

vision is made for the preservation of such perishable collections as dried specimens of insects. Under the present condition of things, it is actually unfortunate for the future of this science, when an enthusiast arises in some local museum whose care for and interest in these objects result in the accumulation of a considerable collection, often containing valuable types. At his death or removal, or possibly the failure to retain his early ardor, the chances are ten to one that the collection will be ultimately destroyed. Even our best endowed institutions have failed to make any proper provision for the preservation of their collections of insects and stuffed animals, — the two departments of a natural-history museum which require eternal vigilance.

There are many valuable entomological collections in the hands of specialists in this country, which would find their way by gift, or by sale on easy terms, to the National museum at Washington, were any reasonable inducement held out to them. These collections contain material especially valuable for the future of descriptive entomology in this country. Within a few years many such collections have been sold, either to other private collectors, or perhaps to parties out of the country, to find their place in European museums, where they are insured perpetual care. It is only within three years that there has been even a nominal curator in charge of the collection of insects at the National museum; and the paltry collection of the department of agriculture was all the authorities at the national capital had to show for an entire department of natural history, and one abounding in its wealth of varied forms. The present curator has but an honorary office, and is without funds for the support of an assistant. Until provision is made for the proper conduct of this immense department of natural history at the national capital, the appointment of an honorary curator is worse than useless. It only deceives those who know no better, into the supposition that collections sent to the museum are insured proper care. They are not.

## LETTERS TO THE EDITOR.

*\*\* Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

### Verification of predictions.

THE vulnerable point about Mr. Doolittle's measure of success (given under 'Proceedings of societies' in this number of *Science*) seems to me to be his combination of the two differences of probabilities, —

$$\frac{c}{o} - \frac{p-c}{s-o} \quad \text{and} \quad \frac{c}{p} - \frac{o-c}{s-p}.$$

It appears clear to me that either of these differences may be taken alone, with perfect propriety, as the true measure, according as our concern is to test occurrences for successful prediction, or to test predictions for fulfilment. If we allow an importance  $n$  to the former test (limits of  $n$ , 0 and 1), so that an *ad valorem* change of  $\delta$  in this measure produces an *ad valorem* change of  $n\delta$  in  $i$ , and similarly an importance  $1-n$  to the latter test, these two quantities will enter as exponents, and

$$i = \left( \frac{c}{o} - \frac{p-c}{s-o} \right)^n \left( \frac{c}{p} - \frac{o-c}{s-p} \right)^{1-n}.$$

In my opinion, the value of  $i$  is not discoverable unless the value of  $n$  is given; and this is a subjective quantity. Assuming  $n = \frac{1}{2}$ , we have for  $i$  an expression equal to the square root of that given by Mr. Doolittle, and without the fault of giving no negative values to answer to perverse predictions.

HENRY FARQUHAR.

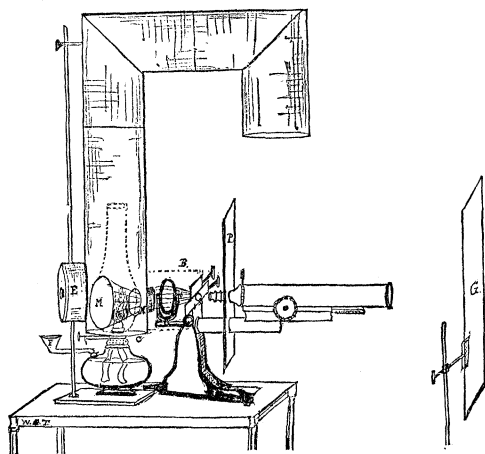
### The microscope for class-room demonstration.

The following adaptation of the use of the microscope as a sort of magic-lantern for class demonstration has been found so extremely useful, cheap, and practical, that it is illustrated here.

A large common kerosene 'duplex' lamp is the illuminator. Superfluous light is cut off by a piece of six-inch stove-pipe, which fits over the lamp-chimney, and rests upon a horizontal collar, *C*, of stove-pipe metal. The collar prevents the pipe from shutting down too far upon the lamp, which would cause the kerosene to become dangerously hot. The lamp is filled at *F* with a curved glass funnel; and the two flat wicks, an inch and a half broad, are turned by their separate keys outside of the pipe. The pipe has two elbows, which conduct heat and smoke away, and completely cut off the light from the top of the flame. These elbows may be rotated into any convenient position. Opposite the lamp-chimney a third short elbow, *E*, is inserted, closed by a movable cap. Through this elbow the chimney can be removed, the wicks trimmed, and a concave glass or tin reflector, *M*, four inches and a half in diameter, may be placed behind the flame. The flat of the wicks should be parallel to this mirror. Opposite the mirror, and directly in front of the flame, a plano-convex lens, *X*, two inches in diameter, is inserted in a hole in the pipe. The light reflected from the mirror, *M*, passes through this lens, and falls upon the reflector of the microscope, whence it is made to illuminate the object upon the glass slide in the ordinary way. The object is magnified by a one-fifth inch or one-half inch objective; the eye-piece of the microscope is removed; and the image is projected upon a ground-glass screen, *G*, a foot and a half square, which is placed from one to four feet in front of the microscope. The screen is supported by a perpendicular iron rod and cork-lined clamp, such as is in use in every chemical

