CHARLES STARLING CHILDS, '91, and Edward C. Childs, '28, have presented to the School of Forestry of Yale University a new site for its summer camp in the Great Mountain Forest in Norfolk and Canaan Townships.

THE Oklahoma State Planning and Resources Board has granted to the University of Oklahoma a ninety-nine-year lease on a three hundred-acre tract on the south side of Lake Murray for a summer camp of the School of Geology of the university. It is said that there are few places in North America where such a diversity of geological features may be observed in so small an area as that within a 25-mile radius of the new site. For more than twenty years a summer field course in geology has been conducted in the region. It is expected that instruction will be carried on throughout the entire summer under a group of instructors to be chosen from the various colleges and universities participating. Dr. A. J. Williams will represent the University of Oklahoma. The School of Geology of the university will maintain control and instructional supervision of the camp, but its facilities will be made available to any one interested in the purpose of the camp.

DISCUSSION

GENERAL OR SPECIAL IN THE DEVELOPMENT OF MATHEMATICS

MODERN mathematical advances are largely based on generalizations, and this has naturally led to an emphasis on what appears to be general in modern mathematical publications. It is not always observed that the generalizations of the earlier special cases are largely due to the fact that these cases are really more general than was at first observed so that their appearance as special was often due to a lack of foresight on the part of those who regarded them as special. For instance, when H. Cardan (1501–1576) included in his now famous "Ars Magna" (1545) the solution of a special quadratic equation having complex roots he took a very fruitful step forward, even if his later work seems to justify the view that this solution was not original with him. It inspired work which several hundred years later became the core of various fundamental developments.

The normal way in which mathematics has been developed is from the special to the more general, and hence it is somewhat striking that many are now inclined to dismiss various contributions merely on the ground that they are special. The much more important and more difficult question is whether they are apt to be fruitful. In the past various writers have purposely confined their remarks to the main points for the sake of simplicity and left to the reader obvious generalizations. For instance, at the close of his "La Géométrie" (1637), R. Descartes said, "I hope that posterity will judge me kindly, not only as to the things which I have explained, but also as to those which I have intentionally omitted, so as to leave to others the pleasure of discovery." In view of the very wide scope of the mathematical work at present nearly every individual contribution may reasonably be regarded as special, even when it is clothed in very general terms.

In the development of mathematics the pre-Grecian work is almost entirely concerned with the consideration of special cases, while Greek mathematics as it is represented by the "Elements" of Euclid (about 300 B.C.) is largely devoted to the consideration of general cases. This generalization in Greek mathematics does not extend as far back as was formerly supposed. The widely praised Greek rigor in geometry does not extend as far back as Pythagoras (about 580–501 B.C.) but began about a century later, according to recent critical studies of the ancient Greek mathematical literature. The systems of postulates as they have come down to us through Euclid's "Elements" seem now to be due to Euclid himself. In particular, they do not appear in the works of Aristotle, who was about twenty years older than Euclid and frequently referred to mathematics.

Notwithstanding the fact that the pre-Grecian mathematicians confined themselves almost entirely to the consideration of special cases in their extant publications, they developed one of the most fruitful abstract concepts, *viz.*, the concept of abstract numbers. It is not known that they formulated a definition of such numbers or emphasized the distinction between abstract and concrete numbers, but their use of abstract numbers is fully established. Just as abstract groups are now commonly called general groups, so abstract numbers may be regarded as general numbers in comparison with the more special concrete numbers. The ancient Egyptians are now known to have had the concept of general rational fraction, even if their publications mostly involve unit fraction. The special and the general therefore extend through the entire mathematical literature and both have been very fruitful.

