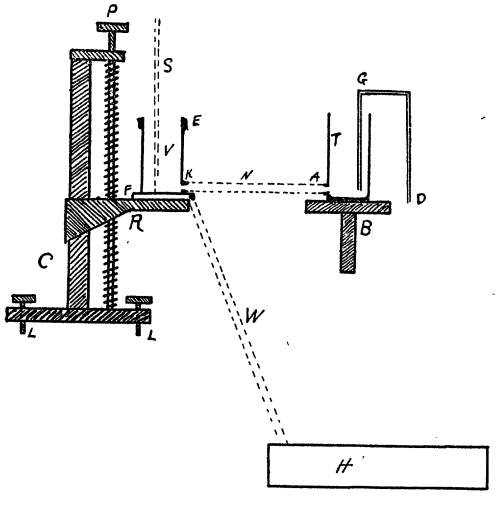
A NEW RHYTHM AND TIME DEVICE

AFTER having tried various rotation devices for the production of a series of uniform stimulations at regular intervals, I have concluded that the construction of such a machine which will be really reliable, is possible, but would be too expensive to be justified by present needs. Whether the machine could be designed so that gradations through all rates, from say one tenth second to two seconds, would be possible, is a question. Some of the machines which have been used for rhythm work have a fair adjustment for rate, but are irregular in speed, and depend on forms of electric contact which give exceedingly variable current strengths. A reliable and convenient mechanism as yet is not obtainable.

Feeling that rotation devices are out of the question for accurate work, I have turned my attention to the employment of the dropping of water, varying the rate of fall by changing the level of the water in the vessel from which



the drops issue. I have tried several arrangements of apparatus for the purpose, and have finally settled on one which is highly satisfactory. Reference to the figure will show the details of this, although not the proportions, as I have not had the parts drawn to any scale.

About four feet above the sink *H*, is a glass jar *T*, supported on a bracket *B*. From the orifice *A* at the bottom of the jar, a rubber tube *N* runs to another jar *V*, supported by the stage *R* of the statif *C*, which stands on a high table beside the sink. A rubber tube *S* conducts a small stream of water from a faucet to the jar *V*, the tube dipping into the water in the jar to prevent disturbance of the surface. The overflow from *V* is caught by the saucer *F* in which *V* is set, and is conducted noiselessly to the sink by the rubber tube *W*. A band of cloth *E*, its edge flush with the edge of *V*, facilitates the overflowing, and keeps the water level constant. The siphon *GD*, of small bore tubing, slightly constricted in one place to retard the flow, and firmly held by a support not shown, drops the water upon a resonator or key placed in the sink. By turning the head *P* of the screw of the statif, the stage *R* and jar *V* may be raised or lowered, thus raising or lowering the water level in *T*, and accelerating or retarding the rate of the drops.

For auditory stimulation a tin resonator placed in the sink gives admirable results. For other purposes, where it is desired to utilize the making or breaking of an electric current, I have modified a light make-and-break key, by extending the lever and giving it a small disc to be struck by the falling drop. With this, I am able to operate telegraph sounders or telephone receivers for auditory stimulation, and sparks or Geissler tubes for visual, or to record on a kymograph drum.

Some care is needed in setting up and operating the apparatus. Air bubbles must be removed, although the double jar system reduces that trouble to a minimum. Shaking of the apparatus disturbs the drops, so accuracy will not be attained if the building is subject to much jarring. If the size of the drop is not sufficiently large, a ring of rubber tubing slipped over the end of the siphon *D*, will increase the adhering surface. The faucet should be adjusted so that a little water is constantly flowing down the side of *V*. The orifices *K* and *A*, and the tube *N* must be large enough so that the water level in *T* is quickly readjusted when the height of *V* is changed. The siphon *GD* may be of

about three thirty-seconds of an inch bore, "drawn" enough in one place to make the water level appreciably above D at slow rates of drop. A jar seven or eight inches high and three or four inches wide will be plenty large enough for T, and V need not be so tall.

I have made a number of record tests of the time accuracy of the drop, and find that it is perfectly reliable for one second to one eighth second, as shown by comparison with a 256-vibration fork. The drop will run much faster than one tenth second, if the size is properly controlled by the means mentioned above, but my key is too clumsy to record well much beyond one eighth. With a slight change in the key that difficulty will be obviated. From one second to six seconds my first records showed an apparent variation. These records for the longer periods were not intended to be extremely close, and were taken with a Zimmermann chronograph. I found later that the variation was in the chronograph, and have not yet tested these intervals with the tuning fork. Compared with a pendulum record, they appear perfectly regular. Intervals longer than six seconds I have not employed at all, although the apparatus is capable of furnishing them.

This device may be put to a variety of uses about a psychological laboratory. In addition to work in rhythm, I find it useful for time-records on the kymograph, for intermittent stimulation in work in fluctuation of attention, and for a time guide for an experimenter in the employment of definite intervals of preparation for a stimulus or between successive steps of an experiment. The key may be adjusted to give a regularity of current strength far greater than that of even mercury contacts of other time machines, making the apparatus especially valuable where this condition is of great importance, as in the rhythm and attention experiments.

Knight Dunlap
Johns Hopkins University

On Quinine Sulphate and Human Blood

Quinine sulphate when administered in small doses to healthy students has been found generally to slightly increase the phagocytic action of the polymorphous mentrophiles but in some cases it slightly inhibits.

In vitro an inhibitory effect, together with some laking was found when the strength of the sulphate ranged from 1/1,000 to 1/15,000 while from 1/16,000 to 1/1,000,000 dilution there was increased phagocytosis in periods ranging from 30 to 60 minutes, being most marked at a strength of 1/75,000. There was noted in all suspensions, which contained more than 1/20,000 of quinine sulphate, a marked absence of the granules from the polymorphous neutrophiles. The cell membrane was often gone. Vacuoles were very frequently present. As contrasted with those in the unquinized specimens their cytoplasm showed diminished staining powers which was strong evidence of the destructive action favored by the quinine.

A simple method requiring only a few hours for its accomplishment has also been worked out for studying in vitro the effect of any drug on opsonic index and in connection with the latter subject a means of standardizing the virulency of any organism has been suggested.

Thos. M. Wilson
Hull Physiological Laboratory,
University of Chicago

Botanical Notes

Farm Botany

For botanists who may wish to learn something more about wheat, oats, barley and corn (maize) than is to be found in the ordinary botanical works, the little book, "Examining and Grading Grains" (Ginn), by Professors Lyon and Montgomery will be found useful. Many a botanist will be surprised at the number of things which may be seen in a careful study of these common plants. For classes in applied botany in agricultural schools and colleges it must prove very helpful.

Fossil Iowa Plants

Professor Macbride's paper on "Certain Fossil Plant Remains in the Iowa Herbar-