

with water at various temperatures and in various proportions. When two salts to which either the acid or the base is common, and which do not form a double salt, are mixed in equivalent proportion, the cryogen produced has nearly the temperature due to the salt, which alone would produce the greatest degree of cold. Solidification begins at a temperature below the melting-point of the least fusible, and continues at lower and lower temperatures until the temperature due to the other constituent salt is reached. Occasionally a cryohydrate having a constant solidifying point has been obtained by mixing in definite proportions salts which are not known to exist in the form of a double salt. In all such cases the solidifying point of the mixture is intermediate between the solidifying points of the constituents, and its temperature as a cryogen is also between the temperatures of the constituents when separately used as cryogens. When two salts composed of different acids and bases are mixed, and no precipitation occurs, it is generally considered that partial double decomposition takes place, two new salts being formed. It was found that if the salts AX and BY be mixed in atomic proportion and dissolved in the smallest possible amount of water, a mixture identical with that produced on mixing AY with BX is obtained. The temperature and composition of the resulting cryohydrate are the same in both cases. But the temperature never falls as low as the point which could be reached by employing whichever of the salts AX, AY, BX, BY, forms a cryohydrate with the lowest temperature. Thus a saturated solution of a mixture of nitrate of potassium and sulphate of sodium solidifies at  $-5^{\circ}\text{C}$ . A mixture of nitrate of sodium and sulphate of potassium also solidifies at this temperature. Since the solidifying point of nitrate of sodium is  $-17^{\circ}$ , this salt cannot exist without partial decomposition taking place in either mixture; for, as has been shown above, its presence would ultimately depress the solidifying point. Dr. Rae remarked that these researches are specially interesting in connection with the salts retained by sea-ice. With a view to study this subject, he has already requested captains of whalers visiting the Arctic regions to bring home samples of ice of different age and from various localities.

## PARIS

Academy of Sciences, March 15.—M. M. Frémy in the chair.—The following papers were read:—On electro-capillary action and the intensity of forces producing it, by M. Becquerel (fourth paper on the subject).—A note by H. Sainte Claire Deville, on the alloys of platinum and iron.—Researches on the fatty acids and their alkaline salts, by M. Berthelot. The subject is treated at length, and the formation of sodium, ammonium, and barium salts, both in solution and in the solid state, is considered.—On acetic anhydride, by the same; account of new experiments to determine the heat evolved during the transformation of acetic anhydride into acetic acid.—A note by M. de Lecaze-Duthiers, on the origin of the vessels in the tunica of simple Ascidia.—On the simultaneous formation of several mineral species in the thermal source of Bourbonne-les-bains (Haute-Marne), specially of galena, anglesite, pyrites, and silicates of the zeolite family (notably of chabasite), by M. Daubrée (second paper).—On a peculiar mode of excretion of gum arabic, by the *Acacia Vereh* of the Senegal, by M. Ch. Martins.—Report by M. Milne-Edwards, on the measures proposed to prevent the invasion into France of the American insect *Doryphora*, which destroys the potatoes.—M. Mouchez, the chief of the expedition sent to St. Paul to observe the transit of Venus, was then received by the President, who welcomed him in the name of the Academy. M. Mouchez read a long paper on the subject, giving all the details of the transit. He specially described the optical phenomena observed in the vicinity of the contacts, and brings home no less than 489 photographic proofs that can all be utilised for micrometrical measurements. The two interior contacts were observed with great precision, the two outer ones having been rather spoiled by clouds. Altogether this expedition may be considered highly successful.—On the geometrical solution of some new problems relating to the theory of surfaces, and depending upon infinitesimals of the third order, by M. Mannheim (second paper).—On the simplest modes of limit equilibrium which can be present in a body without cohesion and strongly compressed; application to a mass of sand filling the angle between two solid planes and movable round their line of intersection as axis; by M. J. Boussinesq.—A memoir on the formulæ of perturbation, by M. Emile Mathieu.—Micrographic study on the manufacture of paper, by M. Aimé Girard.—On the action of sulphate of ammonia in the culture of beet-root, by M. P. Lagrange.—A note by M. F. Fouqué, on the nodules

