quired ten minutes of time, and if we had exact measurements of angles and times we should undoubtedly from these curves be able to deduce the rate of rotation of the meteor, and possibly its mass.

Most of the aerolites that come to the earth show, by their pitted surfaces, that the meteoric material is being split off or ejected quite uniformly from the whole surface; but some meteors, like some comets, may have only a very few regions on the surface from which material is ejected with any special force. In Mr. Davis's meteor of October 13 we seem to have a case in which some one spot on the side of the meteor, namely somewhere between its head and its tail, ejected its material freely and with considerable force, in a direction at right angles to the axis of rotation, or the line joining head and tail: it represents the rare case of a symmetrical revolving meteor.

CLEVELAND ABBE.

WASHINGTON, D. C.,
August 15, 1906.

SOME 'DEFINITIONS' OF THE DYNE.

IT would seem comparatively easy for any one whose mind has dwelt comprehendingly upon the relation $F = ma$ to define correctly the unit of force in terms of mass and acceleration. But such is evidently not the case. Of the text-books of physics immediately at hand, four give incorrect definitions of the dyne. In each case the author is a man of high and wide reputation as a writer and teacher. In quoting the definitions in question, I have taken the liberty of italicizing the words to be omitted with advantage.

(*a*) Force: dyne. 1 g. given unit acceleration *in 1 sec.*

(*b*) The practical unit of force is the dyne. * * * It produces unit acceleration of unit mass *in unit time.*

(*c*) The absolute unit of force (in the C. G. S. system) is called a dyne, and is that force which *in one second* is capable of giving to a gram-mass an acceleration of one centimeter per second.

(*d*) The absolute unit of force is the force that, acting *for unit of time* upon unit of mass, will produce unit of acceleration. * * * The centimeter-gram-second (C. G. S.) unit of force is the force that, acting *for one second* upon a mass of one gram, produces an acceleration of one centimeter per second. It is called a dyne.

The first two books are intended for universities and colleges, the latter two for preparatory schools, and all four, I believe, have been widely used.

It is perhaps proper to state that each of these authors gives a correct definition in terms of mass, time and change of velocity, but each seems implicitly to ignore the fact that acceleration is not change of velocity, but is *rate* of change of velocity. To conclude, the dyne is the force that, acting on a mass of one gram, gives to it C. G. S. unit acceleration (for which there is no name), irrespective of the time during which the force acts upon the mass, whether it be the millionth part of one second, or one million eons. $F = ma$, and when $m = 1$, and $a = 1$, then $F = 1$.

Similar errors are of course committed in defining the poundal. The text from which the quotation (*d*) above is taken gives:

The foot-pound-second (F. P. S.) unit of force is the force that, applied to one pound of matter *for one second,* will produce an acceleration of one foot per second. It is called a poundal.

And a fifth book, also for preparatory schools, states:

In the F. P. S. system the unit is the poundal, which is the force that on being applied to 1 lb. of matter *for 1 sec.* will give to it an acceleration of 1 ft.

In this last case, the same mistake is made in the general definition of the absolute unit of force, but the dyne, specifically, escapes with a defective definition in terms of mass, time and change of velocity.

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SPECIAL ARTICLES.

A PECULIAR MUTATION OF THE PINE MARTEN.

A TRAPPER'S skin, without skull, of a pine marten (*Mustela americana actuosa* Osgood) recently offered for sale to the National Museum by Mr. James Aitchison, Nulato, Alaska, differs strikingly from any marten skin in the museum collection, or elsewhere, so far as I am aware. The long bristly hairs are everywhere lacking on the skin, which bears about the same relation to a normal marten that a plucked beaver or seal skin does to an unplucked one. Coues[1] describes the pelage of the marten as consisting of three kinds of hairs:

> The first is very short, soft and wool-like * * * the second soft and kinky, like the first but very much longer, coming to the general surface of the pelt. The third is the fewer, still longer, glossy hairs, bristly to the roots.

The specimen in question entirely lacks the long glossy hairs, and possesses a very few only, of Coues's second variety of hairs, with soft kinky base and short bristly tip. The entire pelage is practically composed of the soft short underfur. The general color of the skin is not abnormal; the head, chest, legs and feet are perhaps a little darker brown than the usual run of skins. The general size and proportion of the skin differ in no way from that of a normal marten.

Marcus W. Lyon, Jr.

[1] 'Fur-bearing Animals,' U. S. Geol. Survey, Miscell. Pub., No. VIII., 1877, p. 82.

AN OBJECT-FINDER FOR THE MICRO-PROJECTION APPARATUS.

No doubt every one who has undertaken to project the image of a microscopic preparation directly upon a screen for class or lecture demonstration purposes has realized the difficulties in the way of rapid and accurate location of the exact part of the object desired. Indeed, this method of illustration is at present seldom made use of, owing chiefly to the great loss of time involved, and to the distracting effects upon the attention of the class or audience.

Some time ago the writer devised an attachment for the micro-projection apparatus which so effectually overcame the difficulties mentioned above as to render this method of demonstration quite as expeditious and precise as that with ordinary photo-micrographic or other lantern slides. With this condition assured, the advantages of the method are obvious. Inquiries regarding this apparatus have led to the belief that the publication of a description of it may be worth while. The following description and the accompanying figures represent the latest improved form of the attachment.

As indicated in the figures, this attachment consists of a rotary object stage and a secondary, short-range projector, mounted on the same base-board with the usual projection apparatus. The light is taken from the electric arc, or other illuminant, *L*, of the main projector, through the opening at the side of the hood. In place of the blue or purple glass commonly found in this opening, there is put a simple collimating lens. The parallel emergent rays are reflected by the mirror, *A*, into the line of the optical axis of the finder, which is parallel to that of the projector proper. By means of the condenser, *B*, these rays are brought to a focus at the position of the object on the revolving stage *C*. A good hand lens at *D* projects an image of the object upon the small screen, *E*, which need not be more than about thirty inches from the object. The plan of the base-board, Fig. 2, will make clear the arrangement of the parts.

Fig. 3 shows the plan of the rotary stage-plate, with four openings and spring clips for holding the slides in position. Fig. 4 represents a face-view of the screen, *E*, which has a dead-white surface, with the two centering lines in black. All the parts are mounted on telescoping pillars, and are made adjustable in position on the base-board.

The rotary stage-plate requires special care in its construction and mounting, as it must be both accurate and rigid. Fig. 5 shows the details of the mounting. On top of the heavy pillar is the sleeve, made from thick-walled brass tubing. On the ends of the sleeve are the two collars, *b* and *c*. Working in the sleeve is the shaft, which is held in position by the collar *a* and the nut *n*. The plunger, *p*, actuated by the spring, *s*, passes through the collars, *b* and *c*, and engages the collar *a*. Four holes are drilled in the collar *a* for the plunger, and these holes must be exactly