being traceable to a male individual trapped at Silver Lake, Oregon. Since we thus have four yellows, in a total of sixteen young, it appears probable that the character is a simple recessive for which the male in question happened to be heterozygous.

The oldest mouse is now in post-juvenile pelage and appears, in color, to occupy a position between Sumner's yellow and pallid *Peromyscus* and to be comparable with dilute brown agouti *Mus*. The pattern of the individual hairs of the segregant is the same as that in wild mice, but the individual dark pigment granules are brown rather than black. A reduction in the intensity of the black pigment is noticeable also in the normally pigmented portions of the skin. The eyes are less protruding than in wild *Peromyscus*, are quite sensitive to light and appear slightly reddish when well illuminated. The new yellow mice appear to grow as rapidly and to be as vigorous as their normally colored sibs.

R. R. HUESTIS
ELIZABETH BARTO
UNIVERSITY OF OREGON

SCIENTIFIC BOOKS

A Study of the Solar Chromosphere. BY DONALD H. MENZEL, with an introduction by W. W. CAMPBELL. Publications of the Lick Observatory, Volume xvii, Part I, 1931.

DR. W. W. CAMPBELL'S photographs of the flash spectrum, made at Lick Observatory expeditions to solar eclipses in 1898, 1900, 1905 and 1908, form the observational sources for Dr. Menzel's study. In a brief introduction the director emeritus of the Lick Observatory and former president of the University of California discusses the "moving-plate" method of recording the flash spectrum, which he invented and effectively used at these eclipses. Pressure of administrative duties compelled him reluctantly to postpone and finally to relinquish the discussion of his flash spectrograms—but the course of research runs so much more smoothly than the conduct of administration that transformations of able research men into able administrators tend not only to restore the social balance but also to advance the ultimate security of research.

Dr. Campbell's "moving-plate" method of observing the flash will remain a primary contribution to eclipse technique. The interpretation of his splendid spectrograms has profited by the delay in discussion, thanks to intervening development of atomic theory; and in Dr. D. H. Menzel he has found a most competent investigator, who has carried the work to completion.

In mid-afternoon of August thirty-first, when the moon's shadow skimmed during twenty-five minutes southeastward from James Bay across Cape Cod, eclipse expeditions, carefully placed along its narrow and unfortunately not wholly unclouded track, attempted again to photograph the instantaneous or "flash" spectrum of the sun's upper atmosphere or "chromosphere." The flash spectrum was briefly seen just at the beginning, and again just at the end of totality, when the chromosphere was visible as a narrow bright changing crescent while the glaring lower photosphere conveniently was hidden behind the edge of the opaque moving moon. The spectrum of this bright crescent, first observed by Young in 1870, has been photographed at every visible eclipse since 1896. Complete success in recording it is very difficult of attainment. Among many attempts, the most notable spectrograms have been secured by Mitchell (Spain, 1905), by Campbell (at the same eclipse), and by Pannekoek and Minnaert (1927).

In the usual "fixed-plate" method of taking flash spectrograms the time-coordinate for the chromosphere's changing crescent is suppressed; the thinness of this uneclipsed crescent after the photosphere is hidden renders a slit unnecessary, and in the direction of dispersion a series of bright parallel arcs represents the composition with respect to wavelength of the light from the upper solar atmosphere. In Campbell's "moving-plate" instrument the time-coordinate is made explicit at the cost of restricting the photograph to the short central sections of these arcs. This is accomplished by placing a long narrow aperture running in the direction of dispersion immediately in front of the photographic plate, and by uniformly moving the plate during the exposure, in its own plane behind the long aperture, at right angles to the direction of dispersion. In the fixed plate spectrograms the lengths of the bright arcs indicate the minimum heights to which the corresponding elements extend above some zero level approximating the level of the photosphere. In the moving plate spectrograms the arcs obviously are replaced by parallel straight lines. The changing intensities of these lines in the direction of motion of the plate yield a multiplicity of interesting data not otherwise revealed. For example, the rare earth lines, and, again, enhanced lines due to ionized atoms, can be picked out by their characteristic appearances—they remain bright well inside the sun's limb, where other lines show as dark against the continuous spectrum of the photosphere. These features are well shown in enlarged reproductions in numerous excellent plates in the monograph.

