The institute has no endowment fund except a few hundred pounds and is dependent for its income upon contributions from companies and donations and subscriptions, an increase in which is appealed for.

BECAUSE of a year's delay in obtaining radium for the Marie Curie Radium Institute of Warsaw, for which Mme. Curie was given $50,000 in 1929 by a group of Americans, the hospital will not be able to open its doors until December. The delay is said to have had its advantages, however, for the interest on the money will be sufficient to purchase platinum screens for the radium when it becomes available.

MAJOR-GENERAL MERRITTE W. IRELAND, Medical Corps, U. S. Army, states that the "Index Catalogue of the Surgeon General's Library" is to be continued, after consideration of replies to his recent letter of inquiry. Ninety per cent. of institutions and organizations addressed expressed an earnest desire for a continuation of the catalogue. A new series will be started after the completion of the present, or third, series.

AN Associated Press dispatch reports that Premier Mussolini, on receiving plans for the dental clinic for which Mr. George Eastman, of Rochester, N. Y., gave $1,000,000, ordered the opening for October 28, 1932, the tenth anniversary of the Fascist march on Rome.

CHRISTIAN MICHELSEN, formerly prime minister of Norway, has instituted a fund of 5,500,000 crowns for scientific research. The statutes of the institute to which the funds are to be given contain a provision to the effect that the board may grant yearly contributions to Norwegians interested in research work.

A DECISION was handed down by the Court of Claims on June 16, 1930, in a test suit brought by the Cosmos Club, Washington, which holds that it is not a social, sporting or athletic club within the meaning of the Internal Revenue Act providing for taxes on dues and initiation fees of members of a social, sporting or athletic club and that therefore the ten per cent. tax on dues and initiation fees of members which heretofore has been exacted should be returned by the government.

A DECISION resulting from the refusal of Harvard University to accept a gift in a will to endow courses for instruction in eugenics has been handed down by the Supreme Court of Pennsylvania in the cases of Mears' Estate, in which the court held that the gift was one which must be deemed to be for a charitable use, and that since the specific purpose had failed because of Harvard's rejection of the gift, the court would name another medical school to carry out the charitable intent of the testator.

DISCUSSION

EARLY DEFINITIONS OF THE MATHEMATICAL TERM ABSTRACT GROUP

WHILE science is international it is always of some interest to consider the question in what country certain fundamental ideas were first published. For instance, it is well known that English and German writers were inclined for many years to claim for their own respective countries the discovery of the calculus under the leadership of I. Newton and G. W. Leibnitz, respectively. Hence it is of some interest to note here that the honor of the discovery of abstract group theory seems also to be shared by these two countries, although up to the present time it has been customary to credit German writers alone, especially L. Kronecker (1870) and H. Weber (1882 and 1893), for the earliest publications of sets of postulates relating to abstract groups. Sometimes G. Frobenius (1887) has also been thus credited.

This credit entails, however, a striking anomaly in the history of group theory since it is universally admitted that the English writer A. Cayley was the first to publish a complete determination of the possible abstract groups of all the orders which do not exceed certain small numbers, publishing this determination for the orders less than 8 in 1854 and for order 8 in 1859. It is obviously impossible to determine rigorously all the abstract groups of a given order without employing a definition of the technical term abstract group, and such a definition implies a set of postulates. What is perhaps a still more striking anomaly in the history of group theory is the fact that A. Cayley is commonly given credit for the earliest proof (1854) of the fundamental theorem that every abstract group of finite order can be represented as a regular substitution group, and such a proof seems to imply a set of group postulates.

This proof results directly from the well-known group table which was used by A. Cayley in 1854, and hence it seems to imply that a set of group postulates was known in England at that time. As a matter of fact it is not difficult to see that A. Cayley used here substantially the same set of postulates for a finite group as the one which was published later by H. Weber in the *Mathematische Annalen,* volume 20 (1882), page 302. It is true that A. Cayley's postulates were not as clearly formulated as some of those which were published later and that he restricted his attention to groups of finite order. On the other hand, the set of postulates which was published by L. Kronecker in 1870 and which has been widely quoted

as the earliest set of abstract group postulates is not only restricted to groups of finite order but also to commutative groups of such orders.

