lantern slides by photography is tedious and rather difficult.

A modification of this technique has been in use in our department for some time, and the method has been very convenient for some phases of visual presentation. The materials required are a number of glass plates the size and shape of the ordinary lantern slide, drawing inks of the waterproof type and drawing instruments. The plates may be prepared by cutting up thin window glass or boiling emulsion off of old photographic plates and cutting them up. Very fine pen points and camel's-hair brushes are necessary.

After thorough cleansing of the glass surface, the desired diagram is drawn directly in ink on the glass with fine point pens and brushes, using colored inks as desired. The material to be copied may be first drawn on paper and then the slide placed over it for the ink transference to glass. Details, such as fine shading, are rather difficult to reproduce and may often be better left out. But ordinary line drawings are very easily and quickly reproduced on the slide. Any color combinations may be used and, with care, color washes are often of value.

If the slide is to stand a good deal of wear it may be made fairly permanent by dipping the slide, after the ink has dried thoroughly, in a thin clear solution of rosin in xylol. The edges of the slide may be conveniently bound in black, gummed linen tape. The rosin-xylol coating is not necessary for ordinary use, the slide resisting all but direct heavy rubbing and scratching. Slides may be rapidly and easily altered at will. Fifteen or twenty minutes should be sufficient time to prepare a slide for lecture use.

The lines of even the finest pen are much heavier than the fine shading in photographic slides and therefore stand out heavily on the screen. Full daylight may be allowed to fall on the screen without marked diminution in visibility. The lines of the drawing being the only obstruction to the passage of light rays from the machine to the projection surface, very little light is cut off and a great deal of it is concentrated on the screen. Due to this fact and to the heaviness of the lines, a blackboard may be used as a screen in a daylight-illuminated room. Even the lines in black ink stand out clearly by reason of the intense illumination about them. This makes possible modifications of the usual technique of lantern slide projection.

Manifestly, if the lecturer is sufficiently facile with chalk drawing, the method of building up diagrams as the lecture goes on is best of all. The student sees the picture grow under his eyes at the same time that word pictures are built up by the speaker. However, this takes a good deal of time. Few lecturers are possessed of the magic touch of being able to draw accurately and artistically in a short period of time while simultaneously delivering a lecture. To make this easier, the basic fundamental outlines required may be prepared upon slides and projected upon the board. Then while lecturing the speaker may quickly and easily put in the necessary additions or alterations in chalk. By virtue of their lack of reflecting power, the chalk lines are distinct from the original outlines. Altering or adding is much easier and more rapid than the building up of the entire diagram. An eraser may be run over the board and the original lines left for reference and equilibration.

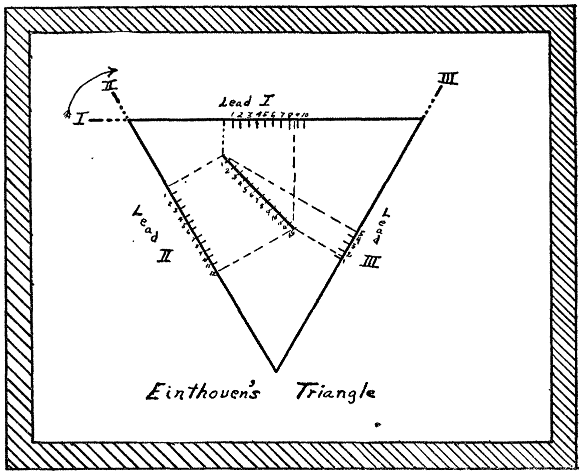

FIG. 1. Einthoven's electrocardiographic triangle. Slide may be projected on board, and after explanations, direction of heart axis may be changed by chalk alterations, simultaneously changing length of projected vectors on triangle to show effect of cardiac axis change on electrocardiographic records.

Uses of this method are numerous. Formulae for chemical equations may be thrown on the board with no figures and the necessary quantities may be written in chalk and altered to suit the problems. Outlines of the body or organs may be thrown on the screen and functions added in chalk (Fig. 1).