A good synopsis of Menzel's study is included in a review by Dr. Theodore Dunham, Jr.,[1] and need not be repeated here in full. Menzel's monograph is very extensive, and is packed with details which have not always been brought into adequate unity. More editing would have resulted in improvement in form and clarity. (The same criticism can be offered of many scientific papers and texts nowadays.) The central purpose of Menzel's study has been shifted toward the theoretical, a little too far perhaps. Owing to the resultant restriction of the space devoted to actual discussion of the spectrograms, the reader in a few places is left in doubt as to what operational links exist between spectrograms and conclusions.

Menzel's discussion of the relative advantages of moving and stationary plate flash spectra exhibits a little excusable partisanship. The comparison, on page 253, of Dr. Mitchell's stationary plate estimates of heights at the 1905 eclipse with those indicated by the Lick moving plate at the same eclipse requires amplification before the conclusions presented can be accepted as final. Like every novelty in technique, the moving-plate method has had to struggle for its "place in the sun." The struggle now admittedly has been won, but, as Menzel is careful to emphasize, the older fixed-plate process has not thereby been displaced. The reviewer ventures to endorse Dunham's suggestion that advantages of both methods ultimately may be retained by taking a true motion picture of the crescent spectral arcs on a very wide film—for example, with a one-second exposure and a rapid jerk between exposures. However, this scheme would introduce new difficulties for the photographic photometry.

In Table I of the monograph Menzel lists normal solar and flash wave-lengths and estimated intensities and flash "heights" of nearly 4,000 lines in Campbell's spectrograms, and for most lines also the moving-plate characters, the spot intensities, the atomic identifications and multiplet designations, where known. This very considerable work occupies 96 clearly printed pages; a valuable separate table (III) of 85 pages reclassifies these data for each element with the lines of each multiplet grouped together, and includes other facts in addition.

Campbell's plates of two or three decades ago were not provided with photometric calibration. Menzel undertook to supply a calibration, and apparently overcame the serious difficulties involved, obtaining quantitative contours which he uses in a discussion of the density gradient and turbulence in the chromosphere. But since even the type of the original emulsion is not certainly known this part of the study may have been overemphasized. It will be well to wait for its repetition at future eclipses, particularly as the motion of Campbell's pioneer plates was not strictly uniform;—and one confidently may expect that Lick expeditions will take a leading part in such repetition.

[1] Publ. Astron. Soc. Pacific, xliv, pp. 111–116, April, 1932.

The flash intensities listed in the Table I represented eye estimates of flash lines. These were used in connection with theoretical intensities to study the abundance of elements in the chromosphere (summarized on page 281). (The method was that developed by Russell in his well-known study of the composition of the reversing layer.) The temperature of the chromosphere was also determined as about 4400° K.

About thirty pages—Chapter IV—are devoted to a critical discussion of the theory of solar and stellar absorption and emission lines. An unusually good bibliography is included. Menzel extends the theory in certain directions. The subject is an exceedingly complex one—in its physical implications as well as in its astrophysical applications; and no completely adequate treatment is possible in the present state of theory and observation. The algebraic intricacies of certain phases of the subject have tempted more than one well-known investigator to develop his equations far beyond the point where the necessary physical and observational knowledge fails; and the resultant discussions must be in part invalid. (To be sure, it is not only in the study of stellar atmospheres that mathematico-astrophysical speculations have outrun the conclusions which would have been drawn by sober and skeptical scientific judgment of the pre-inflationary era!) Menzel attempts to keep relatively close to established physical principles; but it would have been difficult everywhere to make clear the distinction between observational fact and theoretical extrapolation.

Extensive laboratory investigations of the general opacity of a heated gas are in particular badly needed. Again, while contours near the edges of many Fraunhofer "absorption" lines conform to computations based on the hypothesis that the atoms are not absorbing at all, but are scattering like classical "resonators," the central contours are not yet observationally very well determined. One would expect an additional process of true absorption to set in there, involving an equilibrium between the radiant and the molecular kinetic energies, and the theory of such a process still remains somewhat obscure. Not until such physical uncertainties as these have been resolved can a high degree of mathematical refinement be justified in the discussion of the flow of radiation outward through stellar atmospheres.

