NOTES ON SOME GERMAN UNIVERSITIES.

By WALTER K. SIBLEY, M.B., B.C.CAMB.,

II.—THE UNIVERSITY OF BERLIN.

(Continued.)

The Physiological Institute.—Professor du Bois Reymond.

THE Physiological Institute, a red-brick building situated at the corner of the Neuen Wilhelmstrasse and the Dorotheenstrasse, contains four departments: (1) Microscopic and Biological, under Professor Fritsch; (2) Chemical, under Professor Kossel; (3) Special Physiological, under Professor Gad; (4) Physical and Physiological, under the director, Professor du Bois Reymond. The building contains two lecture theatres, one seating 250 persons which is used by the director, and one with accommodation for 65 students which is used by his assistants. On the ground floor are the director's private workroom and laboratory, and the physical department with a laboratory for six workers and a private workroom; there is a special instrument room for physico-physiological apparatus. On the first floor is the microscopical department with twenty places, a large aquarium for sea animals, a microscopical gallery, and an injection room, together with the zoological and comparative anatomy collections. On this floor there is also a special photographic department under the direction of Professor Fritsch. On the same floor is the chemical department under Professor Kossel, with a laboratory fitted for thirty workers, which every summer term is used by seventy or eighty students; moreover, a weighing room and a spectroscopic room. The vivisection department, with six places, is on the ground floor, and is provided with a demonstrator's table and a gallery. The animals are kept in the cellars. In the summer the frogs are kept in a large basin in the garden. In the cellars are also two bacteriological chambers, together with heating apparatus. The lectures and courses are very numerous. Professor du Bois Reymond lectures twice a week in summer on the first part of physiology, and in winter on the second part of physiology, with experiments four days a week. Professor Fritsch teaches histology, comparative anatomy and microscopic work, Professor Kossel, medical chemistry with experiments, and Professor Gad gives special courses on respiration, speech, and experimental work. Several special courses are also held by the other assistants.

Professor du Bois Reymond was born in Berlin in 1818, and was a pupil and assistant of Johannes Müller. In 1843 he published his work *On the So-called Frog's Current and the Electrical Fishes*, with a dissertation entitled, "*Quæ apud veteres de piscibus electricis extant argumenta*." In 1858 he succeeded Müller in the Chair of Physiology. In 1848 appeared the first volume of his chief work, *Experiments on Animal Electricity*. A number of further essays on electro-physiology followed. As Secretary to the Academy of Science, since 1867, he has had to deliver a number of lectures which have been recently published by Seit and Co., of Leipzig. From 1859 to 1877 he edited the *Archives of Anatomy and Physiology*, in conjunction with Reichart. Since 1877 he has been sole editor of the *Archives of Physiology*. In spite of his age, du Bois Reymond is still a most energetic worker, and in addition to his distinction as a physiologist, he is a leader of philosophical thought in Germany. As a representative of natural science, du Bois Reymond is considered to base his philosophical theories upon definite knowledge; in reality, however, they appear to rest on an absence of definite knowledge, that is on agnosticism. "Ignoramus" is his invariable answer to all fundamental problems, and he often carries this profession of present ignorance still further by adding "Ignorabimus." Since his famous paper at the Naturforscherversammlung of 1872, he has employed himself in marking out the boundaries of our knowledge in various directions, putting up a *Weltrathsel* whenever, in his opinion, the limit was reached. From one *Weltrathsel* he has advanced within a few years to seven, so that at last, with Hæckel one looks on with concern, wondering where he is going to stop. At the same time it would be interesting to know from what place, within the boundaries, the knowledge comes which has enabled the Professor thus to formulate his "Ignorabimus." A

good feature of du Bois Reymond's system is its usefulness to the practical scientific student. Lange says somewhere, in speaking of modified materialism, that it may serve as a *Maxime der wissenschaftlichen Detailforschung*, words which exactly describe the possibility of usefulness of all philosophical agnosticism. As the physicist would never have got on if he had puzzled his head too much about the metaphysical meanings of force, matter, attraction, etc., so all along the line of scientific inquiry there are certain disturbing elements both under the stars and beyond them which must necessarily be excluded when special progress is to be made.

