second per second. The physicists, however, who use this term in the same sense, also use it indiscriminately in an entirely different sense, namely, to express a change of direction of a moving body, without any regard as to whether there is any change in speed or not. Thus the physicist will refer to the existence of acceleration when to the engineer there is none. A case in point is the revolution of a fly wheel at a constant speed, the rim of which to the physicist is being constantly accelerated while to the engineer there is no acceleration, as the speed is constant.

The physicist argues, and quite correctly, that a moving body represents a vector quantity, as it has both speed and direction. The same external force applied to such a moving body will change either the speed or the direction, depending upon the relative directions of that force and of the moving body. But as force is defined as mass $\times$ acceleration, the physicist, apparently forgetting the difference between pure and applied mathematics, methodically divides this force by the mass and calls the quotient acceleration. It simplifies his mathematics.

Such blind applications of pure mathematics, however, sometimes lead to absurd results. In the present case, if this external force is applied in the direction of the movement of the body, it adds energy to the moving system, as in the case of a falling body. This is the sense in which engineers use the term acceleration. But if this external force is applied perpendicularly to the direction of motion, no energy whatever is added to the moving system, as in the case of bodies rotating around a center.

The importance of this distinction is shown in the common term foot-pounds, the product of feet and pounds (of force). If both are in the same direction this product represents energy, while if perpendicular to each other it represents torque, which is decidedly not energy. The writer long ago suggested to use the term pound-feet, when it refers to torque, in order to call attention to the difference.

In the MLT system of dimension of physical quantities, force multiplied by length gives energy; hence torque has the dimension of energy, when as a fact they are two entirely different physical quantities. The reason for this inconsistency is that in this system an angle has no dimension, yet we know that torque (which is not energy) when multiplied by an angle gives energy, hence an angle must have some dimensions. This is one of the serious shortcomings of that system. It is also the cause of the double use of the term acceleration.

When force is defined as mass $\times$ acceleration, it should be understood that the angle is eliminated by being zero; acceleraton is then always a change of speed, the sense in which the engineer uses that term. A new term should be used when the force is at right angles to the direction of motion, in which case it adds no energy to the system and produces no change in speed, but merely a change of direction. For any angle between 0 and 90° no further distinction is required as the resultant then is always the vector sum of the two components at 0 and 90°.

Such a distinction between these two different meanings of acceleration is very desirable in order that the engineer and the physicist may always understand each other without confusion.

Carl Hering

Philadelphia,
October 7, 1919

AN ORNITHOMIMID DINOSAUR IN THE POTOMAC OF MARYLAND

A recent study of some of the dinosaur specimens in the United States National Museum from the Arundel formation of Maryland has led to a discovery of more than ordinary interest. It is the recognition of an undoubted Ornithomimid dinosaur, the first representative of this group to be found east of the Rocky Mountain States, or geologically below the Judith River formation of the Upper Cretaceous.

The materials on which this determination rests consist of various bones of the hind foot, pertaining to more than one individual. Originally some of these elements were in-

cluded among the cotypes on which Marsh[1] founded the species *Allosaurus medius,* but in 1911 they were removed from the Theropoda by Lull[2] to the Ornithopoda, and with other bones made the cotypes of the new species *Dryosaurus grandis.* I had never been satisfied in my own mind that these bones pertained to a herbivorous dinosaur but it was only recently that I have had the opportunity of comparing them with Ornithomimid materials. Through the courtesy of Mr. Walter Granger, of the American Museum of Natural History, I was enabled to compare these foot bones with those of the genotype of *Struthomimus altus* (Lambe) and other Ornithomimid foot materials from the Belly River and Edmonton formations, and in every instance have found such close resemblances as to leave no doubt of their Ornithomimid affinities, a view concurred in by Mr. Barnum Brown, of the above institution.

In an extended paper on the carnivorous Dinosauria contained in the collections of the U. S. National Museum, now in press, these bones are discussed in detail and are there tentatively assigned to the genus *Ornithomimus.*

The recognition of this Ornithomimid dinosaur led to an investigation of the other members of the Arundel fauna and the preliminary study appears to show that there are at least three other dinosaurian forms having Upper Cretaceous affinities.

The presence of dinosaurs with Upper Cretaceous affinities, associated with Sauropod dinosaurs (*Pleurocœlus*) is a combination previously unknown, but whether it means that the Sauropoda lived on to a much later time than we had previously suspected or whether we have in these dinosaurs of Upper Cretaceous affinities the progenitors of the Judith River (Belly River) forms, I shall reserve judgment until a critical study of the whole fauna, now in preparation, is completed.

[1] *Amer. Jour. of Sci.* (III.), Vol. XXXV., 1888, p. 93.

[2] Geol. Survey of Maryland, Lower Cretaceous, 1911, pp. 204–206, Fig. 7; Pl. 20, Figs. 1–4.

The Arundel formation is regarded by the most competent authorities to be Lower Cretaceous in age, and equally eminent paleontologists have correlated the Arundel fauna with the Morrison fauna of the Rocky Mountain region so that the conflicting evidence of these later discoveries promises to be of both paleontological and geological interest.

CHARLES W. GILMORE

U. S. NATIONAL MUSEUM,
October 4, 1919

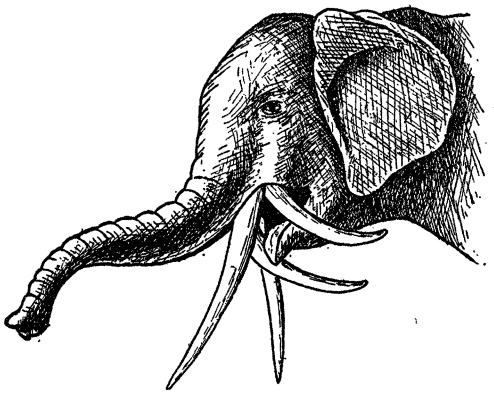
AN ELEPHANT WITH FOUR TUSKS

TO THE EDITOR OF SCIENCE: I have thought that the accompanying note with regard to the "elephant with four tusks," and its illustration would be interesting for SCIENCE to reproduce as an extraordinary record tucked away in a rather remote publication.

Picture and text are taken from "Sudan Notes and Records," Volume 2, number 3, July, 1919, page 231, and the account is there printed in Arabic with the accompanying translation. I am sure this will engage the attention of our many mammalogists and paleontologists.

JOHN M. CLARKE

On the 18th May, 1917, I went out shooting in the district of Sheikh Ako Mangara, in the Markaz of Yambio, in the village of Wakila Marbo, on the borders between Tembura and Yambio districts.



I met a herd of elephant which I followed, searching for a good one to shoot. I kept following them until they stopped near a pool of water, where they began to drink and throw mud on them-