A large amount of trustworthy information has been derived concerning the abundance, densities, distribution and behavior of the various chemical elements in the atmospheres of the sun and stars. For years to come no student concerned with these interesting matters can afford to overlook this important, vigorously written, and beautifully printed monograph.

JOHN Q. STEWART
PRINCETON UNIVERSITY OBSERVATORY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A METHOD FOR MOUNTING SPECIMENS OF DROSOPHILA ON MICROSCOPIC SLIDES

MANY students of the genetics of Drosophila must have felt the need for a reliable method by which specimens could be preserved in their natural condition of coloration and structure. It is especially desirable to keep as permanent records unusual specimens, such as the various types of aberrant flies which are frequently sterile. With the view of meeting this need, the writer has experimented with various methods for mounting flies on microscopic slides. As a result of these efforts, a method has been found that not only preserves the life-like appearance of the fly, but also has every indication of giving preparations of a permanent character. The following brief description of this method is given with the hope that it may be found useful to other workers in the field. It is possible that the method can be employed for mounting other types of insects that are not well adapted to the usual pinning process.

A microscope culture slide with a depth of 1.5 mm has been found to be the best for Drosophila. The concavity is first covered with a thin layer of ever-ready mucilage or glue (Stafford's); then, working under a binocular microscope and with the aid of a pair of dissecting needles, the fly is arranged in the desired position in the center of the concavity. The glue hardens in a few minutes, and serves to hold the specimen in a definite position during the subsequent treatment. As soon as the glue is set the slide is placed in a jar containing equal parts of absolute alcohol and xylene (Baker's) and left for thirty minutes. It is then transferred to absolute alcohol and left for at least three hours. The preparation is completed by filling the concavity with Euparal (Grubler's) and applying a cover glass.

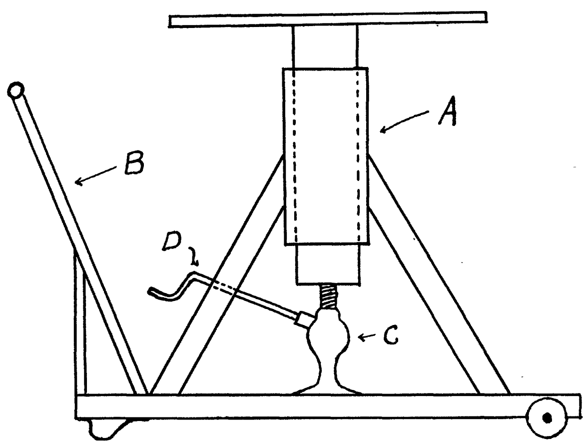
If the best results are to be obtained, it is necessary to take the following precautions: (1) The slide must be absolutely clean, otherwise the glue will crack loose and allow the fly to float off in the liquid. (2) The specimen to be mounted should be at least two days old. Newly emerged or young flies tend to become distorted in the alcohol-xylene mixture. (3) It is desirable to prevent the fly from making any movements before the glue has hardened. This can be done by holding a small wad of cotton, saturated with ether, just above the fly for the two or three minutes that it takes for the glue to set. These preparations have the advantage of permitting examination of both the upper and lower surfaces of the mounted specimen, and if it be desired, a drawing can be made at any time.

J. T. PATTERSON
AUSTIN, TEXAS

AN ADJUSTABLE APPARATUS STAND AND TRUCK

THE average laboratory apparatus stand is quite unwieldy with regard to height adjustment and mobility if the stand is loaded with a heavy piece of apparatus. It is true that some stands are equipped with rack and pinion for adjusting, but the cost is usually prohibitory.

In order to overcome these difficulties in case of a small spectrograph, which it was desired to move quickly from one part of the laboratory to another and to adjust in height, the scheme shown in the figure was adopted.



An ordinary laboratory stand A was mounted on a very low truck provided with rubber-tired wheels in front and sliders at the rear. A handle B was provided for easy manipulation. An ordinary automobile jack C was used as the means of raising the adjustable part of the stand The jack used was of the "double extension" type, giving a lift of about 8 inches. Since the height of the stand at the lowest point was arranged to be about that of an average