WE learn from the Annual Report of the Moscow University that the number of students at the University was, during 1878, 1,643, with 108 professors; 318 of them were in the Jurisprudence Faculty, 131 in the Philological, 240 in the Physico-Mathematical, and 954 studied Medicine. No less than 62 medical students have taken part in the last war; the majority of students are very poor, and 417 of them received pecuniary help which has reached, during the year, the sum of 11,500*l*.

SCIENTIFIC SERIALS

American Journal of Science and Arts, January, 1879.—Prof. Loomis's important paper in this number on storms on the Atlantic, &c., has been noticed elsewhere. Prof. Marsh (in an appendix) describes a new order of extinct reptiles (*Sauranodonta*) from the Jurassic formation of the Rocky Mountains; they closely resemble Ichthyosaurus (of which no remains have hitherto been found in America), but are without teeth. The same author continues his "Principal Characters of American Jurassic Dinosaurs."—Prof. Greene, of Troy, New York, describes a paper dome constructed from his plans for an astronomical observatory. The paper covering is in sixteen equal sections, the framework of each section consisting of three ribs of pine meeting at the apex. There are also a circular sill at the base and two parallel semicircular arch girders spanning the dome (all of pine). The entire structure weighs about 4,000 lbs. The dome is supported on six 8-inch balls rolling between grooved iron tracks by direct pressure.—Mr. Edison describes his tasimeter as applied to measuring the heat of the stars and of the sun's corona.—Mr. Fontaine writes on the mesozoic strata of Virginia, and Mr. Holden on the brightness and stellar magnitude of the third Saturnian satellite.—A list of fifty species of east coast fishes (many of them new to the fauna) is supplied by Messrs. Goode and Blan.—In the "Miscellaneous Intelligence" will be found the report of the committee appointed to consider the scientific surveys of the United States territories.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 23.—"On the Microrheometer." By J. B. Hannay, F.R.S.E., F.C.S., lately Assistant Lecturer on Chemistry in the Owens College, Manchester. Communicated by H. E. Roscoe, LL.D., F.R.S., Professor of Chemistry in Owens College, Manchester.

In this paper the author reviews the work done by chemists and physicists in determining the relation between the chemical composition of a liquid and its rate of flow through a capillary tube. Poiseiulle[1] ascertained, in a very accurate manner, all the physical laws relating to the rate of flow, as regulated by temperature, pressure, and dimensions of the tube; but on examining saline solutions he could make nothing of the numbers presented, because he used percentage solutions instead of solutions proportional to the equivalent of the body dissolved. Graham,[2] noticing that Poiseiulle had discovered a hydrate of alcohol by running various mixtures of alcohol and water through the tube, examined mixtures of the various acids with water, and found that the hydration proceeded by distinct steps of multiple proportions. Several others, notably Guerout,[3] have since worked on the same subject, but as they have only worked on organic liquids, and have done all the rates at the same temperature, the results throw no light on the phenomena. Thus water runs about five times as quickly at 100° as at 0°; and in a series of alcohols, such as Guerout experimented upon, the differences between their boiling points were very great, so that, their vapour tensions or molecular mobilities being quite incomparable while at the same temperature, the experiments do not admit of any real interpretation. The author reserves the organic part of the investigation, which requires the determination of vapour tensions, till a future paper, and in the present deals with saline solutions.

The phenomenon of the flow of liquids through capillary tubes has been called in this country transpiration, while in other countries no distinct name has been adopted; and as the English word is already in use in French for another purpose, and properly applies to gases (the laws relating to which are quite different), the author proposes to use for liquids the term "Microrheosis," from μικρός and ῥέω, the instrument being called the microrheometer. The form of apparatus which the author finally adopted is figured in the paper, and is so arranged that when the liquid is introduced, as many experiments as may be desired may be tried, and the pressure and temperature, as well as the atmosphere in which the experiment is conducted, may be varied, while the thermometer indicating the temperature is at the mean point of the system. The author gives a curve for water from 0° to 100°, the differences of rate being smaller as the temperature rises.

