located the traditional "Garden of Eden," and proceeds with commensurate accounts of the results of German, English, French and other hybridizers, until 1902. The author's ability to translate the several languages—he is an accomplished linguist—immeasurably facilitated his thorough search of the literature, which extended over several years and through many libraries in a number of countries. Many of the pertinent facts are stated in lucid translations from, or if in English in, the actual words of the hybridizers themselves. These quotations are introduced with an adroitness and smoothness that would do credit even to the literati.

As already indicated, the work greatly transcends its title in giving a succinct account, probably the best extant, of the rediscovery in 1900 of Mendel's paper, independently by DeVries, Correns and von Tschermak, and the contribution of the late Wm. Bateson in the introduction of Mendelism to the world. The author was aided in the preparation of this account as well as in the production of the rest of the book by a mutually cordial friendship with DeVries, who spent more than two weeks in 1906 in Professor Roberts's home in Manhattan, Kansas, while preparing and revising lectures. The author also spent some time in DeVries's home in Holland. The latter as well as both Correns and von Tschermak have contributed valuable and interesting special letters of personal reminiscences which are included.

The amount of material in the book exceeds the expectations of the only vii + 374 pages, because of the fine, clear print of the extensive though very apposite quotations. This book should go into the hands of all persons interested in either pure or applied biology. The language, including the translated quotations, is such that the general reader may peruse it with facility and keen interest.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLE METHOD FOR STAINING SPIROCHETES

THE methods usually employed for the staining of spirochetes in many cases require specially prepared solutions and a mastery of expert technique. A simple, rapid and effective stain based on the method proposed by Kliewe[1] has been used in this laboratory for two years. The solutions are easily prepared in any laboratory and do not deteriorate. The modified method is as follows.

A film of the material to be examined is prepared as usual, air-dried and fixed by passing several times through a Bunsen flame. It is mordanted with a 0.5 to 1 per cent. aqueous solution of potassium permanganate, washed in water, stained with a 2 per cent. aqueous solution of methyl violet and finally washed in water. The time allowed for the action of the mordant is from eight to ten minutes, while the stain is permitted to act for the same period. In staining *Treponema pallidum* it is often desirable to warm the mordant gently on the slide. It is never necessary to warm the stain. For the coarser more easily stained spirochetes a shorter staining time is required, two to three minutes being quite sufficient. The longer period is preferred for the more delicate organisms. With this method the spirochetes are stained bluish-black and the delicate forms stand out clearly. There is a marked contrast on the slide, and the organisms stained by this method have been photographed without difficulty. Good stained specimens have been obtained of various spirochetes, including *Treponema pallidum, Spironema novyi, Spironema obermeieri, Spironema duttoni, Leptospira icterohemmorhagiae, Treponema vincenti,* water leptospira and spirochetes from birds.

[1] *Centralbl. f. Bakt.*, 1924, Ref. 76, 232.

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ARCUATE MOUNTAINS PRODUCED BY MODIFICATION OF STONE'S STRUCTURE MACHINE

THE machine described by Stone, in the accompanying article, lends itself to certain modifications. In addition to its use in producing thrust normal to the face of the thrust block it can easily be modified so as to transmit a thrust by means of a thrust block the face of which may be at any angle to the direction of thrust. This can be accomplished by using an additional board (X) separated from the movable

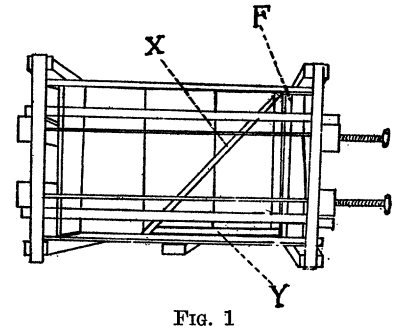


FIG. 1

board (F) by means of a block (Y) of suitable length. By varying the length of the block the angle of the face of the thrust block may be varied. (Fig. 1.)

