Mémoires sur les Questions proposées par l'Académie Royale des Sciences et Belles-Lettres de Bruxelles, qui ont remporté les Prix en 1822–3. Tome IV. 4to.

———————— en 1824–5. Tome V. 4to.

———————— en 1826–7. Tome VI. 4to.

———————— en 1828. Tome VII. 4to.—*The Academy.*

Correspondance Mathématique et Physique, publiée par A. Quetelet. Tome V. 8vo.

———————— Livraisons 1 à 6 de Tome VI. 8vo.—*Professor Quetelet.*

The reading of a Paper, entitled, "On a New Combination of Chlorine and Nitrous Gas." By Edmund Davy, Esq. F.R.S. M.R.I.A. Professor of Chemistry to the Royal Dublin Society. Communicated in a Letter to Davies Gilbert, Esq. late President of the Royal Society;—was commenced.

February 17.

DAVIES GILBERT, Esq. V.P., in the Chair.

The following Presents were received, and thanks ordered for them:—

A Manual of Analytical Chemistry. By Henry Rose, Professor of Chemistry at Berlin. Translated from the German by John Griffin. 8vo.—*Presented by the Publishers.*

Tables of Life Contingencies. By Griffith Davies, Esq. 8vo.—*The Author.*

Caii Plinii Secundi Libri de Animalibus cum Notis Variorum, curante J. B. F. S. Ajasson de Grandsagne. Notas et Excursus Zoologici Argumenti adjecit G. Cuvier. 8vo.—*The Editors.*

Aperçu d'un Ouvrage Analytique. Par M. Decajeul. 8vo.—*The Author.*

The reading of Professor Davy's Paper was resumed and concluded.

In the course of his experiments on a new test for chlorine gas, an account of which was lately read to the Royal Society, the author was induced to examine the gases produced by the mutual action of nitric acid and different chlorides, and also of the nitric and muriatic acids on each other. When fused chloride of sodium, potassium or calcium, in powder, is treated with as much strong nitric acid as is sufficient to wet it, a considerable action takes place: cold is produced, and a gas of a bright reddish or yellowish colour is copiously evolved, which is promoted by applying a gentle heat. This gas, especially in the early stage of the process, appears to be a mixture of chlorine and another gas, distinguished from it by the great facility with which it is absorbed by water. From this circumstance, and from its also exerting a considerable action upon mercury, its properties cannot be satisfactorily ascertained by collecting it in con-

tact with either of these fluids; but as it is much heavier than common air, the author was enabled to collect it in sufficient quantity for examination, and nearly in a pure state, from a tubulated retort by means of a bent tube reaching to the bottom of small narrow-mouthed bottles, with ground stoppers.

The gas, when thus obtained, is of a pale reddish yellow colour; has an odour somewhat resembling that of chlorine, though less pungent. From its strong affinity for moisture, it fumes when brought into contact with the air. In its ordinary state of dryness it destroys vegetable colours, readily bleaching turmeric paper: litmus paper, however, is reddened by it before it is bleached. But when carefully dried by means of fused chloride of sodium, it does not affect those substances. This gas does not support combustion; but the bifulminate of silver explodes in it.

The author next describes its action upon phosphorus, sulphur, antimony, arsenic, bismuth, tin, copper, zinc, iron, lead, gold, silver, platina, mercury, sulphuric ether, alcohol, oil of turpentine, naphtha, concentrated muriatic acid, iodine, and bromine. With hydrogen gas it forms a mixture which explodes when ignited.

The general conclusion which the author draws from his experiments is, that this gas is an actual compound of chlorine and nitrous gas, and he therefore gives it the name of the chloro-nitrous gas. When collected over mercury, one portion of it forms with that metal a white compound, which appears to be a mixture of calomel and corrosive sublimate, whilst the remainder is found to give orange vapours with common air, attended with a diminution of volume, and to be almost wholly absorbed by a recent solution of green sulphate of iron. He also infers that the gas consists of equal volumes of chlorine and nitrous gas, combined together without any condensation, its atomic number being 102. He finds its specific gravity, compared with that of atmospheric air, to be 1.759.

In the mutual decomposition of chloride of sodium and nitric acid, the products appear to be chloro-nitrous and chlorine gases, and nitrate of soda. The author explains the changes which take place in the following manner:—the nitric acid, by its partial decomposition, yields nitrous gas and oxygen: the former unites with part of the chlorine expelled from the chloride of sodium, to form chloro-nitrous gas, whilst the latter combines with the sodium to form soda, which, with the remaining nitric acid, compose nitrate of soda. The remainder of the chlorine mixes with the chloro-nitrous gas.

The author states that the two component gases of the chloro-nitrous gas unite at once when brought into contact, after having been dried in the most careful manner possible; a fact which is contrary to the opinion generally entertained among chemists.

By passing chloro-nitrous gas through water an acid is obtained, which appears to resemble very closely the common solvent of gold, or *aqua regia*, otherwise called the nitro-muriatic acid. The author here remarks, that if the constitution of the chloro-nitrous gas be such as he has stated, that is, composed of 30 by weight of nitrous gas, and 72 of chlorine, one of its proportionals should decompose

two of water, consisting of 16 oxygen and 2 hydrogen; thus forming 46 nitrous acid, and 74 muriatic acid. But an acid so constituted should be incapable of acting on gold or platina; now the acid resulting from the absorption of chloro-nitrous gas by water has this power.

The author concludes from his experiments, that the power of nitro-muriatic acid in dissolving gold is not owing to the liberation of chlorine, and that muriatic acid may be separated from nitric acid, even when the latter is only half the volume of the former. He regards chlorine and chloro-nitrous gases as the gaseous products arising from the mutual action of strong nitric and muriatic acids on each other. The nitro-muriatic and chloro-nitrous acids strongly resemble each other in their action on platina, though the solvent power of the latter is decidedly greater than that of the former; and the addition of water considerably increases this power in both, probably by counteracting their disposition to assume the elastic state. Both acids form, with different bases, salts which are mixtures of nitrates and chlorides. The principal differences in these acids may arise from their mode of preparation, and is probably due to the want of uniformity in their composition.

February 24.

DAVIES GILBERT, Esq. V.P., in the Chair.

The Bishop of Chichester; John Lee, LL.D.; and Isaac Wilson, M.D.; were elected Fellows of the Society.

The following Presents were received, and thanks ordered for them:—

Memoir of the Life of Thomas Young, M.D. F.R.S.: with a Catalogue of his Works and Essays. 8vo.—*Presented by Mrs. Young.*

An Enquiry respecting the Site of the Battle of Mons Grampius. By Lieut.-Col. Miller, C.B. F.R.S. 4to.—*The Author.*

An Engraved Portrait of Charles Wilkins, Esq. LL.D. F.R.S. Engraved by J. Sartain from a painting by T. G. Middleton.—*William Marsden, Esq. F.R.S.*

Bulletin de la Société Géologique de France. Tome premier. 8vo.—*The Society.*

A Paper was read entitled, "On the Chemical Action of Atmospheric Electricity." By Alexander Barry, Esq. F.L.S. Communicated by J. G. Children, Esq. Sec. R.S.

A kite was raised in an atmosphere which appeared favourable to the exhibition of electrical phenomena, from an apparatus firmly fixed in the earth, and insulated by a glass pillar. The string to which it was affixed contained a double gilt thread, and was let out to a length of five hundred yards. It was connected with a platina tube passing about half way down a glass tube full of a solution of