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.

G. A. MILLER

UNIVERSITY OF ILLINOIS

## 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.

Most areas in the United States characterized by selenite fragments have annual rainfalls of from five to fifteen inches (125 to 375 mm). Obviously none of the fragments can lie on the surface for any great number of years and still remain bright and glistening, since they will be gradually dulled by solution. Even this short time is long compared to the few minutes necessary for frosting by the sandblast.

Hence it is safe to conclude that bright, glistening fragments or crystals signify an absence of effective wind action. The presence of these fragments of selenite in the vicinity of niches and pedestal rocks, such as occur at so many localities in the Cretaceous, Jurassic and Triassic areas of Western United States, might be used as indicative of the general absence of effective wind scour.

WALTER H. SCHOEWE
UNIVERSITY OF KANSAS

KIRK BRYAN
HARVARD UNIVERSITY

## ARE PLANETS RARE?

THE latest statement of Professor Arthur H. Compton as reported in the *Literary Digest* under the title, "Science's New View of Evolution," should not be allowed to pass without comment.

That a directive intelligence is evident in the universe is undoubtedly held by a great majority of scientists; but that the new principle of uncertainty "which disputes the uniformity of the physical world" supports this view many of us might be disposed to question. The unity of the universe, as shown by the absolute unchangeableness of natural law, has been held from the time of Newton to be one of the strongest arguments for the existence of God.

Leaving this aside, however, I seriously question Professor Compton's statement in regard to the rare occurrence of planets. He says, "Though astronomers tell us that there are millions of millions of stars in the sky, a planet is a very rare occurrence, and a planet on which life can exist is even more rare."

No telescope, unfortunately, will show us the planets of other suns. Our views on the subject must be based on what we find in our own system. Here we have eight major planets revolving about the sun, and six of these have satellites forming miniature solar systems. Does this look as though such systems were a freak of nature—a rare occurrence? That double stars have planetary systems may be doubtful, but there is absolutely no reason for the assumption that the formation of families of attendant worlds may not be the ordinary course of evolution for the single stars.

As for life on these worlds, we have in our system one out of eight that is fitted for the support of life, and another, Venus, which may be habitable. Why should the proportion be different throughout the universe? Surely the success of the noble experiment of life on the earth has not been so notable that we may not hope for better results elsewhere.

JERMAIN G. PORTER
THE CINCINNATI OBSERVATORY

## VIABILITY IN EGGS OF AEDES CAMPESTRIS DYAR AND KNAB (CULICIDAE)

ON July 12, 1928, adults of *Aedes campestris* were caught as they came to feed, allowed to engorge and then isolated over water. Four days later eggs were laid. These were placed in pond water in tightly stoppered glass vials and stored in a cold chamber in which the temperature fluctuated between 0° and 10° C. In March, 1930—twenty months after they were laid—the vials were unstoppered and placed at 22° C. Within twelve hours about 25 per cent. of the eggs hatched, and during the ensuing five days several additional eggs hatched into healthy, vigorous larvae, which duly matured.

*Aedes campestris* constitutes one of the dominant species in the plains areas in Montana, and this remarkable viability of the eggs merely complicates the problem of efficient control.

G. ALLEN MAIL
ENTOMOLOGY DEPARTMENT,
MONTANA STATE COLLEGE

## THE MITOSIS FOUND IN HYDRA

THE endoderm and ectoderm of hydra each present epitheliomuscular and interstitial cells. The mitosis occurring in epitheliomuscular cells is quite typical for a dividing metazoon cell. The interstitial cells, however, present a mitosis that is more primitive. The mitotic figure of an interstitial cell lacks asters, centrosomes and centrioles, despite the fact that spindle fibers converge sharply at the poles. Moreover, the primitive condition of the mitosis of the interstitial cell is seen in the fact that the prophases appear within the original nuclear area. A marked characteristic of the mitosis of the interstitial cells is that its spindle fibers persist even after the daughter nuclear membranes have been formed. The daughter cells themselves are linked together by a persistent spindle. This vestigial spindle eventually disappears and the daughter interstitial cells lie contiguous but free.

CARL H. MCCONNELL
MILLER SCHOOL OF BIOLOGY,
UNIVERSITY OF VIRGINIA