Chamberlin and Shepard produced arcuate mountains by applying pressure over a limited portion of the free side of a block.[1]

By means of this machine, with the face of the thrust block at an angle of 45° to the direction of thrust, arcuate mountains were repeatedly produced. Fig. 2 shows the results of one of a number of experiments in which such mountains were obtained. The curvature of the fold may be explained by the force resultant of the forces active in its production. This indicates that arcuate mountains can be produced by more than one method.

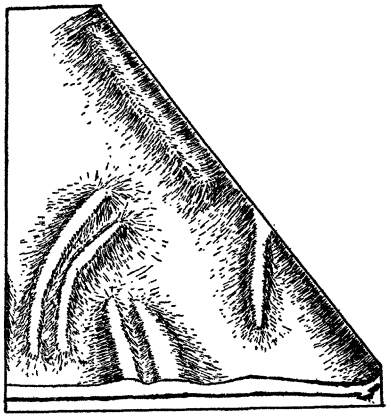


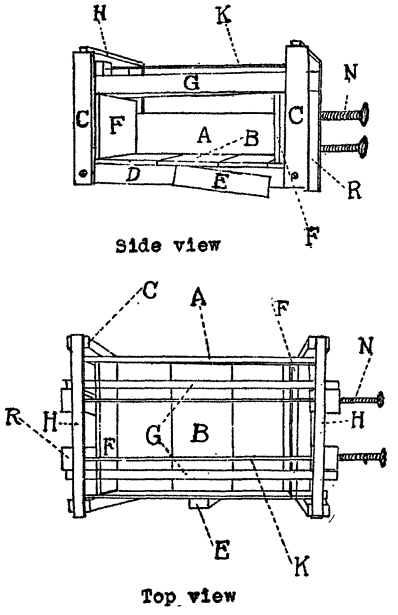
FIG. 2

R. H. MITCHELL

A MACHINE FOR THE INVESTIGATION OF STRUCTURE

IN laboratory experiments carried on for the purpose of investigating mountain structure it has seemed desirable to devise an apparatus that will overcome the difficulties of the narrow machines usually used. Such an apparatus is here described. The machine is simply a box, the ends of which may be freely approached towards each other, making it possible to compress layers of material placed between them in the box. This machine has worked very satisfactorily and has been found quite capable of withstanding a great pressure.

The inside dimensions of the box are: length, about 31 in.; width, 22¾ in. The floor (B) and the side boards (A) are of one inch pine material nailed securely to a base of oak two by fours (D). The corner posts (C) are also oak two by fours and are two feet high. At each end of the box these uprights are fastened together by one inch pine strips (H). The movable end boards (F) are of oak. (Two end boards are used at the end upon which the pressure



is applied, the outside one being protected by iron strips from the ends of the screws (N). Short oak two by fours (E) are bolted to the base and are turned to a vertical position to support the side boards when pressure is applied. The pressure is produced by means of four vice screws (N) set in four 4 x 4 oak posts (R), two of which are at each end of the box. These are fastened together by four iron rods (K) 11/16 in. in diameter running lengthwise across the box, two fastening the tops and two the bottoms of the posts. The end boards are kept from creeping upward by pine two by fours (G) which serve as a track.

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SPECIAL ARTICLES

THE RELATION OF TOTAL NITROGEN TO REGENERATION IN THE WILLOW

A CORRELATION between the carbohydrate-nitrogen relationship and growth has been shown by Kraus and Kraybill[1] and Murneek[2] for the tomato plant, Harvey[3] for the apple and Reid[4] for wheat and

[1] R. T. Chamberlin and F. P. Shepard, *Journal of Geology*, vol. 31, 1923.

[1] *Ore. Agr. Exp. Sta. Bull.* 149, 1918.
[2] *Plant Physiol.*, 1: 3–55, 1926.
[3] *Ore. Agr. Exp. Sta. Bull.* 200, 1923.
[4] *Amer. J. Bot.*, 26: 770–779, 1929; 27: 272–289, 1930.