

Relations to Cholera and Typhus" (Boden und Grundwasser in ihren Beziehungen zu Cholera und Typhus) in which he develops at length his views. To many these are probably now well known, but still, it may be perhaps as well to state that they are somewhat as follows.

The phenomena of Cholera result from the introduction into the animal system of a cholera poison, which is possibly an organic being, and which we may call  $z$ . Now,  $z$  is non-reproductive; does not of itself multiply or spread. But there is another distinct thing, the cholera germ (originating in India), which we may call  $x$ .  $x$  of itself will not produce cholera symptoms. It may remain, and probably may multiply in the human body, and be carried in or on the body from place to place without of itself producing cholera. Cholera symptoms can only be brought about by  $z$ , and  $x$  can only give rise to cholera, indirectly, by generating  $z$ . But  $x$ , in order that it may generate  $z$ , must come in contact with and act upon another substance, which we may call  $y$ . That is,  $x$  cannot germinate into  $z$  unless it meets with the substratum  $y$ ; or we may use the idea, thrown out we believe by Dr. Farr, and imagine  $x$  and  $y$  to be the male and female parents of the offspring  $z$ , which is either sterile, or can only reproduce  $x$ .

Thus, then,  $x$  originating at certain times in India, and meeting with  $y$  at once gives rise to  $z$ , and an outbreak of cholera is the result. The quantity of  $z$  is probably more than sufficient to account for all the cases that occur; the surplus may even perhaps be carried about, and so spread the epidemic; but there being no reproduction of  $z$ , the stock would soon be exhausted. With  $z$ , however, a quantity of  $x$  is also carried about, more particularly by the excrement;  $x$ , in fact, clings to its products just as yeast cells cling to a fermented liquid. And whenever  $x$  meets with fresh  $y$ , it generates fresh  $z$ ; and so the epidemic travels on,  $x$  making itself felt by  $z$  whenever it falls upon a store of  $y$ . For the existence of  $y$ , certain things are necessary, to wit:—

1. A soil which, like alluvium, is permeable to air and water for several feet deep.

2. A rise and fall of sock-water. A soil which is permanently dry, or one which is always filled with sock-water, are equally unfavourable for the development of  $v$ . The change of level of water is absolutely necessary.

3. The presence of organic and mineral matters on which the variations in the amount of sock-water may act, and out of them produce  $y$ .

4. A temperature suitable for such processes of organic evolution.

All these points and many others are fully discussed in a series of chapters with such headings as "Porous and Compact Soils"; "The Soil and the Immunity of Wirzburg"; "Influence of drinking Water on Cholera epidemics"; "Considerations on the Cholera epidemic of 1866 in East London, in reference to Soil and Sock-water conditions"; "Apparent evidences against the 'Soil and Water theory' and for the theory of 'Contact and Idiosyncrasy,'" &c. &c. It concludes with a series of aphorisms, "On the Origin and Spread of Cholera"; "On the Influence of Variations in Sock-level on the Enteric Fever of Munich"; and, "On the Causes of the Immunity of Lyons."

#### SOCIETIES AND ACADEMIES.

**Zoological Society.**—The first scientific meeting for the session will be held on Thursday the 11th inst., when Prof. Flower, F.R.S., will read a paper on the Anatomy of the Aard-Wolf (*Proteles cristatus*). The following communications have been received since the last meeting:—Dr. J. Anderson: Letter received from, describing a living specimen of the Pigmy hog of Terai (*Porcula salvania*).—Mr. P. L. Selater: Remarks on the condition of various Zoological Gardens on the Continent recently visited by him, and on new and rare animals observed in those establishments.—Dr. B. Simpson: Notes on *Ailurus fulgens*.—Mr. John Brazier: Note on the Egg of a species of *Megapodius* from Bank's Islands.—Surgeon Francis Day: Remarks on fishes in Calcutta Museum.—Mr. John Brazier: Notes on the Localities of two Species of Land-Shell. —Mr. R. B. Sharpe: Additional Notes on the genus *Ceyx*.—Dr. George Bennett: Letter received from, on the habits of the Wood Hen of Lord Howe's Island.—Dr. J. E. Gray: On the Guemul or Roe Buck from Tinta, South Peru.—Dr. A. Günther: Report on two collections of Indian Reptiles.—Mr. Morton Allport: Letter received from, on the introduction of Salmon into the Australian Colonies.—Rev. O. P.

