

A short truncated cone is made of wood, and the conical surface carefully whitened. The approximate dimensions of the cone in my apparatus are: lower base, 20 cm.; upper base, 15 cm.; height, 3.7 cm. The cone is cut in two along the axis, one-half reversed in direction, and the halves fastened together in this new position. The whole is then mounted so as to rotate about the axis of the cone, which is placed parallel to the photometer bar.

The figure represents the photometer. L and L' are the lights to be compared.

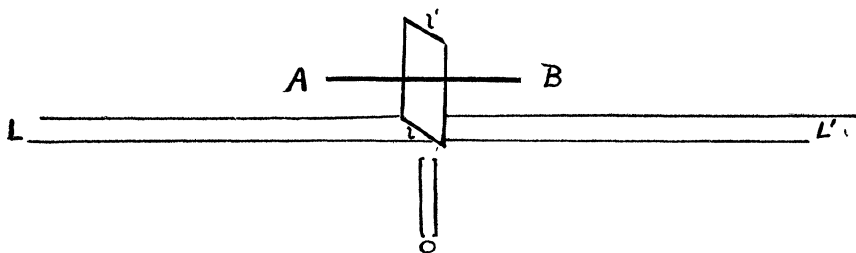


FIG. 1.

The cone, cut and reversed as described, revolves about the axis AB. The plane of division of the cone, as the figure is drawn, passes through this axis and is perpendicular to the paper. O is the eye-tube. When the instrument is in the position shown, *l* is in the field of view and is illuminated by the lamp L, but when the cone has made one-half a revolution *l'* is seen, which is lighted by the lamp L'.

While this instrument is compact and convenient for most photometric measurements, the disk form is superior for the comparison of pigments, as one of the fields consists simply of a card, which can be removed in an instant and replaced by another. Thus differently tinted papers can be easily compared in succession with the revolving disk, which may be of any color, but which in practice is generally white or gray.

I do not know whether it has been generally remarked that Captain Abney, in his

careful measurements of the distribution of brightness in the spectrum, seems to have used a method of observation closely akin to the flicker method, though apparently without perceiving its definite character or possibilities. His well-known color-patch apparatus places side by side two differently colored fields, the brightness of one of which can be rapidly varied by opening or closing the apertures in revolving sectors. I quote the following from his Tyndall lectures, delivered in 1894:

"By gradually diminishing the range of

the 'too open' to 'too close' apertures we arrive at the aperture where the two colors appear equally bright. *The two patches will cease to wink at the operator*, if we may use such an unscientific expression, when equality in brightness is established. This operation of equalizing luminosities must be carried out quickly and without concentrated thought, etc."

It seems probable that Abney, throughout these measurements, applied himself not so much to a careful comparison of the brightness of the two colors involved as to reducing to its faintest condition this *wink*, which differs little in its nature from a flicker.

FRANK P. WHITMAN.

#### BIOLOGICAL SURVEY OF LAKE ERIE.

ON July 1, 1898, the U. S. Commission of Fish and Fisheries will inaugurate a biological survey of Lake Erie, under the direction of Professor Jacob Reighard, of the

University of Michigan. Commissioner Bowers has allotted a liberal sum for the first season's inquiries, and will undoubtedly provide for a continuance of the work over several years. Professor Reighard will have associated with him Dr. H. B. Ward, of the University of Nebraska; Dr. H. S. Jennings, of the Montana College of Agriculture and Mechanical Arts; Dr. Julia Snow, of Ann Arbor; Mr. A. J. Pieters, of the U. S. Department of Agriculture, and a number of other assistants.

An elaborate plan for the study of the lake fauna and flora has been outlined and will be followed as closely as the circumstances permit. The work will extend over the entire year. Experimental work, similar to that conducted at agricultural experiment stations, will be a prominent feature of the survey, some of the problems to be considered being the rate of growth of fishes; the food of young fishes reared from the egg and the changes in their regimen during growth; the source of food of aquatic rooted plants; the life histories of food fishes reared in aquaria or ponds, and of certain aquatic insects and other invertebrates; the rate of increase of the plankton as a whole and of its individual constituents. There will also be systematic studies of the habits, migrations, distribution and food of the fishes and other organisms of the lake.

At the beginning of the work Professor Reighard and Dr. Ward will devote a considerable amount of time to plankton problems, especially the perfection of methods and apparatus; Dr. Snow will carry on experimental work on the algæ; Dr. Jennings will undertake experimental researches on the protozoa, and Mr. Pieters will pursue studies of the aquatic flora. The summer headquarters of the survey will be at the government hatching station at Put-in-Bay, South Bass Island, Ohio.

Lake Erie affords an excellent field for

work of this character, on account of its varied fauna, diversified physical features, extensive fishing interests, and the recent serious depletion of the supply of certain valuable food fishes. The investigations may ultimately be extended to some of the other Great Lakes.

H. M. SMITH.

U. S. COMMISSION OF  
FISH AND FISHERIES.

#### EUGÈNE FLACHAT.

THE committee on the inauguration of the monument erected to the memory of Eugène Flachat, of the *Société des Ingénieurs Civils de France*, issued invitations to scientific and professional colleagues on both sides of the Atlantic. The ceremony took place June 12th, at Paris, at the intersection of the streets named for Brémontier, Alphonse de Neuville and Eugène Flachat. We glean the following from the circular issued by the committee:

Flachat, one of the most famous, and justly so, of French engineers, was the designer of the now familiar I-section of rolled iron or steel beam, universally employed in construction.

Flachat was born in 1802. He exhibited his genius for construction, and his inclination toward engineering as a profession, in earliest childhood. As a school boy he was called upon to check the mathematical work of his master, and as a youth investigated the proportions of parts of structures and machinery with the greatest completeness and success. He became particularly interested in metallurgy, constructed the largest blast furnaces and mills of the Ardennes, organized the forges at Commeny and, with Barrault and Petiet, produced a great work, now classic, on the metallurgy of iron which is known by their names. He wrote many articles and brochures, some on economics and related subjects. His main occupation was the construction of railways; but he published descriptions of