

Self-recording apparatus is being constructed which we hope will prove useful in a more detailed study of the matter.

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### THE PHYSIOLOGY OF THE SINGING VOICE

WITH Miss Minnie K. Willens, of the graduate department of the University of Denver, I have made preliminary studies on the physiology of the voice with special reference to the relation of the respiratory mechanism to the voice mechanism in the formation of tone. The study indicates that the respiratory muscles, in addition to their rôle of providing a moving column of air to be interrupted by the vocal mechanism in the formation of the voice, are important synergists of the intrinsic and extrinsic muscles of the larynx in tone formation, and that the maximum tone range and the optimum tone quality are attainable only by utilization of such synergistic action. This conclusion is at variance with the accepted practice of vocal instructors of encouraging the use of a single type of breathing—the costo-diaphragmatic. The later type of breathing has been favored and assumed to be the best because it produces the greatest vital capacity, involves a minimal respiratory rate for a definite volume of air, and supposedly reduces respiratory fatigue as a consequence. However, fatigue of the powerful respiratory muscles is a very remote contingency in singing, whereas strain and tiring of the delicate musculi vocales (thyroarytenoides) is a very frequently observed phenomenon. The employment of different types of respiration for different tone ranges—*viz.*, chest breathing for the higher tones, costo-diaphragmatic breathing for the intermediate tones and abdominal breathing for the lower tones—minimizes the strain upon the laryngeal musculature by altering the relative position of the shoulder girdle to the upper attachments of the larynx, the base of the skull, the lower jaw and the spine, and thereby alters the tension and tonus of the various groups of laryngeal muscles involved. Moreover, singing in this manner results in improvement of tonal range and quality and of vocal resonance. Complete results of the study will be published in the future.

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### A POPULAR FALLACY ABOUT HARDNESS

THERE appears to be a popular idea that a softer substance constantly rubbed over a harder one will in time wear the harder one away. Nearly any cigar store clerk will tell you this in explaining how his

glass counter has become so thoroughly scratched up that the cigars can not be seen beneath it. A casual examination will show that such a surface is produced by an accumulation of definite scratches which no copper, silver or nickel coin can make. It is true that where most scratches are made most coins are passed, but at the same place most sand grains, dust particles and ring settings are also rubbed against the plate glass of the counter.

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### THE PREPARATION OF CHARTS FOR REPRODUCTION

IN the making of charts and graphs which are to be reproduced in publications, it is always desirable to make certain that the smallest details such as lettering, character of lines where several curves are shown on the same coordinates, etc., will show clearly when reduced to the size of journal illustrations. Likewise, when one wishes to place several charts on the same page of text, it is necessary to know how much reduction can be made with safety to the small details. The following rough-and-ready method will give this information without the labor of making measurements and computations:

Pin the chart to the wall. With a foot or so of twine in your hand, back away from the chart to the furthest point from which the smallest detail is clear. Hold the string at the level of your eyes at reading distance from them and parallel to the wall. Fixating the chart, move your hands apart on the string until your two thumb-nails are tangent to the vertical borders of the chart. Measure the length of string between your thumb-nails, which will be the minimum width the chart may have after it is reduced for publication.

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### ORGANIC SYNTHESSES

THE board of editors of *Organic Syntheses* (an annual publication of satisfactory methods for the preparation of organic chemicals) has decided to collect, revise and rearrange the preparations described in the first nine volumes in such a way as to make them more suitable for general use in synthetic organic chemistry. All these preparations are to be published in a single comprehensive volume to be designated as the "Collective Volume—Revision of Volumes I-IX."

In this work of revision we would greatly appreciate suggestions in the way of corrections, difficulties in checking, new and improved methods, etc.

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