Edward Bovalius of the Essequibo Exploration Company.

Progress above Cangaruma was retarded slightly by fever. A portage at Amatuk and another at Waratuk with two days paddling brought the expedition to Turkeit at the base of a series of Cataracts at the head of which is Kaieteur Fall, the show place of British Guiana. The Potaro here leaps 741 feet from the plateau to the Potaro Gorge below.

A portage of 2½ hours carries one from Tukeit to the Savannah above the falls. Mr. Schideler returned from this point to collect near the coast, while Professor Eigenmann continued with thirteen Indians to Holmia and Arnataima, the first cataract above Holmia.

Thorough collecting was undertaken in the Potaro above and below the Kaietue with the use of hooks, seines, dynamite and most effectively with Haiara, the poison used by the natives in their fishing. The expedition was thoroughly satisfactory although few photographs of fishes could be taken on account of the labor necessary to secure suitable specimens.

It is hoped that it will be made possible to continue the exploration of the Guiana Plateau which sends rivers over heavy falls to the Essequibo, Orinoco and Amazon from around Roraima, possibly the oldest land area of South America.

The bit of most satisfactory discovery is that Gasteropelecus, an aberrant characin, flies. This fish has the most amazing structure for a characin. It possesses huge pectorals, a tremendous "sternum" and pectoral muscles to correspond. It was frequently seen to dart from in front of the boat, float its pectorals while part of its tail and sternum remained in the water and then in the last five or ten feet of its 45-foot flight clear the water. As long as part of the fish remains in the water the pectorals touch the water with each stroke. Not the least interesting fact is that their line of evolution from generalized Characins is indicated by the still-existing genera like Chalceus and Pseudocorynosoma.

SPECIAL ARTICLES

SPECTRUM OF COMET MOREHOUSE

The spectrum of this comet has been under observation here since October 28, with the use of a Zeiss photographic doublet of 145 mm. aperture and 81 cm. focal length, made of "ultra-violet" glass, over which was placed a 15° objective-prism of the same glass and aperture. With an exposure of fifteen minutes the head of the comet then gave a sufficiently strong impression, showing a row of seven knots. With longer exposure the tail could be well traced from some knots until it ran off the plate, at a distance of 3°.

The absence of a continuous spectrum was striking, and on no plate thus far obtained has it been certainly visible. This indicates that during this period the reflected light has been exceedingly weak in both head and tail relatively to the intrinsic light due to the carbon and cyanogen bands.

A very small quartz spectrograph was also attached to the same telescope, and plates having the advantage of a comparison spectrum were obtained on four nights. Twenty-one satisfactory plates were obtained with the objective-prism on eleven dates. All the plates were made by Parkhurst, with assistance, when necessary, from Frost.

The measurements of wave-length are quite uncertain on account of the very small scale of the spectrum with either apparatus—only 2.5 mm. from $H\beta$ (λ 4861) to $H\theta$ (λ 3798) with quartz spectrograph (3.0 mm. with objective-prism)—but we have been surprised at the accordance of our measures on different plates. It is difficult to make settings on the edges of the cometary bands on account of their diffuseness, so that it is often necessary to be content with settings on the centers of the knots.

We regard the identification as certain for the third and fourth carbon bands (edges at λ 5165 and λ 4737) and the first, third and fourth cyanogen bands (λ 4601, 3883, 3590). These carbon bands are two of the three bands characteristic of cometary spectra, and often, perhaps generally, ascribed to a hydrocarbon. The other one, at λ 5635, did not affect our plates. We have measured other bands as follows:

Extending from about λ 4290 to λ 4250 with center at λ 4267.

Extending from λ 4030 to λ 3995 with center at about λ 4015.

Center at about λ 3915, less refrangible edge at about λ 3920.

Center at about λ 3795.

Those at λ 4267 and λ 3920 fall in the position of the only lines (as contrasted with bands) in the carbon spectrum in this region, but we do not regard this as an identification.

The tail extends out in very different intensities from some of the knots: thus λ 4737 has only a small extent of tail, but the knots at λ 4737 and 3883 give the appearance of a greater development than the others in the direction away from the tail, *i. e.*, toward the front of the head.

Otherwise the spectral images of the tail exhibit the same general structure shown by direct photographs of the comet on the same nights. No marked changes in the chemical constitution of the tail have been observed by us between October 28 and December 1. It is interesting to note, however, that this simple apparatus would have been competent to show any differences in constitution such as called for by Bredichin's theory, had it been used on September 16, when the direction of the tail changed through a large angle from its direction before and after that date.

A detailed account of our study of these plates, with reproductions of some of them, will appear later in the *Astrophysical Journal*.

EDWIN B. FROST,
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YERKES OBSERVATORY,
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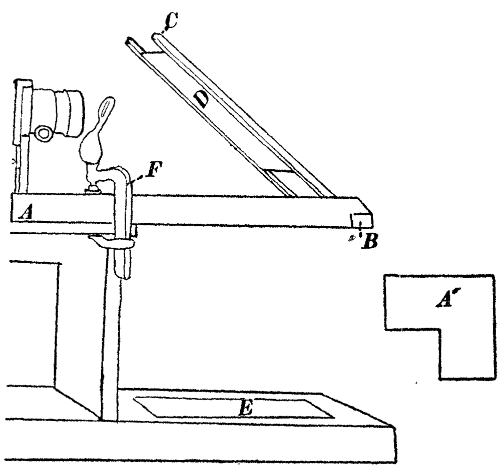
A SIMPLIFIED APPARATUS FOR DRAWING WITH THE AID OF THE PROJECTION MICROSCOPE

IN a number of laboratories there are in use devices for drawing by the aid of a projection lantern. These vary in complexity from a simple easel at which is traced the direct projection of the image, to comfortable dark rooms especially equipped for this work and with an apparatus for reflecting the image to the table at which the artist sits. The first type is inconvenient and fatiguing, the second, on account of both the expense and the space demanded, is not available in every laboratory. It was Professor S. H. Gage's complete and excellent equipment that suggested the here-described simple device, to be used in the lecture-room where the projection outfit stands, without duplication of apparatus or requirement of extra space.

It consists merely of a rod holding a mirror at an angle of exactly 45°, clamped to the stand which carries the projection lantern or the microprojection outfit. With this in use one may sit at a table in a darkened room and trace the projection of microscopic preparations, lantern-slides or of photographic negatives. A glance at the diagram will show the extreme simplicity of the parts involved.



A, shown also in end-section at *A'*, is a piece of wood two by two inches and about three feet long, grooved by means of a rabbet plane so as to clamp firmly to the lantern table (see *A'*). The arm *B* bears the two grooved strips *C* which carry at an angle of 45° the mirror *D*. This casts the image on the drawing surface *E*, where it may be traced with ease.

The magnification depends directly upon the distance of the drawing board from the mirror. Thus if the enlargement is two times when line *E–D* is ten inches, the image will be enlarged four times if line *E–D* is twenty inches.