

sidered to be amongst those who are exceptionally competent to give an opinion on this point, to be most probably due to the corona. Plates taken in England about the time of the eclipse of May 6, 1883, and drawn by Mr. Wesley before any information reached this country of the observations of the eclipse, presented not only a general resemblance to those taken during the eclipse, but showed the remarkably-formed rift on the east of the sun's north pole which is the main feature of the corona, as photographed at Caroline Island. It is true that since the summer of 1883 I have not been able to obtain in England photographs which show satisfactory indications of the corona; but the abnormally large amount of air-glare from finely-divided matter of some sort, which has been present in the higher regions of the air since the autumn of 1883, might well be considered a sufficient cause of the want of success. This well-known state of the sky rendered the plates taken by Mr. Ray Woods in Switzerland in the summer of 1884 inconclusive as to the success of the method. During the past year photographs of the sun have been taken at the Cape of Good Hope, and are under discussion by Dr. Gill.

Such was the state of things before the eclipse of August 29. The partial phases of this eclipse furnished conditions which would put the success of the method beyond doubt if the plates showed the corona cut off partially by the moon during its approach to and passage over the sun. As the telegrams received from Grenada and a telegram I have this day received from Dr. Gill at the Cape of Good Hope state that this partial cutting off of the corona by the moon is not shown upon the plates, I wish to be the first to make known this untoward result. I regret greatly that a method which seemed to promise so much new knowledge of the corona, which under ordinary circumstances of observation shows itself only during total eclipses, would seem to have failed. At the same time, I am not able to offer any sufficient explanation of the early favourable results to which I have referred briefly in the opening sentences of this letter.

WILLIAM HUGGINS

Upper Tulse Hill, S.W., September 11

In reply to a similar communication which appeared in the *Times*, Mr. A. A. Common writes to that journal as follows:—

“Dr. Huggins, in his letter in to-day's issue, seems to consider that the failure to get a picture of the moon projected on the corona of the sun during the partial phases of the last eclipse is fatal to his method of photographing the corona; but it is quite possible, and, indeed, probable, that this is due entirely to the state of the sky, for against such unfavourable negative as this we have the positive evidence that the moon has been seen so projected in various solar eclipses, and in one case it has been so photographed. This was by Liáis, at Paranagua, in 1858, under conditions that were not, as far as concerns the processes employed, nearly so favourable as those now in use. This single piece of positive evidence, if correct, is of vital importance in showing that the present failure is probably due only to such temporary causes as have prevented Dr. Huggins getting lately such promising plates as those he obtained in 1883.

“Ealing, September 13 “A. A. COMMON”

THE RECENT AMERICAN EARTHQUAKE¹

THE author gave a brief account of the earthquakes in Eastern Europe of August 27, which seem to have travelled eastwards from Malta to the south of Italy.

¹ “Notes on the Recent Earthquake in the United States; including a Telegraphic Despatch from Major Powell, Director of the United States Geological Survey.” Read at the British Association by W. Topley, F.G.S., Geological Survey of England, President of the Geologists' Association.

It is a curious coincidence that the first important indications of earthquake disturbance in the United States took place on that date, when the geyser of the Yellowstone spouted forth and when the first moderately severe shock at Charleston occurred. The principal shock was on Tuesday night, August 31. This is the one which has done most damage, and which was felt over a wider area than any previously recorded in North America. It has, however, been succeeded by shocks, fortunately of less intensity, which have been felt over a still wider area. The later shocks of Thursday and Friday were felt in Nevada and California.

The author gave a description of the earthquake, founded upon the newspaper telegrams and upon a telegraphic despatch which Major Powell had kindly forwarded at the author's request. The latter is as follows:—

