen, like a finger-mark on paper, with a diameter of 1 cm.; during the three minutes that observations were not prevented by clouds, the relative motion of the supposed cometary image was about 0·5 cm.

Dr. Hartmann also contributes a note on the measures of the surface brightness of the comet made at Sonnwendstein. First he suggests that, instead of such indefinite terms as "bright," "faint," &c., a definite scale of standardised surface-brightnesses should be employed, the standard unit being referred to a definite illumination produced by a standard lamp under defined conditions. This unit is called a *phos* (*ph.*), a thousandth part of it a *milliphos* (*mph.*), a millionth part a *microphos* (*mkph.*); for the multiples the prefixes *kilo-* and *mega-* are suggested. Then he describes a method of using the photometer where the image of the object is seen through a hole pierced in a mirror fixed in the focal plane of the objective. By measured variations of the source of illumination, the surface of the mirror is brought to the same brightness as the focal image of the object. Again, by using suitable screens, the different radiations from any object may be directly compared, and for Jupiter Dr. Hartmann finds a range from red to green of 27 to 68 mph. (milliphos).

The results obtained by this method, comparing various parts of the comet on different dates, are very interesting. They are too numerous to give fully here, but one or two examples will serve to illustrate them. May 23, 9h. 2m. (M.E.T.), mean brightness of nucleus and the surrounding area of 22″ diameter: white, 220 mkph., yellow, 180 mkph., green, 410 mkph.; 9h. 27m., nucleus alone: white, 620 mkph., red, 360 mkph., orange, 630 mkph., yellow, 730 mkph., green, 1350 mkph. On May 26 a number of observations, including the nucleus, the area surrounding it, and the tail, were made, and for the tail, at 3m. 42s. in R.A. behind the head, a value of 0·22 mkph. was found. For comparison, Dr. Hartmann found on May 31 that the surface brightness of the Ring Nebula was 1·2 mkph., and for the inner space 0·6 mkph.; a bright area of the Milky Way, in Cygnus, gave a value of 0·05 mkph.

M. Antoniadi suggests that the tail, seen by Prof. Eginitis, turned towards the sun on May 20, was only a minor sheath; his observations, and those of Dr. Hartmann and others, show the tail as a sickle-shaped object with its *convex* side turned sunwards.

That the comet was a fine spectacle at Tokio is shown by a table giving the magnitude, length of tail, &c., as seen by Mr. K. Saotome, of the Tokio Observatory, reproduced in the *Astronomische Nachrichten*.

In No. 4433 of the same journal Drs. Cowell and Crommelin discuss the different elements published by various calculators for the 1910 osculation. These agree fairly well except in the value given for the mean motion (μ), in which there are grave differences. M. Iwanow adopted Pontecoulant's value for 1835, which the Greenwich observers have shown to be 0·05″ in error, and should therefore have arrived at a perihelion date differing from theirs by about one month. That this is not so indicates that some serious error crept into his calculations, and it is suggested that, as the difference is so important from a gravitational point of view, the discordance should not be allowed to remain unproved. Mr. Merfield and Messrs. Crawford and Meyer appear to have deduced their value of μ from the recent observations alone, a procedure which Drs. Cowell and Crommelin deprecate as untrustworthy; and the value obtained by the Berkeley computers is enormously in error. According to the Greenwich calculators, the value for 1910 is $\mu = 46{\cdot}6747''$, but this cannot yet be accepted as definitive.