The pre-Grecian rules that the area of a rectangle is equal to the product of two of its adjacent sides and that the volume of a rectangular parallelepiped is equal to the product of its three concurrent edges represent very fruitful general concepts. They exhibit the use of square units having linear units as edges

and the use of cubical units having square units as their faces, and hence they establish numerical relations between entities of different dimensions. In fact, the ancient Babylonians used certain equations whose terms represent different dimensions. The developments of number and form are thus seen to have partly united long before the work of R. Descartes and others during the seventeenth century. The deep study of mathematical history tends to exhibit a much more gradual development of our subject than is commonly exhibited in the brief accounts which usually emphasize unduly the work of a few outstanding individuals.

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ILLUSIONS IN PRINTED MATTER

THERE may be "nothing new under the sun" but only something new to the writer of this note. For that reason he is recording an observed phenomenon to discover whether others have also experienced it, perhaps long, long ago.

If typewritten copy is produced with the original form on thin or "onion-skin" paper and the carbon copy on similar paper, thus usually making the second copy blacker than the first and if this copy is "single spaced," preferably, but not necessarily, with no paragraph separations, or better yet, without paragraphing, the materials are supplied for an interesting perception. The top sheet should be rotated over the lower sheet to the left or to the right to the extent of an angle no greater than about 20°, but without displacement in any other manner. An angular rotation of 5° appears to be optimal under the conditions tested.

The blank spaces between words, and to some extent the dark blocks made by the words, will form ten or twelve concentric circles like ripples on the surface of a pond into which a pebble has been cast. In the present psychobiological state of the writer, these rings did not seem to move, but the center or focus of the rings can be made to move in a direction at right angles to the line of displacement of the top sheet.

While the phenomenon appears to be illusory, because the printed words and spaces are obviously of different lengths, the circles seem to be by measurement about one centimeter in increment of radius from center to periphery. The other illusory feature is, of course, the completion of the circumferences in the perception of the concentric circles: only intermittent cues from the spaces between the words are physically furnished or, putting it obversely, many printed words obstruct or interrupt the smooth course of the spaces.

It also remains to be explained why a slight shift of about 5° around an axis should produce fairly complete circles, or at least partial circles, if the axis lies close to any one of the margins on the paper.

This brings to mind several other illusions observed in printed matter. Years ago a matter was referred to the writer concerning the bad alignment of a printed "letter-head" containing at the beginning of the address a number of 4's, thus

American Sawdust Company
4440 Austin Boulevard
Chicago, Illinois

A complaint had been registered with the printer regarding the improper assembly of the second line with respect to the first and third lines, so that the line in question seemed to be tilted downward at the left end. It was easy to show that the effect was due to the diagonal direction of the left portions of the three 4's, well known to psychologists as the Zöllner illusion and related also to the figures of Hering and Wundt. If the 4's had been printed in the type face which includes the script form, this difficulty would have been obviated.

A similar effect is noticed in those typewriters that include a triangular bracket to the right of the writing point into which a pencil is to be inserted for drawing horizontal lines on the paper moved by the carriage when released from one side to the other. Often the line, which has been typed half-way across the paper, appears to be dropping gradually to the right. The slanting side of the triangle is responsible in a similar way to the above for the distortion of the line away from its parallel relationship to the other lines.

CHRISTIAN A. RUCKMICK

C. H. STOELTING COMPANY,
CHICAGO, ILL.

CATALOGUE OF NORTH AMERICAN EARLY TERTIARY FOSSILS OF THE GULF AND ATLANTIC COASTAL PLAIN

THIS catalogue is prepared in a manner similar to the "Catalogue of North American Devonian Fossils" published by the Wagner Free Institute of Science in Philadelphia.

The Early Tertiary catalogue will contain descriptions and illustrations of the fossil invertebrates from the Paleocene, Eocene and Oligocene of the Atlantic and Gulf Coastal Plain of the United States. Each species will be described and illustrated on a card of heavy paper 8½ by 11 inches in size, fitting a letter file. The text of the cards will be printed; the figures will be printed by full-tone collotype process. Type specimens will be figured if available; if not, photographs of topotypes will be used wherever feasible. Photographs of topotypes will be used extensively as supplementary illustrations. Original descriptions will be quoted in every case. Additional remarks or complete redescriptions will be given where necessary.