THE PATHOGENIC MICROBE OF DISTEMPER IN DOGS, AND ITS USE FOR PROTECTIVE INOCULATION.

By EVERETT MILLAIS.

[FROM THE PATHOLOGICAL LABORATORY OF ST. THOMAS'S
HOSPITAL.]

DISTEMPER is a disease which attacks the whole dog tribe before maturity, as a rule, and, in my opinion, is due to a bacillus whose identity I believe I have established. Distemper is a specific infectious disease (one attack confers immunity); and as with other zymotic diseases, so here, some animals appear to be naturally immune against it.

After exposure to infection an incubative period of variable duration follows; the symptoms which then appear are dulness, loss of appetite, and fever; the nose at the same time becomes hot and dry, and a husky cough, constipation, or diarrhoea are commonly present. The eyes and nose now discharge freely, the fluid being at first watery but purulent later on. Finally, the animal emaciates rapidly, while the coat becomes hard and staring. In about three weeks, should no complication ensue, the dog begins to regain condition and recovers. Unfortunately, complications generally do supervene, for few cases occur in which bronchitis is not a symptom. Pneumonia carries off a large number of those attacked, whilst jaundice, fits, and diarrhoea account for the death of many others. As sequelæ we find chorea and paralysis.

The mortality is very high, and 90 per cent. has been given as the loss from this disease. It is nevertheless doubtful whether the mortality is really so high, as it is a notorious fact that mongrels are peculiarly exempt from malignant distemper. In well-bred dogs, however, 90 per cent. fairly represents the average of fatal cases.

To give a slight idea of the fatal effects of the disease on highly bred canine stock, I will give but one or two examples, although these might be increased by hundreds.

TABLE I.—*Distemper contracted at Shows.*

Show.	Date.	Owner.	No. Shown.	Deaths.	Ultimate Damage at Home.
Crystal Palace	1887	Mr. A.	2	1	23 deaths.
Barn Elm ...	1888	Mr. A.	2	1	15 deaths.
Brighton ...	1889	Mr. B.	1	1	13 deaths.
"	"	Mr. C.	2	1	Entire kennels attacked.
"	"	Mr. D.	2	2	17 deaths.
Crystal Palace	"	Mr. E.	3	0	6 deaths.
Total ...	—	—	12	6	74 deaths.

Such a table will give a small notion of the frightful annual loss occasioned by exhibiting puppies for the first time at our principal dog shows.

Experiments Undertaken to Discover the Pathogenic Micro-organism.—In the beginning of June, 1889, I inoculated gelatine tubes with the mucus from the nose of a collie suffering from distemper complicated by pneumonia. Four tubes were inoculated, and in three days a growth of a similar character was apparent in each, the growths liquefying the gelatine. Shortly after this Mr. Sewell procured for me a puppy suffering from pneumonic distemper. From this dog further tubes were inoculated with the discharge from the nose, and in a like period similar growths were to be seen as those grown from the collie. This puppy was then destroyed.

A drop of each growth, stained with fuchsin and examined with a Zeiss D, showed three micro-organisms, namely, two bacilli, which I will distinguish as A and B. In addition, micrococci were present in far larger quantities than either of the bacilli. The

organs of the puppy that came from Mr. Sewell were also examined, after being hardened in alcohol and stained by Gram's method. In addition to the lungs and trachea, the liver, spleen, and kidneys were found to contain similar micro-organisms. From the condition of the organs and the fact that they contained in large quantities the same micro-organisms as had been observed in the gelatine growths, I was led to test these growths by experiment, in order to prove whether one of the micro-organisms might not be perchance the active agent producing the disease. I therefore applied to a gentleman to do the inoculations for me, choosing as subjects two of my own very inbred basset hounds.

Puppy No. 1 was inoculated by syringing the nasal fossæ with the growth contained in a gelatine tube, and puppy No. 2 was immediately after the inoculation placed with No. 1. In eight days both puppies were down with the disease, and afterwards showed signs of pneumonia, No. 2 having undoubtedly taken the disease from sniffing the nose of puppy No. 1.