Cambridge: Notes on some Spiders and Scorpions from St. Helena, with descriptions of new species.—The Secretary: On additions to the Menagerie during June, July, August, and September.—Mr. W. T. Fraser: Letter received from, respecting the Existence of the Rhinoceros in Borneo.

#### MANCHESTER.

**Literary and Philosophical Society, October.**—Mr. E. W. Binney, F.R.S. in the Chair. The following extract of a letter from Dr. Joule, F.R.S., dated Southport, October 5th, 1869, and addressed to the Chairman, was read:—"I enclose a rough drawing of the appearance of the setting sun. Mr. Baxendell noticed the fact that at the moment of the departure of the sun below the horizon, the last glimpse is coloured bluish green. On two or three occasions I have noticed this, and also near sunset that just at the upper edge, where bands of the sun's disk are separated one after the other by refraction, each band becomes coloured blue just before it vanishes."

#### PARIS.

**Academy of Sciences, October 25.**—M. L. Pasteur communicated a note relative to the dispute which has arisen between him and M. Thenard on the subject of his patented process for preserving wines by the application of heat. A paper was read by M. Phillips on the Movement of similar solid Elastic Bodies, supplementary to a memoir on the equilibrium of such bodies, read in January last.

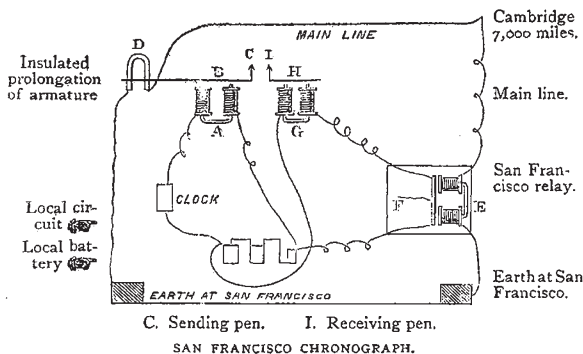
A memoir on the fundamental Equations of the mechanical theory of Heat, by M. F. Reech, was presented by M. Regnault. In a note on the illumination of transparent bodies by polarised Light, M. A. Lallemand described some new experiments with transparent solids. On passing a ray of polarised light horizontally through a polished cube of glass in a direction perpendicular to two of its faces, the maximum of illumination is horizontal, the light emitted is white, is entirely polarised in a horizontal plane, and gives the principal lines of the solar spectrum. When viewed vertically, the illumination is nil, unless the glass be fluorescent. The light observed in a vertical direction in the latter case is more or less coloured, is neutral to the polariscope, and gives none of the lines of the solar spectrum. The author noticed the behaviour of various other substances, such as crystal, fluor spar, Iceland spar, &c., M. Dumas communicated a letter from M. P. Volpicelli on the Heat of the Lunar Radiation containing an historical sketch of the researches upon this subject, and showing that both Melloni and Herschel have demonstrated the calorific action of the Moon. M. H. Marie Davy, whose previous statement (September 20, 1869) that the calorific effects of the Moon's rays were inappreciable called forth M. Volpicelli's remarks, now communicated a note on the Calorific Power of the Lunar Rays, in which, after noticing that Melloni was the first to demonstrate the existence of such a power, and that his results had been confirmed by Prof. Piazzi Smyth; he goes on to describe his own recent experiments, in which, by the employment of the thermo-electric pile, he has been able to obtain a series of results perfectly confirmatory of those of his predecessors. He found that the heat furnished by the moon is quite appreciable, and that its amount increases rapidly as it advances towards the full. M. C. Daresté communicated a memoir on the notion of Type in Teratology, and on the distribution of monstrous type in the division of vertebrate animals; the argument of which is, that the type of monstrosities is correlated with the type of organisation, so that if uniformity of type occurs in monstrosities throughout any wide range in all classes of the vertebrata, for example, the origin of such monstrosities dates from a very early period of embryonic development, and the more limited the range of a monstrosity, the later in the life of the embryo will be its origin. A paper was read by M. P. P. Dehérain on the influence exerted by different luminous rays upon the decomposition of carbonic acid and the evaporation of water by leaves. The author states that, with equal intensity, the yellow and red rays act more energetically than the blue and violet rays, both in producing evaporation, and in causing the decomposition of carbonic acid; in the latter respect he found that the leaves of *Potamogeton crispus* emitted 26·2 cub. cent. of gas under yellow light; they gave off only 5·8 cub. cent. in the same time under blue rays of equal intensity. M. E. Decaisne communicated some remarks on the various conditions of the production of goitre; M. Landrin, a note on the physiological action of Chloral; M. Jaliwski, an account of a process for bronzing iron; M. Delaurier, a note on the manufacture of manganate of calcium, and M. Mehay, a note on the Infinitesimal Calculus.