Various salts are then examined, being dissolved to form "normal" solutions; but as the solubility of some salts is too low for such solutions, the effect of the amount of salts dissolved is determined. This is found to be directly proportional to the amount of salt in solution. Values for many salts in solution are then given, each number being the mean of ten experiments, and the probable error of the mean is calculated in each case. The conclusions arrived at are these. The rate of flow does not depend on any of the "mechanical" features of the salt, such as crystalline form, specific volume, solubility, &c.; but upon the mass of the elements forming the substance and the amount of energy expended in its formation. Each element has a value of its own, which is continued in all its compounds. Thus all the salts of potassium and sodium formed by the same acids have a constant difference. In like manner each metalloid and acid radicle has a value which is continued in all its combinations. Then the greater the combining value of an element the quicker is its microrheosis; thus potassium has a higher rate than sodium, barium than strontium, strontium than calcium, and so on. The microrheosis also varies with the amount of energy in the compound; thus nitrates stand highest, as they contain most energy; then chlorides; and, lastly, sulphates, which are exhausted compounds.

The instrument, bringing to light as it does the fundamental relations of combining weight and energy in chemical action, will be of the utmost importance in chemical physics, as by its use not only will the amount of energy evolved in reactions be determined, but the mass combined; or, in other words, the chemical equivalent of the elements involved will be found.

February 6.—"On certain Dimensional Properties of Matter in the Gaseous State." By Osborne Reynolds, F.R.S., Professor of Engineering at Owens College.

Mathematical Society, February 13.—C. W. Merrifield, F.R.S., president, in the chair.—Sir J. Cockle, F.R.S., was admitted into the Society.—Mr. R. Hargreaves and Prof. W. E. Story were proposed for election.—Dr. Hirst, F.R.S., communicated a paper by M. Halphen on the number of conics which satisfy five independent conditions.—Sir J. Cockle spoke upon a construction for making magic squares. Messrs. Cayley, Harley, Henrici, Roberts, Hart, and other gentlemen took part in a discussion on the subject. Prof. Henrici, F.R.S., gave some properties of frames.—Prof. H. J. S. Smith, F.R.S., read two papers on a modular equation and on the formula for four Abelian functions.—Mr. J. J. Walker communicated a quaternion proof of Minding's theorem.

Linnean Society, February 6.—Prof. Allman, F.R.S., president, in the chair.—Mr. J. R. Jackson exhibited specimens from the tombs of ancient Thebes. Among these were fruits of the Doum Palm (*Hyphæne thebaica*) and of *H. aigun*, formerly, but wrongly, described as an *Areca*. Small berries also obtained were identified as those of *Juniperus phœnicea* as against those of *J. excelsa*.—Mr. J. G. Baker showed dried bulbs of *Buphane toxicarea*, which furnish a principal ingredient of the poison the Bushmen of South Africa tip their arrows with. Structurally, the numerous tunics of the bulb are a peculiarity. The range of this plant has been found to be as far north as Lake Tanganyika. In Sir C. W. Strickland's hothouse a plant flowered last year, and this for the first time in England.—Mr. W. T. Thiselton Dyer shortly described specimens of, and pointed out the special characters and probable advantages of, a new fodder grass, *Euchlæna luxurians*, and he also exhibited and made remarks on curious instruments used for weaving fibre of *Curculigo latifolia* by the natives of Borneo.—Mr. T. Christy drew attention to a sample of tea grown in Natal, and to a bottle of the milky secretion of the African Rubber Tree (*Landolphia*), the same having been freshly drawn from the living plant and immediately thereafter forwarded to this country; slight coagulation of the juice had nevertheless occurred.—The Rev. G. Henslow passed round for examination a specimen of female

[1] *Ann. de Chim. et de Physique*, [3], t. vii. 50.
[2] *Phil Trans.*, 1861, p. 373.
[3] *Comptes Rendus*, lxxix. p. 1201; lxxxi, p. 1025.