No. 1 was destroyed on the tenth day from the first symptoms, and its organs were found to be filled with all three micro-organisms, just like the puppy first examined. This fact seemed to prove that the growths contained the pathogenic microbe of distemper, and as the disease had been produced with tubes of the eighth generation, I now tried to isolate each organism.

No difficulty was found in separating out and obtaining pure cultures of bacillus A and micrococci by means of ordinary plate cultivation; both liquefy gelatine. The bacillus produces an opaque liquefaction, a yellowish scum forming on the surface of the tube; whereas the micrococci grow with a clear liquefaction, forming a thick deposit of a chalky appearance at the bottom of the tubes.

Two puppies, No. 3 and 4, were each inoculated with one of the growths respectively, No. 3 being inoculated with a tube containing bacillus A, and No. 4 with micrococci without the animals showing any symptoms of disease. The inoculations were now reversed, No. 4 being inoculated with bacillus A, No. 3 with micrococci, again without result. Both puppies were now inoculated with both micro-organisms, and suffered no harm. From such negative results I felt justified in supposing that neither bacillus A nor the micrococci were the cause of the disease. I now isolated bacillus B, photographs of which, taken by Dr. Copeman of St. Thomas's Hospital, are annexed.

Fig. 1.—From a photograph taken by Dr. Copeman, of St. Thomas's Hospital (oil immersion).

The bacillus B, like the other micro-organisms found, also liquefies gelatine, descending as a flakey mass in the almost clear fluid, which is covered by a whitish scum. Finally, when the whole of the gelatine is liquefied, the flakes gather at the base, and, if stirred, appear to be of a ropy consistency.

Puppy No. 5 was now inoculated in the nose, and in a week it began to show unmistakable signs of the disease. Another puppy, No. 6, was inoculated in the nose with the previously described micrococci, and kennelled with puppy No. 5. Three days after No. 6 was placed with No. 5, No. 5 began to show signs of pneumonia, and was destroyed. Again three days after the death of No. 5 No. 6 showed symptoms of distemper, and was then also destroyed.

Microscopic examination was now made of the organs of both dogs, when the organs of No. 5 were found to be filled with the micrococci, those of No. 6 to be full of bacillus B. In other words, No. 5 previously inoculated with bacillus B contracted distemper from the inoculation, and then showed symptoms of pneumonia directly it was brought into contact with No. 6. No. 6 on the other hand, whose organs were found filled with bacillus B, showed no signs of pneumonia, although it had been inoculated with micrococci, but of distemper. Doubtless, had it been allowed to live, pneumonic symptoms would have appeared.

The only legitimate conclusion is that No. 6 contracted distemper from No. 5, and that in all probability bacillus B is the cause of the disease. At the same time, not feeling satisfied, and having obtained a licence to carry out experiments on this disease, I inoculated two puppies, No. 7 and 8, with bacillus B. In five days both puppies showed well-marked distemper, when No. 7 was destroyed, but No. 8 was inoculated with the culture containing the micrococci. No. 8 then showed symptoms of pneumonia and was destroyed. On examination the organs of No. 7 were found to be filled with bacillus B, those of No. 8 containing few bacilli B but numerous micrococci; the disease is, therefore, produced by bacillus B.

TABLE II.—List of Experiments, with Dates, Inoculations, and Growths used.*

Cases	Growth used and Date of First Inoculation.	Growth used and Date of Second Inoculation.	Date of first symptoms.	Results.
1	D July 10	—	July 18	Mild pneumonic distemper.
2	—	—	July 18	Mild pneumonic distemper.
3	A August 6	—	—	No results.
3	C August 20	—	—	No results.
3	A & C August 30	—	—	No results.
4	C August 6	—	—	No results.
4	C August 20	—	—	No results.
4	A & C August 30	—	—	No results.
5	B October 20	—	Oct. 23	Mild pneumonic distemper.
6	C October 31	—	Nov. 7	Mild distemper contracted from No. 5.
7	B December 17	—	Dec. 21	Mild distemper.
8	B December 17	C December 25	Dec. 22	Mild distemper, followed by severe pneumonia.

* Growth D equals the 3 micro-organisms; A equals bacillus A; B equals bacillus B; C equals micrococci.