One of the most fundamental postulates relating to group theory is that the elements of a group must obey the associative law but not necessarily the commutative law when they are combined. This postulate is explicitly stated in the usual form by A. Cayley in the article under consideration. The postulate that the product of two elements of a group is equal to an element thereof is also stated here in the usual form. As a third postulate A. Cayley assumes here that if $axb = ayb$, where a and b are two elements of the group, then $x = y$ if one of them is an element of the group. As he assumed that every integral power of each element of the group is in the group he could readily prove that the identity is also therein, and hence a group postulate commonly given now results from his third postulate noted above by letting a and b represent successively the identity.

The main object of the present note is to exhibit some of the reasons for saying that the earliest set of group postulates was due to A. Cayley and thus to make the historical statements relating to the early developments of abstract group theory appear more harmonious. It is commonly said that the earliest treatise on abstract group theory is the "Theory of Groups of Finite Order," by W. Burnside, 1897. This would seem to imply that as far as group theory is concerned the tendency towards the abstract was more marked in England than in the other European countries. At any rate, it is interesting to note that notwithstanding the great importance of the groups of infinite order the earliest definitions of abstract groups both in England and in continental Europe were restricted to groups of finite order.

It may be desirable to add to the above a brief explanation of the technical term abstract group. This term implies not only that no attention is paid to the applications in the theory of these groups but also that no properties of their elements are considered therein except those relating to the laws which these elements obey when they are combined. Such a group can therefore not exist without its corresponding set of postulates. It is interesting to note that while a large number of different sets of postulates has been proposed these sets have nearly always been equivalent and differed from each other only as regards simplicity or redundancy. Hence no serious diversity in developments has as yet arisen on account of the adoption of different definitions of the term group. It is true that the term group is also sometimes used in the mathematical literature with such a general meaning that no extensive theory can as yet be based thereon. This is done, for instance, in the *Encyclopédie des Sciences Mathématiques*, tome 1, volume 2, page 243. The preceding remarks have obviously no contact with this definition.

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SELENITE FRAGMENTS OR CRYSTALS AS CRITERIA OF WIND ACTION

STUDENTS of geomorphology are naturally interested in and seeking for criteria which may be used to interpret the origin and history of land forms. Various criteria of wind action have been and are now being used by students of geomorphology to establish the effectiveness of the wind as the chief agent in producing and destroying the land forms of arid regions. Among such criteria may be mentioned the following: wind-worn stones, collar-studs, vermicular or arabesque limestones, stone lace, stone lattice, lag gravels or desert pavements, pedestal rocks, niches and caverns, jardang or sphinx rocks, dunes, ridge and hollow type of topography, depressions or lake basins, etc. It is not the purpose of this short paper to discuss the merits of these phenomena as criteria of wind action, but it is sufficient to say that some of them, such as pedestal rocks, niches, vermicular limestones, stone lace and stone lattice, have lost much of their critical value as a result of detailed studies.[1]

Experiments performed by Schoewe at Harvard University last winter on the formation of dreikanter or ventifacts by means of an artificial sandblast have suggested a new criterion which may be used to indicate the presence or absence of wind action. In the course of these experiments, several substances were introduced into the sandblast for the purpose of studying the rate and also the general effect of abrasion by sand. Bright, glistening cleavage fragments of selenite were immediately frosted. The effect took place so rapidly that it is inconceivable that bright selenite fragments could exist in an area having any effective action by windblown sand. In arid regions the optimum condition obviously exists for the formation, preservation and accumulation of selenite crystals or cleavage fragments at the surface.

Gypsum is soluble in rain water, as noted by Lahee,[2] who proved that granular gypsum was dissolved at the rate of one inch (25.4 mm) in twenty-eight years in Stonewall County, Texas, where the rainfall is twenty-three inches (584.2 mm) a year.

[1] Kirk Bryan, "Pedestal Rocks in the Arid Southwest," U. S. Geol. Survey, Bull. 760, 1923, pp. 1–11; "Pedestal Rocks in Stream Channels," U. S. Geol. Survey, Bull. 760, 1923, pp. 123–128; "Pedestal Rocks Formed by Differential Erosion," U. S. Geol. Survey, Bull. 790, 1926, pp. 1–19; "Niches and Other Cavities in Sandstone at Chaco Canyon, New Mexico," *Zeitschr. f. Geomorphologie*, 3: 125–140, 1928; B. G. Esher, "Über des Reliefs auf den sogenannten Rillensteinen," *Geol. Rundschau*, 4: 1–7, 1913.

[2] F. H. Lahee, "The Rate of Solution of Gypsum," *Jour. Geol.*, 33: 548–549, 1925.