laboratory, to hold glass retorts, tubes, etc. The iron rod rests upon the floor, occupies very little space, and can be moved to any convenient focusing distance. A similar stand supports the horizontal elbow of the stove-pipe. The tube of the microscope should be blackened inside as in micro-photography. The microscope is handled in every way as usual in respect to stage movement, fine adjustment, etc.

The great difficulty with the apparatus consists in trying to prevent the reflection of superfluous light. To obviate this, a pasteboard box, *B*, six by six by eight inches, is readily cut to fit closely over the plano-convex lens and the back of the microscope stage, thus enclosing the microscope reflector, and allowing it room to be focused properly when the lid of the box is removed. It is also advisable to fit a sheet of pasteboard, *P*, tightly over the microscope tube at right angles to it, in order to cut off the rays which escape around the object illuminated, pass along the axis of vision outside of the tube, and tend to blur the image on the screen.



*B*, outline of paper box to enclose mirror; *G*, collar to support stove-pipe; *E*, elbow through which chimney may be removed; *F*, funnel for filling lamp; *G*, ground-glass screen; *M*, reflector inside of stove-pipe (posterior surface); *P*, pasteboard screen; *X*, hole in stove-pipe where lens is inserted.

Dr. J. West Roosevelt (to whom the larger part of the ingenuity of this apparatus is due) and the writer have for some time made constant use of it for instructing students. Physiological, histological, pathological, and botanical specimens may be clearly shown. A number of students can look on at once. The slides are rapidly changed, and students and instructor may always be sure that they are discussing the same particular cell; which, unfortunately, is not the case when a beginner in the use of the microscope looks through the instrument alone. The apparatus may readily be constructed by any one for about five dollars: it is easily portable, and always ready for use in any darkened room. It is possible to throw the light from the lens *X* directly upon the object without the intervention of the microscope reflector, but the reflector facilitates focusing. Objectives of wide aperture are preferable. With some lenses, the use of the eye-piece adds distinctness, but in most cases it cuts out too much light. An Abbe illuminator may be inserted. The image on the screen *G* is seen most distinctly upon the farther side; and some objects become clearer if the screen

be moistened with water, or covered with a thin coat of transparent varnish laid over the ground surface. The image may also be received upon white glazed paper, but this is less clear.

For demonstration on a larger scale, an oxy-hydrogen light can of course be used, or some form of electric light. The arc-light is not sufficiently steady, and the incandescent light requires a great deal of storage-room for batteries. The light above described shines with thirty-six candle power, is clear and steady, and serves every ordinary purpose: the circulation in the frog's foot, varieties of epithelium, injected lung tissue, tubercle, plant-cells, etc., may all be clearly shown. The colors of stained or injected specimens come out distinctly.

The principle of this apparatus is by no means new; but its application is made so easily within the reach of any one who owns a microscope, that it is especially recommended to instructors in schools and colleges.

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### QUINTINO SELLA.

QUINTINO SELLA was born July 27, 1827, at Mosso Superiore, a little village on the Biellese mountains, and pursued his early studies at Biella, evincing a special aptitude for the classics. Later he completed a course of study in mathematics and physics at the Turin university, and obtained the degree of hydraulic engineer. He then entered the school of mines at Paris, and passed the following five years, partly in study, partly in travelling through Germany and England. His studies were much interrupted by the political excitement of 1848, and he was an interested witness of all the stirring events from the fall of Louis Philippe to the proclamation of the second empire. At Paris he made the acquaintance of Gastaldi, with whose co-operation he later founded the Valentino museum. After his return to his home in 1852, he would have entered the service of the royal corps of mining engineers; but Savoy being the only district vacant, and not being able, on account of private business and his somewhat impaired health, to reside there during the winter, he remained at Turin, where he became professor of geometry at the technical institute, and where he married Clotilde Rey. In June of the next year he went to Savoy, and remained till the autumn, when he was appointed temporarily professor of mathematics at the university of Turin. In 1856 he was admitted into the corps of mining engi-