Experiments in Attenuation and Protection.—Now none of the growths with which these experiments were made had been grown at such a high temperature as that of the dog, viz., 101.5° F. In fact they were all cultivated in a cool room at the top of my house, at a temperature varying from 60° F. to 70° F., and I can only come to the conclusion that the successive generations of cultures which have been produced from the originals and grown at a very reduced temperature to that which the pathogenic microbe flourishes in the dog, has resulted in attenuating the virus, as the inoculations with bacillus B were followed by a mild attack of distemper only. Mr. Garnett, of Bromley Cross, having placed two very valuable bloodhound puppies at my disposal I inoculated them both with bacillus B.

TABLE III.

Case.	Growth used and Date.	First Symptoms.	Result.
9	B January 7	January 13	Mild distemper.
10	B January 7	January 13	Mild distemper.

If the fact that the original growths were obtained from dogs suffering from the disease in its most acute form be taken into consideration, and if we also remember that bloodhounds, when attacked, show less resisting power than any other variety of dog, except the basset hound, it is clear that bacillus B had become

attenuated. The temperature of both Mr. Garnett's hounds never exceeded 102.5° F., even at the time they were suffering from the effects of the inoculations.

Protective Treatment.—A growth of bacillus B having been heated to 60° C. for 10 minutes, 5 cubic centimetres of this culture were taken and added to 5 cubic centimetres of previously sterilised water. This quantity was now injected under the skin of two puppies (Nos. 11 and 12) but no ill effects followed. After allowing a week to pass for the virus to take effect, the same two dogs were inoculated in the nose with a pure culture of bacillus B, and to make the experiment more demonstrative, the animals were placed in a kennel which had been inhabited by the dogs previously suffering from distemper. No disease following, I determined to repeat the experiments, a list of which is now given:—

TABLE IV.

Case.	Inoculation subcutaneously with Modified Virus.	Inoculation through the Nose with Non-modified Virus or Exposure to Infection.	Results.
	Date.	Date.	
11	December 26	January 2	No distemper or symptoms.
12	December 26	January 2	No distemper or symptoms.
13	January 13	January 20	No distemper or symptoms.
14	January 13	January 20	No distemper or symptoms.
15	Control experiment.	January 20	Distemper January 23.
16	January 15	Placed with diseased dogs, January 22	Distemper January 30; died.
17	January 15	Sent to Liverpool Show, January 27	Mild distemper; pneumonia.
18	January 15	Ditto	Mild distemper; pneumonia.
19	January 15	Ditto	Mild distemper; pneumonia.
20	January 15	Ditto	Mild distemper; pneumonia.
21	January 15	Ditto	No distemper; pneumonia.
22	January 27	Ditto	Mild distemper; pneumonia.

Fig. 2.—Section of small bronchial tube, showing bacilli. Bronchial drawn from a section; surroundings diagrammatic.

The above table is worthy of attention on various grounds. It will be observed that the dogs in cases 11 to 14 were inoculated hypodermically with modified virus in order to protect them from the disease. Case No. 15, on the other hand, contracted the disease, being the only animal not protected by the injection of modified virus. Case No. 16, the only one in which death resulted, deserves notice. This puppy was only 7 weeks old, and it was thought better not to give it a full dose of the protective material. As a result it was only given a very diluted dose, suitable, as was thought, to its age. But in point of fact it was evidently given too little, especially as it was afterwards exposed to contagion by the most malignant virus. Case No. 15 is somewhat remarkable

from the fact that two puppies, not intended to be used for experiments at all, became infected through carelessness, as I neglected to carefully disinfect my hands after handling case No. 15. Cases 17, 18, 19, 20, and 22 exhibited symptoms of the disease seven days after exposure to infection at Liverpool. When I saw them five days after their illness commenced there was no running at the eyes or nose, and no cough except in the case of two. In fact, their owner informed me that they were much better than they had been. They were at that time in a fair way to recover, when the weather became intensely cold, with a keen east wind, and to this cause we must attribute the subsequent pneumonia. In case 21 the veterinary surgeon at Liverpool, Mr. Sumner, states that the animal showed no symptoms of distemper, but suffered from congestion of the lungs and pleurisy. In every case the animals have recovered, or are doing so, and this is all the more remarkable, since a large number of malignant cases of the disease have appeared in non-protected puppies which were at the same show, some of which have died and others likely to succumb.