of wollastonite, fassaite pyroxene, melanite garnet of the Santorin lava.—On the immediate treatment of intestinal obstruction, by the aspiration of the gases from the intestines, by M. Demarquay.—A memoir, by M. Michal, on the determination of the results of several observations, with special reference to the precision of the result.—A note, by M. L. Berthout, on the discovery of a deposit of fossils in the plain of Ecouché, in the arrondissement of Argentan (Orne).—A number of members then made various communications on Phylloxera.—The Minister of Public Instruction addressed to the Academy a project of a medal in commemoration of the Transit of Venus.—The Minister of Public Works sent a report of the Commission charged with the proposal of measures to be adopted to prevent the infection of the River Seine in the neighbourhood of Paris.—On certain left perspectives of plane algebraic curves, by M. Halphen.—On some properties of curves traced on surfaces, by M. Ribaucour.—On diffraction and the focal properties of nets, by M. A. Cornu.—On the magnetising function of tempered steel, by M. Bouty.—On the determination of the quantity of magnetism in a magnet, by M. R. Blondlot.—On the theory of storms; a reply to M. Faye, by M. H. Peslin. M. Faye, who was present, then made some observations on the same subject.—On some double stars whose motions are rectilinear, and are due to a difference in proper motion, by M. C. Flammarion.—On the identity of the bromo-derivatives of the hydrate of tetrabromethylene with those of perbromide of acetylene, by M. E. Bourgoign.—On the quantities of heat evolved in the decomposition of the chlorides of some acids of the fatty series, by M. L. Longuinine, specially referring to butyric, isobutyric, and valeric acids.—On amylogene, or soluble starch, by M. L. Bondonneau.—On a new method of volumetric analysis of liquids, by M. F. Jean.—Chemical researches on the absorption of the ammonia of the atmosphere by the volcanic soil of the solfatara of Puzzola, by M. S. de Luca.—A reply to two recent communications of M. Béchamp, relative to spontaneous alterations of eggs, by M. U. Gayon.—Observation of the life of *Heloderma horridum*, Wiegmann, by M. Sumichrast, reported by M. Bocourt.—On the helminthological fauna of the coasts of Brittany, by M. A. Villot.—Critical observations on the classification of Palæozoic Polyps, by M. G. Dollfus.—MM. Dumay and Martin de Brettes then made some communications relating to the bolide seen on February 10 last.—A note, by M. Neyreneuf, on the combustion of explosive bodies.—A number of scientific works were presented to the Academy by several gentlemen.

## BOOKS AND PAMPHLETS RECEIVED

COLONIAL.—Microscopical Notes regarding the Fungi present in Opium Blight: D. B. Cunningham, M.B., Surgeon H.M. Indian Medical Service (Calcutta).—Geological Survey of Canada; Report of Progress for 1873-74 (Dawson Brothers, Montreal).

## CONTENTS

	PAGE
DEEP-SEA FISHING	421
JARDINE'S "PSYCHOLOGY OF COGNITION." By DOUGLAS A. SPALDING	422
WHITE'S "SELBORNE"	423
OUR BOOK SHELF:—	
Cunningham's "Opium Blight Fungi"	424
Bottomley's "Logarithmic Tables"	424
LETTERS TO THE EDITOR:—	
A Gyrostat Problem.—Answer (With Illustration)—D. M'FARLANE	424
The Sounds of the String Organ.—HERMANN SMITH	425
The Law of Muscular Exhaustion and Restoration.—G. HINRICHS	426
The Height of Waves.—ARTHUR K. GRANVILLE	427
Thermometer Scales.—S. G. DENTON	427
Accidental Importation of Molluscs and Insects.—Dr. F. BUCHANAN	427
WHITE	
Fall of a Meteor at Orleans.—HERBERT M'LEOD	427
Proposed Aquarium in Edinburgh.—RALPH RICHARDSON	427
Acherontia Atropos.—FRED. P. JOHNSON	427
Destruction of Flowers by Birds.—P. E. M.	428
OUR ASTRONOMICAL COLUMN:—	
Southern Double Stars	428
Variable Stars	428
Minor Planets	428
DANIEL HANBURY, F.R.S.	428
TWENTY-THREE HOURS IN THE AIR. By W. DE FONVILLE	429
ON A PROPELLER IMITATING THE ACTION OF THE FIN OF THE PIRATE-FISH. By Prof. A. H. GARROD (With Illustrations)	429
THE NEW STANDARD SIDEREAL CLOCK OF THE ROYAL OBSERVATORY, GREENWICH (With Illustrations)	431
ARCTIC VEGETATION	433
NOTES	
ACCIDENTAL EXPLOSIONS. By Prof. F. A. ABEL, F.R.S.	436
SOCIETIES AND ACADEMIES	439
BOOKS AND PAMPHLETS RECEIVED	440

ERRATUM.—Vol. xi. p. 493, col. 2, lines 10 and 11 from bottom, for "work" read "rock."