"more chemists employed." The evidence is "more chemists would be discharged." It is a question whether, under the proposed code, professional men in many fields may not be compelled to have their tests done by these corporations.

Last summer, in response to the President's appeal for cooperation, both the Association of Consulting Chemists and the American Institute of Chemists inquired of National Industrial Recovery officials how they might best cooperate, and whether professional codes, based primarily on codes of ethics (rather than the expediencies of business), were contemplated. After consideration, both organizations were informed that professional chemists and professional chemical engineers were not to be "coded." Therefore, when a code for commercial testing laboratories was proposed and discussed, the vast majority of professional men paid little or no attention to it. It was only when the letter of resignation of Arthur D. Little, Inc., was published that it became evident that into the "Commercial Testing Laboratory Code" there had been inserted wording of great danger to professions in general and to the chemical profession in particular. It is against public policy to allow incorporated testing laboratories controlled by public utilities and manufacturing corporations to dominate professional work.

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UNUSUAL STROKES OF LIGHTNING

LAST night (May 9, 1934) about one o'clock there was an occurrence which I believe is rather rare. In the course of a severe electrical thunderstorm lightning "struck" a tree about 100 feet from our house. The peculiar facts about the phenomenon are that it "struck" the same tree twice within about a second's time, and that the tree is a *dead* (walnut) tree, whereas within 75 feet of it, near our house, are two tall *live* Lombardy poplars. The old tree, about 50 feet tall and with a trunk close to 4 feet in diameter at its base, died several years ago, but had been left standing (it being in a vacant lot).

The lightning blasted off a layer of wood, a few inches to nearly a foot wide and two to three inches thick in pieces from a few inches to five or six feet in length from opposite sides of the tree from about twenty feet up to about two feet from the ground, hurling the pieces as far as a hundred feet from the tree. There was no searing or burning effect.

I have never heard of a case where lightning "struck" more than once so close to the same spot within so short a time.

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CLOCKWISE ROTATION IN PARAMECIUM TRICHIUM

As Wenrich[1] and others have pointed out, the rotation of all species of Paramecium except *P. calkinsi* is typically counter clockwise while swimming freely. Inasmuch as the clockwise rotation of *P. calkinsi* is one of the characteristics given by Wenrich as diagnostic for this species, the following observations may be of interest.

I have seen numerous specimens of *P. trichium* change the typical counter clockwise rotation for a clockwise one. The clockwise rotation may be for a few turns only or it may persist for some time. In no case, however, has the "abnormal" rotation been observed to persist for longer than about twenty-five complete rotations of the body. Often an individual will rotate counter clockwise for fifty or more turns of its body, change to a clockwise rotation for from three to ten turns, and then resume the counter clockwise rotation. Rarely, individuals reverse this process, temporarily turning clockwise more than counter clockwise. If one individual be watched for an hour or more the counter clockwise rotation is always seen to be the more frequent.

These observations were made upon organisms cultured in a standard hay infusion. The animals showed no sign of abnormalities.

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THE "GUNS" OF SENECA LAKE

IN SCIENCE for April 13, Professor H. L. Fairchild explains the nature of certain mysterious muffled sounds or explosive noises long noted about or over Seneca Lake. These sounds, it may be said, are conclusively shown to be due to escape of gas from the deep Dundee gas area making its way through the glacial drift filling the bottom of the great canyon-like Tertiary river valley of central New York now occupied by the lake. As gas bubbles make their way upward, first through the drift and then through the deep water, heavy pressures are gradually released, and as the surface of the lake is reached the noises like those of muffled guns are heard. Although, exploitation in the Dundee field having greatly reduced the original pressure of 770 pounds per square inch, it is believed the ghost guns of the Seneca are about "silenced."