Finally, we have the statement of a St. Bernard breeder who allowed me to inoculate two puppies out of seventeen. Distemper had broken out in his kennels. Of these seventeen puppies fifteen are dead, the survivors being the two inoculated puppies, who, although kennelled with those which died, have shown no symptoms of the disease.

Fig. 3.—Third day after inoculation. Fig. 3.—Tenth day after inoculation.

Without presuming too much, I think we may assume that while five cubic centimetres of modified culture, added to five cubic centimetres of sterilised water, is sufficient to protect against mild distemper as produced by the culture of bacillus B, it is not quite strong enough to render animals immune against the extremely virulent bacilli met with at shows.

One thing, however, is clear, namely, that some kind of immunity is produced, and it is possible that dogs inoculated with ten centimetres of undiluted material will prove to be immune against the stronger virus.

It will have been noticed that death in distemper results from a complication, namely, pneumonia. In pure uncomplicated distemper we find a large number of bacilli and few micrococci only,

whilst in pneumonic distemper the latter are present almost to the exclusion of the former. This fact opens up the following important question, namely: Can a micrococcus such as is found in the dog, and which, when injected through the nose, has been proved by experiment to have no evil effect on the dog (see Cases 3 and 4), have a dangerous result or cause complication when associated with the bacillus *B* as in Case 1, or when succeeding the bacillus as in Case 8. That one of the micro-organisms is often associated with the other appears highly probable. It is a well-known fact that if a puppy contracts simple distemper it will infect others with a similar mild form of the disease. In an exactly similar manner we find that if a puppy suffers from pneumonic distemper, it will affect others with the same variety of the disease. Finally we know that if a dog suffering from uncomplicated distemper, be brought into the presence of one suffering from the pneumonic type of the disease, that animal will very soon develop the malignant type.

In conclusion, the bacillus is the primary cause of disease, namely, distemper; the micrococcus is the cause of the complication, namely, pneumonia; whilst the two when combined produce pneumonic distemper. Judging from facts observed in the course of my investigations I think it highly probable that there are two kinds of micrococci to be met with in the nasal fluid of distempered dogs, and it is perfectly possible that two or more kinds of micro-organisms may cause pneumonia.

For instance, the micrococci that were injected in Case 8, differed in appearance in their mode of growth, and in the severity of the symptoms produced by their inoculation from the micrococci found in the first cultures. May we not assume that the bacillus causes lesions in the lung, and in so doing prepares the ground for the micrococcus?

To three gentlemen I am considerably indebted for their kindness in greatly assisting me in these experiments, namely, Dr. Sherrington, of St. Thomas's Hospital, who has, besides affording me the use of his laboratory, given me his assistance and advice; Dr. Copeman, of the same hospital, who has been at great pains in photographing my cultures and sections, as also my fellow student Mr. A. Dalzell, who has assisted me in mounting the microscopic specimens.

LEPROSY IN CYPRUS.

A VERY interesting report on leprosy in Cyprus by Dr. Heidenstam, C.M.G., Chief Medical Officer, has recently been issued as a parliamentary paper. As to the date at which leprosy was first observed there are no reliable records, but local tradition is to the effect that it was brought into the island about three hundred years ago by pilgrims from Palestine, who established themselves in the neighbourhood of the monastery of Trooditissa. The natives believe that the disease is transmitted by inheritance; but Dr. Heidenstam, after a very careful investigation of the disease as it occurs in the sparse population of the island, an investigation of almost every individual case that has come under his notice, has arrived at the conclusion that the disease is "simply and solely due to the inoculation of the virus of a person affected into another up to that time free." He has met with many cases where, in his opinion, no other explanation can be accepted. Several of the cases quoted are certainly most remarkable. When about 55 years of age D., who lived with his wife in a village where there had been no case of leprosy, and whose family history was entirely free from any suspicion of leprosy, took as his servant M., a man from a village notably infected with leprosy. After a year or two M. began to show signs of leprosy, but remained in D.'s home, and was carefully tended for some years by D.'s wife. First D.'s wife and then D. himself began to show unmistakable signs of leprosy. No other case occurred in their village, and their children, who had been sent away for education before M.'s arrival, have not suffered. Another man, M. of N., whose father, mother, and relatives were perfectly healthy, with no history of leprosy, left his native village and went to K., "where he contracted the disease." He returned home, but the peasants of the village remonstrated with his father, who housed him in a garden, where he ministered to his son's wants. The son was eventually admitted into the leper asylum, and two years after his father also sought admission, a decided leper. Only those two in the family suffered. It is a curious fact that the Moslems suffer much less than the Christians; in the Leper Asylum, out of sixty-one cases three only are Moslems. "This minority in the Turkish element can," in Dr. Heiden-