PHILADELPHIA.

American Philosophical Society.—We select the following extracts from the reports of the recent meetings of this Society:—

Prof. Trego has communicated an extract from a letter from Mr. Davidson of the Coast Survey, to Mr. D. B. Smith of Germantown, detailing the method employed to obtain the recent determination of longitude and the velocity of the electric current between Cambridge and San Francisco.

"I give you the first written news not only of our telegraph longitude success, but of the success of my plan for determining the time of transmission of clock signals from my clock to Cambridge and back, over 7,000 miles of wire, through 13 repeaters and a multitude of relays. Through the liberality of the Western Union Telegraph Company, I had two trans-continental lines placed at my use, and last night I succeeded beautifully. My circuit was as follows. My clock breaks the local circuit every second, depriving the helix A of its electricity, and the magnet of its magnetism. This relieves the armature B, which is drawn away by a spring, and the pen C makes its record on the revolving cylinders of the chronograph. At the same instant the main current to Cambridge and back is broken by the insulated prolongation of the armature at D, and the break transmitted to Cambridge and back, through 7,000 miles of



wire, to my relay E, which relieves the armature F, and the local circuit is broken; the helix G deprived of its electricity and the magnet of its magnetism, relieving the armature H, which is drawn away by a spring, and the pen I makes the record on the revolving cylinders of the chronograph. These two pens are on the same horizontal line. Our experiments show that it took 0.87 of a second to traverse the above circuit. I also made experiments through to Buffalo, Chicago, Omaha, Cheyenne, Salt Lake, and Virginia, and back. All successful. As this experiment was not contemplated by the programme of the longitude experiments, I have the satisfaction of seeing my ingenuity successfully proved."

Prof. Kirkwood has communicated through Mr. Chase a discussion of the periodicity of the Sun's spots. We shall return to this communication.

Mr. Dubois presented a specimen and analysis of silver ore, accompanied with the following note from the Assay Office, United States Mint:—

"In the Report of the British Commission on International Coinage, lately published, we find an extract from the *Journal des Debats*, of November 13, 1866, stating that the German assayers had found the average fineness of French gold coins of that year to be 808 thousandths, and a fraction. It adds that this is an unworthy source of gain to Government, whose ambition it should be to have the coins correct. The *Moniteur* of November 20 (official organ) replies, that this is as near to standard as can be expected from the defects of practical operation; and that it is the duty of Government to prevent these 'ill-founded criticisms.' Our own assays, for many years, have proved a deficiency in the French coins, averaging about one-thousandth. The apology of the *Moniteur* has no just foundation. Both at this Mint, and at San Francisco, the gold coins are kept close to the mark, scarcely varying the tenth of a thousandth; as is proved by annual assays, and by foreign reports. British coinage is equally exact.

"This fact affords an argument against the project of International Coinage. If we work to 900, and France to 899 or less, and both pass alike, the difference is against us."

DIARY.

THURSDAY, NOVEMBER 4.

LINNEAN SOCIETY, at 8.—On some Brazilian Plants from the neighbourhood of the Campinas: J. Correa de Mello. On two Indian Plants: N. Dalzell. On the Occurrence of a Luminous Insect near Buenos Ayres: R. Trimen. CHEMICAL SOCIETY, at 8.—Discussion on Dr. Williamson's Discourse on the Atomic Theory.

FRIDAY, NOVEMBER 5.

GEOLOGISTS' ASSOCIATION, at 8.—Comparative Anatomy as applied to Geology: Dr. C. Carter Blake, F.G.S.

MONDAY, NOVEMBER 8.