Is there not here seen a partial illustration of the nature of some of the mysterious sounds of the Yellowstone? Elsewhere I suggest a more physicochemic explanation. The conditions about the Yellowstone and Shoshone lakes producing sounds which vary from explosive blurts to highly musical pitches must be complex. That any one explanation may suffice is unlikely. But it would be of interest to know what the impressions gained from hearing the

[1] *Trans. Am. Micros. Soc.*, 47: 280, 1928.

sounds about the northern side of the Shoshone Lake in particular as compared with those of the Seneca Lake might be. As it turns out no one seems to have taken note from lake to lake. Awing and strange as these nature sounds are, there has long been a silence about them quite as strange as the sounds themselves.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

APPARATUS FOR MOTOR CONDITIONING IN CATS[1]

A CONVENIENT apparatus for motor conditioning in cats and other small animals has long been needed. These animals being widely used for operative purposes, it is often desirable to establish conditioned responses in connection with the operative procedures. The lack of a convenient means of training has, however, made it inconvenient to use them in many cases for which they would otherwise be particularly suitable. For example, cats are commonly used in experiments on the middle ear, but hitherto it has been difficult to determine the actual effect of these operative changes upon hearing.

The lack of a suitable conditioning technique has also led to the wide-spread belief that cats are "stupid." This attitude was exemplified by a well-known investigator who, after years of operative work with cats, remarked informally that if cats were able to learn anything he had not yet found it out. It seems likely that this apparent stupidity is due far more to inadequacy of the training techniques employed than to the animal. Proceeding on this assumption, we recently devised an apparatus which seems to be well adapted to the normal action-patterns of cats.

The apparatus consists essentially of four grills composed of small copper bars, set in a radial, fan-wise arrangement; each grill thus constitutes one quadrant of a complete circle. The grills are separated by metal barriers 6 inches high; the animal can easily pass from any quadrant to the next and yet each one forms a distinct compartment. The ends of the bars extend well beyond the upright walls of the cylinder and are thoroughly insulated from each other and from the rest of the apparatus. Alternate rods are connected at the inner circumference and then joined to one pole of the source of shock. The other rods are joined to form the four individual sections. The four leads are joined to switches which connect with the other pole of the shock-potential. Closing any one switch, therefore, completes the circuit for the corresponding grill. The stimuli are presented automatically by a relay circuit so that the sound is "on" for an interval of about 2.2 seconds and is directly followed by a momentary shock on the grill which the animal is then occupying. The shock-intensity is readily adjusted by applying a high voltage (1,100 volts) across suitable resistors. The whole apparatus is covered with a removable wire-mesh lid; the cat is observed from outside the test-room through a mirror.

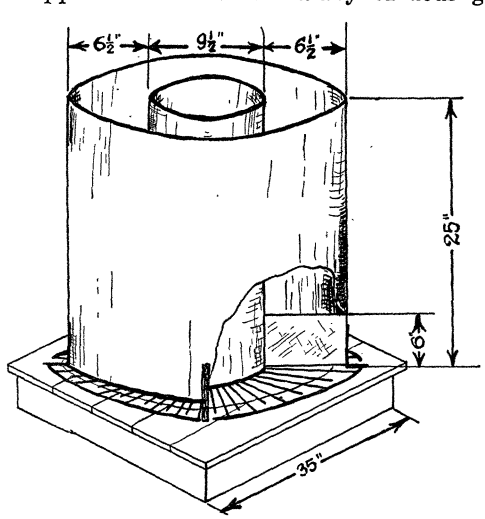

FIG. 1

In actual use, the animal is placed in any one of the quadrants. The stimulus-tone is presented and followed by the momentary shock, which is made just strong enough to stimulate the cat to move hastily over the barrier into the next quadrant. On the following trial, the cat again advances to another quadrant, and so on. The response required is thus as easy and natural as can well be imagined: merely moving into the section just ahead. At first the animal may prove slightly recalcitrant when shocked but soon reaches the stage of moving quickly and quietly ahead as soon as the tone begins.

We have used the apparatus for a number of months in conditioning cats and find that with 25 trials per day most cats will reach a score of 100 per cent. within from 7 to 14 days. This performance is fully equal to that of dogs who are conditioned to flex the right fore-paw upon presentation of a tone.[2] Cats promise to be particularly useful in auditory work, since they are perfectly quiet (no panting). Reliable limens can thus be obtained with minimal time and effort.

This apparatus was primarily devised for auditory stimulation, but by requiring the cat to make a com-

[1] Communication No. 6 from the Alpha Research Laboratory, Department of Psychology. Special aid from the Research Trustees of the American Otological Society and the Elizabeth Thompson Science Fund is gratefully acknowledged.

[2] SCIENCE, 78: 269–270, 1933.