stam's opinion, "only be accounted for by the fact that a Turk avoids a leper as he would a mad dog." As to these three leprous Moslems, the history of one, who was a renegade, could not be traced; another, Y., was the intimate friend of a leper from Paphos; Y. was the only member of his family affected. The history of the third Moslem is most interesting: "His father, mother, grandfather, and grandmother, as well as six brothers, the eldest 30 and the youngest 4, were all perfectly healthy, and there was no other case in the village. He cohabited with a Christian woman, who after some time became a leper, and was ultimately brought to the leper farm, where a few years after he followed." The mode of spread of leprosy through the island teaches, in Dr. Heidenstam's opinion, the same lesson; with a few exceptions in which the villages were affected previous to the present century, and the history is very vague, in every village, "the arrival of the first leper in the village is easily ascertained, and the progress of the affection clearly defined." As an example he mentions Marathovouno, a village now notorious for the number of cases of leprosy. Up to a date about seventy years ago, this village had been quite free from leprosy. At that time a native of the village who had developed leprosy at Paphos returned home; the villagers with one exception shunned him; this exception was an old friend Yacomo. This man died a decided leper; he had no children after the disease declared itself, but the subsequent cases are all traced back to his family or relations. Several other parallel cases are given, and as a contrast the history of the village of Augustina is related. Early in the present century a leper arrived at the village; he was refused admission, but permitted to live in a cave at some distance, where food was sent to him, and where he died at an advanced age. No case had occurred since that time in the village. Towards the end of the last century most of the lepers in the island had spontaneously congregated on a piece of ground conveniently placed for begging, just outside the gate of Famagusta. The Pasha, disliking their presence so near his capital, ordered them all to "be made away with." A wealthy and benevolent dragoman, however, took pity on them, and obtained leave to locate them on a farm near Nicosia, which he offered as a free gift. Upon this farm the majority of the lepers in the island have ever since dwelt. In 1889 there were 63 lepers on the farm, the total number in the island being probably under 100. Since the occupation of the island in 1878 the Government has built stone houses for the lepers on the farm, and have made a small allowance of bread and money. This has had the desired effect of preventing the lepers from leaving the farm and roaming about the island on begging expeditions, and to this wise action may fairly be attributed the considerable diminution in the number of lepers in the island which Dr. Heidenstam shows has taken place.

THE METEOROLOGICAL ASPECT OF THE INFLUENZA EPIDEMIC.

AN important communication on "Influenza and Weather" was made to the Scottish Meteorological Society by Sir Arthur Mitchell, M.D., at its last meeting, held on March 31st, under the presidency of Professor Grainger Stewart. The paper embodied the results obtained by Sir Arthur Mitchell and Dr. Buchan from an exhaustive examination of the deaths registered as due to influenza in London, from the years 1845 to 1890. While certain errors were inevitable in all such inquiries, they believed that the figures disclosed certain phenomena of considerable importance, from which valuable lessons were to be drawn. Thus there could be demonstrated a well marked winter maximum and a well marked summer minimum of mortality, with a small secondary maximum in the second half of March and the first half of April. This was found to correspond with the mean distribution of temperature. When temperature was low, the number of deaths was high, and *vice versa*. The distribution of deaths from influenza was essentially the same, speaking generally, as that from diseases of the respiratory system. Out of the forty-five years embraced in the period they had selected, there were five manifest periods of epidemic influenza, namely, 1847-48, 1850-51, 1855, 1857-58, and 1889-90. While the total mortality from influenza during the forty-five years was 4,690, the periods from December, 1847, to April, 1848, from March to May, 1851, from January to March, 1855, from November, 1857, to January, 1858, and from January to March, 1890, gave an united mortality, from the same cause, of 2,687, or 57 per cent. (*circa*.) In each of those epidemics it was

also to be noted that the rise to the maximum was exceedingly rapid after the disease had been recognised as epidemic.