LONDON INSTITUTION, at 4.—Elementary Physics: Prof. Guthrie. ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—President's Address. Journey to the Yellow River: Mr. Elias.

TUESDAY, NOVEMBER 9.

ETHNOLOGICAL SOCIETY, at 8.—On the Chinese Race; their Language, Government, Social Institutions, and Religion: Mr. Gardner.

WEDNESDAY, NOVEMBER 10.

GEOLOGICAL SOCIETY, at 8.—Australian Mesozoic Geology and Paleontology: C. Moore, F.G.S.—On some Plant and Insect-beds in New South Wales: C. Moore, F.G.S. Further Evidence of the Affinity between Dinosauria and Birds: Prof. Huxley, F.R.S.—On the Dinosauria of the Trias, with observations on the Classification of the Dinosauria: Prof. Huxley, F.R.S.

ROYAL MICROSCOPICAL SOCIETY, at 8.—On High Power Definition, with Illustrative Examples: Dr. G. W. Royston Pigott, F.R.A.S.—On the Structure of the Scales of certain Insects of the Order *Thysanura*: S. J. McIntire.

THURSDAY, NOVEMBER 11.

LONDON INSTITUTION, at 7.30.—On Architecture, or the Fine Art of Building: Prof. Robert Kerr.

ZOOLOGICAL SOCIETY, at 8.—On the Anatomy of the Aard-Wolf (*Proteles cristatus*): Prof. Flower, F.R.S.

LONDON MATHEMATICAL SOCIETY, at 8.—General Meeting at Burlington House.

BOOKS RECEIVED.

ENGLISH.—Chemistry: Prof. Atfield (Van Voorst).—Scenery of England and Wales: D. Mackintosh, F.G.S. (Longmans).—Practical Chemistry: Harcourt and Madan (Clarendon Press).—The Three Kingdoms of Nature: R. S. Houghton (Cassell).—Flora of Middlesex: Trimen and Dyer (Hurdwicke).—Natural Philosophy in Easy Lessons: John Tyndall (Cassell).—Vegetable Physiology: Dr. Lankester (Cassell).—Our Bodies: E. A. Davidson (Cassell).—Scientific Chemistry: F. S. Barff (Groombridge).—Science of Heat: T. A. Orme (Groombridge).—Mechanical Philosophy: R. Wormell (Groombridge).—How Crops Grow (Macmillan).—Travels in Central Africa: Mr. and Mrs. Petherick (Tinsley).—New Tracks in North America: W. A. Bell (Chapman and Hall).—Intelligence of Animals: E. Menault (Cassell).—Picture Natural History (Cassell).—Gold Fields and Mineral Districts of Victoria: R. Brough Smyth (Trübner and Co.).—The World of the Sea: A. Frérol (Cassell).—Prehistoric Times: Sir John Lubbock, Bart. (Williams and Norgate).—De la Rue and Co.'s Red Letter Diaries for 1870.—Natural History of British Moths: E. Newman (Tweedie).

AMERICAN.—The Mississippi Valley: J. W. Foster.—Production of Precious Metals: W. P. Blake.—Parsons on the Rose.—System of Mineralogy: Dana and Brush.—Guide to the Study of Insects: A. S. Packard. (Through Trübner and Co.)

FOREIGN.—Echinides: Cotteau et Triger (with atlas).—Ueber Ratrachier: Keferstein.—Protozoë Helvetica: W. A. and C. von F. Ooster.—Die Elliptischen Functionen: Hattendorff.—Leçons de Chimie: Alfred Riche.—Der Cultur-Ingenieur: vol. ii. part 2.—Die Chinacultur auf Java: van Gorkom.—Handbuch der Edelsteinkunde: Schrauf.—Die internationale Einigung durch das metrische System: C. Bopp.—Landwirthschaftliche Zoologie: Giebel.—Bibliothèque des Sciences naturelles (Zoologie): Gervais et Sauvage.—Erratische Bildungen im Aargau: Mühlberg.—Bergbaukunde (2 vols.): Lottner (posthumous).—Zur Kenntniss der Bryozoen: Nitsche.—Vierteljahrsschrift für öffentliche Gesundheitspflege: vol. i. part 3.—Dictionnaire technologique: Kumpf et Mothes (vols. i. iii). (Through Williams and Norgate: Asher and Co.)

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