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HOW TO MAKE HORIZONTAL DEMONSTRATIONS VISIBLE TO AN ENTIRE CLASS

SOME class demonstrations can be seen only from above. This makes it necessary for small groups to observe them at any one time, which process takes up a great deal of the laboratory period and almost makes it impossible to show effectively such demonstrations in a lecture. At the same time those who are not viewing the demonstration are disturbed by the walking about. A good example of such a demonstration is that illustrating the effect of dilute nitric acid on the surface tension of a drop of mercury in the presence of a crystal of potassium dichromate. Where a reflecting stereopticon is available it could be used to throw the image upon the screen, but this necessitates darkening the room. A much simpler method and one easily adaptable to almost any demonstration which is difficult for the entire class to see at one time is to place a mirror at an angle of forty-five degrees behind the demonstration and raise the whole a little above the level of the class. For small demonstrations a mirror from the five-and-ten cent stores is adequate. This can easily be held in place upon a board in which two finishing nails of the proper length have been driven at an angle of forty-five degrees, and one nail in the center set back behind these to keep the mirror from slipping.

If the demonstration is small so as to be seen with difficulty from the rear seats, a reading glass of a suitable magnification can be placed at the proper distance from the mirror. In this case the entire demonstration should be placed upon a board or platform so that it can be swung into the line of vision of those on the sides. Other modifications and applications will suggest themselves.

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SPECIAL ARTICLES

TRIANGULAR NEPIONIC COILING IN CARBONIFEROUS AMMONOIDS

A FRAGMENTARY cast of a fossil, which, except for its apparently triangular method of coiling, suggested the umbilical portion of a glyphioceran cephalopod, was collected by the writer in the fall of 1923 from the sparingly fossiliferous lower Pennsylvanian Winslow formation near Fayetteville, Arkansas. An extended search failed to yield additional material. About a year later, however, Dr. N. F. Drake, formerly state geologist of Arkansas, kindly placed at the writer's disposal several cephalopods which had been blasted out of the same formation on Mount Nord within the city of Fayetteville. Upon cleaning the material, the umbilical portions of these cephalopods showed that the coiling of their earlier whorls was distinctly triangular, although the individuals again assumed the ordinary circular method of coiling in their later stages of growth.

A canvass of the literature failed to find any reference to this phenomenon, and the questioning of a number of paleontologists over a period of several years led to the conclusion that it had not previously been observed. Because of the scantiness of the material and its rather poor preservation, as well as the unusual nature of the discovery, the writer has hesitated to record the phenomenon. Recently, however, as a result of continued questioning it was discovered that H. D. Miser, of the U. S. Geological Survey, had in 1927 collected from the Atoka formation near Clarita, Oklahoma, a number of unusual cephalopods which were sent to Dr. R. C. Moore, of the University of Kansas, for study. These specimens also exhibit this same peculiar triangular coiling of the earlier whorls. Furthermore, when this feature was called to the attention of F. B. Plummer and Gayle Scott, who are studying the Carboniferous cephalopods of Texas, they found that upon cleaning out the umbilical area of some of their specimens from the Bend group the same nepionic triangular coiling became apparent. In addition, the writer recently received from John McCormack, of the Oklahoma Agricultural and Mechanical College, a number of cephalopods from the Atoka (?) formation taken from a clay pit near Ada, Oklahoma. Among these specimens there are two individuals which illustrate perfectly this triangular method of coiling. Furthermore, although these specimens are not complete, their last preserved whorls fail to assume complete circularity, though they are somewhat more rounded than the earlier ones. Finally, in examining specimens of Bend group cephalopods in the Walker Museum collection it was found that a number of these individuals also show a definite tendency toward angular coiling in the nepionic and neanic stages, though the triangularity is less pronounced than in the other specimens mentioned above.

Additional interest attaches to this phenomenon since it is apparently confined to members of the cephalopod family Glyphioceratidae, and, as far as present information goes, largely to the genus *Paralegoceras*. Furthermore, although it has now been observed in specimens collected from a number of different localities, the extremes of which are nearly 500 miles apart, all the individuals have been found at essentially the same geologic horizon, that is, lowermost Pennsylvanian. The formations yielding the cephalopods are the basal Winslow, just above the Morrow group, at Fayetteville, Arkansas; the basal Atoka, just above the Wapanucka limestone (which carries a Morrow fauna), at Clarita, Oklahoma, and in north-central Texas, the Smithwick formation, which overlies the Marble Falls limestone (also with a Morrow fauna). The specimens from near Ada