From their inquiry they felt themselves justified in concluding that, though epidemics of influenza occurred during the winter, they were not connected with exceptionally cold weather, especially at their commencement, but rather with exceptionally warm weather, which was noted both before and during the epidemic. Having especial regard to the late epidemic, they observed that the total mortality from all causes had been much above the average, and this was not explained by the increased number of deaths registered as due to influenza. Thus, during the first four weeks of the year, when the mortality from influenza was at its maximum, the total number of deaths was 343, while the total mortality from all causes was 10,065, that is, 2,258 over the mean death-rate of the same four weeks for the previous ten years. The diseases which had yielded an exceptionally high general death-rate during the period were those of the respiratory, circulatory, nervous, and locomotory (rheumatism) systems—more particularly the respiratory. This was the more striking when it was remembered that the temperature had been exceptionally high and fogs had been absent. The diseases which had showed a diminished mortality in London during the prevalence of the epidemic were diarrhoea, dysentery, liver disease, measles, scarlet fever, typhoid fever, and erysipelas. As to the weather, the first three weeks of November had a temperature above the mean; the last week of November and the first two weeks of December showed a temperature below the mean; the last two weeks of December had a temperature above the mean; the first week of January had a temperature above the mean; the last three weeks of January and the first week of February, when the epidemic was at its height, had a temperature much above the mean, while, since that time to the middle of March, the temperature was below the mean. As to age, there had been a remarkable rise of the death-rate of all persons above the age of 20 during the four or five weeks immediately preceding the epidemic, so far as this could be fixed by registration statistics.

As to the spread of the epidemic from one locality to another, the mistake had frequently been made of assuming that it was only winds blowing over or near the surface of the earth which were concerned in the distribution of the germs. If the surface winds did not account for the successive distribution of the epidemic it was concluded that the germs had not been transported by the winds. But this was incorrect. It had now been virtually proved that the winds in a cyclone were drawn inwards towards its centre and then ascended in a vast aerial column to the upper regions of the atmosphere, whence again they flowed as an upper current towards any cyclone or cyclones that might surround them. Thereafter they slowly descended down the centre of the anti-cyclone to the earth's surface, over which they were carried in every direction. Owing to the known rapidity of these aerial movements, two or at the least three days were amply sufficient for this distribution. And it was during winter that this rapid and complete distribution of atmospheric impurities from country to country in Europe was effected. In summer time cyclones were rare and the wind system of Europe was more immediately connected with the Atlantic Ocean than during winter.

AUSTRIAN UNIVERSITIES.—During the winter semester 1889-90 the total number of students in the Austrian universities was 13,278. Of these 5,703, or 42.9 per cent. of the whole number, belonged to the medical faculties, Vienna having 2,589, Innsbruck 282, Gratz 575, Prague 1,703 (646 in the German, and 1,057 in the Czech faculty), and Cracow 554. In the winter semester of 1888-89, the total number of medical students in Austria was 5,666. As compared with last year, Vienna and the Czech faculty of Prague show a slight falling off, while the numbers in the other universities have increased.

LITERARY INTELLIGENCE.—A course of lectures on the growth and means of training the mental faculty, delivered by Dr. Francis Warner in the University of Cambridge in 1888-89, will shortly be published. An important work on vaccination in Germany, Holland, Belgium, and Austria (*Der Kuhpockenimpfung in Deutschland, etc.*), from the pen of Dr. M. Hay, has recently appeared at Vienna (Moritz Perles). Dr. A. Baer, the well known Austrian advocate of temperance, has recently published a work (*Die Trunksucht und ihre Abwehr*, Vienna: Urban und Schwarzenberg) dealing with the drink question in the encyclopædic fashion characteristic of German writers.

ASSOCIATION INTELLIGENCE.

LIBRARY OF THE BRITISH MEDICAL ASSOCIATION.