“The earthquake is the most severe on record in the United States, and affected the greatest area. Origin along line of post-Quaternary dislocation on the eastern flanks of the Appalachian, especially where it crosses central North Carolina. There were slight premonitory shocks in the Carolinas for several days, moderately severe shocks occurring near Charleston on August 27 and 28. The principal shock, causing great destruction in Charleston, originated in central North Carolina on August 31, 7.50 p.m., 75th meridian time. Thence the shocks spread with great rapidity in all directions, with velocity varying from 25 to 65 miles a minute, over an area of 900,000 square miles, or one quarter of the United States—from the Gulf of Mexico to the Great Lakes and Southern New England, and from the Atlantic seaboard to the Central Mississippi Valley. In the Carolinas it was accompanied by landslides, crevasses, and great destruction of property. Half of Charleston is in ruins; about 40 lives were lost. No sea-wave has yet been reported. A second moderately severe shock occurred at Charleston at 8.25 a.m. September 1. Minor shocks followed at increasing intervals. The principal shock was felt over this vast area in intervals of 15 minutes, and recorded at some principal points on a scale of intensity of 5 as follows:—Raleigh, 4, 9.50 p.m.; Charleston, 5, 9.54; Cedar Keys, Florida, 2, 10.05; Knoxville, 3, 9.55; Memphis, 4, 9.55; St. Louis, 1'2, 10.00; Milwaukee, 3, 10.06; Pittsburg, 4, 10.00; Albany, 2, 10.00; Springfield, Mass., 1, 10.00; New York, 2, 9.53.”

Prof. Carvill Lewis has studied a previous earthquake in the North-Eastern States. This ranged along the north-eastern flanks of the Appalachian Chain. The author described the structure of Eastern North America, and the lines of old earth-movements therein to which both earthquakes seem to be related.

The local phenomena of the recent earthquake may be summarised as follows:—Fissures were formed, some running north to south, some east to west, out of which mud and sand were ejected. Several telegrams speak of stones falling from the air, which (if true) must previously have been ejected from such fissures. No tidal wave has been recorded, nor has any alteration of level of land or depth of sea occurred, although the earthquake was noticed at sea off Charleston; but some passing disturbance of the water seems to have occurred at Sullivan's Island near Charleston, for the high water spoken of could not be a spring tide, as the tides then were the neap tides. The accounts agree in the earthquake being accompanied by rumbling noises. Accounts differ as to the direction of the vibratory movement, but it was probably from the south or south-south-west to north or north-north-east, both at Charleston and New York. As usual in earthquakes, wells and springs have been affected; some dried up, whilst water has appeared where before there was none. The natural gas wells of Pennsylvania have been affected, and the supply much diminished. Perhaps the most interesting phenomenon is the

outburst in the Yellowstone Park of a geyser which has been quiescent for four years.

All the evidence so far published tends to show that the earthquake was a true seismic disturbance, which was probably transmitted along certain lines of great rock-masses, or along lines of weakness; but details to enable us to determine these points are not yet to hand.

DR. KLEIN'S REPORT ON MILK SCARLATINA

IN a recent Report to the Local Government Board, "On Certain Observed Relations between Scarlatina in various Districts of London and Milk supplied from a Dairy Farm at Hendon," Mr. Power has related the circumstances (NATURE, vol. xxxiv. p. 393) under which I became associated in inquiry at the farm in question; and, while briefly indicating certain provisional inferences of my own as to the nature of the malady discovered among the cows there, Mr. Power goes on to promise an account by me of the special features and pathology of the disease. This I now proceed to give.

The cows (I. and II.) which were the first subjects of my investigations had on the teats and udder several flat irregular ulcers, varying in diameter from $\frac{1}{4}$ to $\frac{3}{4}$ of an inch; some ulcers were more or less circular, others extended in a longitudinal direction on the teat. The ulcers were covered with a brownish or reddish-brown scab, which, when scraped away, left exposed a granulating slightly indurated base. The margin of such ulcer was not raised, nor was there any perceptible redness of the skin around. But where I afterwards got the opportunity of watching the earlier stages (especially in animal IV.) it was noticed that a small vesicle made its appearance on a greatly swollen and red teat, in the course of a couple of days assuming the character of the above ulcers. In another cow, an ulcer about $\frac{1}{2}$ inch in diameter, was becoming covered in its central part with a scab, while at its margin vesiculation was still distinctly visible.

As a rule, *i.e.* in most animals, the disease affected the teats, but in some there was also on the lower part of the udder here and there an ulcer. In such animals, patches denuded of hair were noticed on various parts of the skin, the tail and back particularly. In these patches the epidermis was scaly, and the cutis more or less thickened. The animals looked thin, but not strikingly so, except in one or two cases of animals that had only a few weeks ago been admitted to the place, and which therefore had calved comparatively recently (see Mr. Power's Report). As regards the feeding capacity of affected animals, their milking power, and their body temperature, nothing abnormal could be detected.

Two animals (to be referred to as cow III. and cow IV.) became the special subjects of study after they had been removed from the farm to the stables of the Brown Institution.