MEMBERS are reminded that the Library and Writing Rooms of the Association are now fitted up for the accommodation of the Members, in commodious apartments, at the offices of the Association, 429, Strand. The rooms are open from 10 A.M. to 5 P.M. Members can have their letters addressed to them at the office.

COUNCIL.

NOTICE OF MEETING.

A MEETING of the Council will be held in the Council Room of the Association, at No. 429, Strand (corner of Agar Street), London, on Wednesday, the 16th day of April next, at 2 o'clock in the afternoon.

The following Committees will also meet:—

Tuesday, April 15th, 1890.—Proxy Voting Committee, 3.0 P.M.

—Trust Funds Committee, 4.0 P.M. Wednesday, April 16th, 1890.

—Journal and Finance Committee, 11.30 A.M.

April, 1890.

FRANCIS FOWKE, *General Secretary*.

NOTICE OF QUARTERLY MEETINGS FOR 1890.

ELECTION OF MEMBERS.

MEETINGS of the Council will be held on April 16th, July 16th, and October 15th, 1890. Candidates for election by the Council of the Association must send in their forms of application to the General Secretary not later than twenty-one days before each meeting, namely, June 25th, and September 4th, 1890.

Any qualified medical practitioner, not disqualified by any by-law of the Association, who shall be recommended as eligible by any three members, may be elected a member by the Council or by any recognised Branch Council.

Candidates seeking election by a Branch Council should apply to the Secretary of the Branch. No member can be elected by a Branch Council unless his name has been inserted in the circular summoning the meeting at which he seeks election.

FRANCIS FOWKE, *General Secretary*.

BRANCH MEETINGS TO BE HELD.

MIDLAND BRANCH: LEICESTERSHIRE DISTRICT.—A meeting of this district will be held at the Dispensary, Loughborough, on Wednesday, April 16th, at 3.30 P.M. The following communications have been promised: Mr. C. J. Bond: The Treatment of Enlarged Bursæ and Ganglia by Excision. Dr. H. Handford: Some Forms of Cardiac Dilation. Dr. F. W. Bennett: Recent Experiments on Nasal Respiration. Dr. F. M. Pope: Resorcin in the Treatment of Gastric Ulcer. Dr. J. Headley Neale: A case of Malignant Disease: Enormous and Rapid Enlargement of the Liver. Mr. R. Paul: A case of Compound Comminuted Fracture of the Leg. Dinner at the King's Head Hotel at 6 P.M.; tickets 5s. each, exclusive of wine. All members of the profession resident in the district will be welcomed. Notice of specimens or cases to be exhibited to be sent, before April 12th, to the Honorary Secretary, FRANK M. POPE, M.B., Leicester.

WEST SOMERSET BRANCH.—The spring meeting of this Branch will be held at the Railway Hotel, Taunton, on Thursday, April 17th, at 5 P.M. Dinner at 5.30. The subject, as settled by the Council, for discussion after dinner is the Influenza Epidemic. Members having any case or communication to bring before the meeting are requested to send the title thereof as soon as possible to W. M. KELLY, Honorary Secretary, Taunton.

SHROPSHIRE AND MID-WALES BRANCH.—The half-yearly meeting will be held at the Salop Infirmary, on Tuesday, April 15th, at 3 P.M. Papers have been promised by Messrs. Stephen Paget (on Cancer of the Breast), Webb, and Dr. Charnley. Members having any communications to make or papers to read will kindly inform the Honorary Secretary as soon as possible.—J. A. BRATTON, Honorary Secretary, Shrewsbury.

METROPOLITAN COUNTIES BRANCH: EAST LONDON AND SOUTH ESSEX DISTRICT.—The next meeting will be held at the Town Hall, Walthamstow, on Thursday, April 17th, at 8.45 P.M. A paper will be read by Dr. Angel Money on Nocturnal Restlessness in Children. Visitors will be welcomed.—J. W. HUNT, Honorary Secretary, 101, Queen's Road, Dalston, N.E.

SOUTH-EASTERN BRANCH: EAST SURREY DISTRICT.—The next meeting of this Branch will be held at Croydon on Thursday, May 8th.—P. T. DUNCAN, M.D., Honorary Secretary, Croydon.