The temperatures (Centigrade degrees) of cow III. were as follows:—

	Morning temperature	Evening temperature
January 4	38·8	38·7
" 5	38·9	38·9
" 6	38·8	38·3
" 7	38·9	—
" 8	39	39
" 9	38·8	38·7

The temperature afterwards remained as above without alteration.

The temperatures of cow IV. were:—

January 6	38·4	38·3
" 7	38·7	—
" 8	38·4	38·8
" 9	38·6	38·5

In animal III. the ulcers were present, and on January 4 were at their full development and covered with crusts. They gradually died away, and subsequently healed up by January 10, leaving, however, a whitish indistinct flat scar.

When this animal was received there were noticed on its coat several patches where the hair was gone, and the epidermis was rough and scaly.

Animal IV. when received showed several scabs in the skin of the back; it had also muco-sanguineous discharge from the

vagina (the animal was in the third month of pregnancy) and redness and excoriation of the mucous membrane of the vagina. One teat, which was much swollen and inflamed, presented in several places brownish crusts. These when taken off left an infiltrated firm sore, from which, when squeezed, a thickish lymph oozed out. Similar crusts were found on other teats and on the udder. The greatest development of the sores in this cow was on January 7. On January 9 the sores were decreasing; the animal was then killed.

On opening the chest it was found that both lungs exhibited in the upper posterior lobes numerous petechiæ under the pulmonary pleura, the peripheral lobules of these parts being much congested. There were numerous adhesions by recent soft lymph between the lower lobes of the lung and the costal pleura, particularly laterally. In the liver there were several reddish streaks and patches, reaching from the surface of the organ to a depth of about a quarter of an inch. In these patches the liver tissue was much softened. The spleen and kidneys, with exception of slight congestion, appeared normal. In the placenta there were numerous petechiæ.

Cow III. was killed on March 12. For some days previously the animal had been getting very thin, notwithstanding its ravenous and excessive eating. On post-mortem examination the following appearances were found:—

In the lungs there were numerous lobules, especially in the peripheral parts, which showed great congestion; there were in addition pleural adhesions; the cortex of the kidney was congested, but its medulla was pale.

Experiments were now made with the matter of the ulcers, with a view of ascertaining whether or not the disease was transmissible to other animals.

On January 7, when the ulcers of cow IV. had reached their maximum development, I took scrapings from some of the ulcers on the udder and teats, having first removed the crust, and inoculated in several places the skin of groin and inside of ear of two calves (1 and 2). For inoculation a superficial small incision (not longer than about a quarter of an inch) was made, passing in an oblique direction through the superficial part of the corium, and into this pouch a particle of the scraping was rubbed.

On January 9, with scraping of ulcers of the cow before she was killed, I inoculated two calves (3, 4), introducing the matter as before into the corium of the groin and of the inside of ear.

Calves 1 and 2 showed during the first three days after insertion of the matter no change at the seat of inoculation.

Four days after inoculation:—There was in calf 1 one place in the groin which promised to become an ulcer. Calf 2 showed on the ear one promising place, the other places of inoculation having nearly healed.—At the same distance of time after inoculation calf 3 showed two promising places on the ear, and calf 4 showed two promising places in both groin and ear. Calf 3 also showed a kind of vesiculation at the margin of the spot inoculated and commencing formation of a crust in the centre. What I call promising places of inoculation were spots that had become swollen and tender, the other and not promising places were spots that seemed healing or were already healed and dry.

On the sixth day:—Calf 1 showed four successful places in the groin; the places had become swollen and enlarged with imperfect vesiculation at the margin and formation of crust in the centre. Calf 3 had four successful places on the ear, and calf 4 had the same number in the groin.

On the seventh day:—In calf 1 all places except one in the groin had nearly disappeared. This place was now a distinct ulcer covered with a crust, on removing which a granulating infiltrated base was exposed. In calf 2 all places of inoculation were decreasing, covered with small scabs, easily detached. In calf 3 the sores on the ear had enlarged to about half an inch in breadth, each of them covered in their whole extent by a brownish crust. In calf 4 all except one place on ear were healing.

On the eleventh day:—Calf 1 had still one ulcer in groin not yet healing. Calf 2 had one ulcer on ear not quite healed up. Calf 3 had four big ulcers still progressing; crusts thick, and corium much indurated. Calf 4 had one ulcer on ear much diminished in size.

By the eighteenth day:—The ulcerations in calf 3 (one ulcer had been cut out for microscopic examination) had all healed up and become converted into flat scars. In the other animals the healing was completed at an earlier date.