fied mental diseases in four groups according to the protein composition of the blood.

No change in blood proteins was found in normal persons, chronic demented patients who had probably reached a new state of physical and chemical equilibrium, hysterical patients and those suffering from neurotic disorders.

An increase in a protein called euglobulin was found in patients suffering from mental disease due to some poison. The symptoms are probably due to disturbance in the interchange of water between blood and tissues.

Pseudoglobulin, another kind of protein, was increased in the intoxications due to a specific poison acting on a susceptible organ.

Albumin was increased in patients of a non-reactive type. This increase in albumin shows the presence of physiological deficiency of some sort.

Pig Has Nervous Breakdown

Cases of nervous breakdown in sheep and pigs were reported by Dr. H. S. Liddell of Cornell University Medical College.

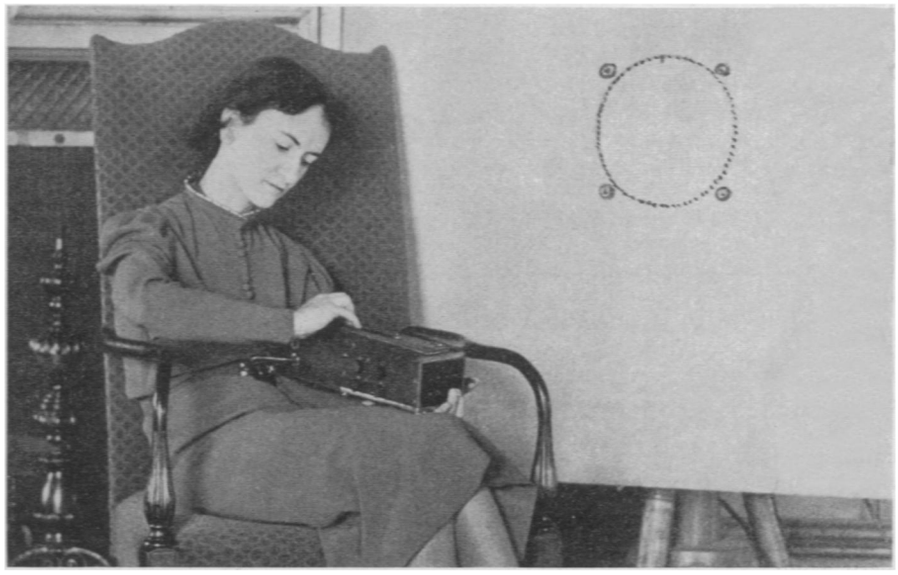
The nervous breakdown was produced experimentally in the animals and is important because it gives psychiatrists for the first time "guinea pigs" on which to test treatments for mental disease before trying them on human patients.

Out of a group of sheep which had been trained to take part in certain laboratory experiments, three suddenly became neurotic and refused to be led to the laboratory. Like a neurotic person, these animals developed tics, irregular breathing and rapid heart beats.

The pig had been trained to open the lid of a box to get an apple which was delivered at certain signals but not at others. Later a slight shock was given when the pig opened the lid of the box, but the animal paid no attention to this.

Then the signals were made more complicated. One kind of shock was given on feeding day and another kind on other days. Soon the animal resisted efforts to give the shock but remained quiet on feeding days. The pig continued to open the lid of the box to get the apple, but when its attempts to do this were met with another shock, it refused to open the lid until a piece of apple was dropped.

Finally the experimenter refused to drop the apple until (*Turn to Page 332*)



THE OSCILLION

Seated in an easy armchair is Mrs. William E. Danforth playing the electrical musical instrument developed by her scientific husband, Dr. W. E. Danforth, for use in the non-paid Swarthmore Symphony Orchestra. By sliding the finger on the strips of metal atop the box the tones of the French horn or the bass clarinet issue from the loud speaker seen in the right background.

PHYSICS

Electric Instrument Invented To Take Place of French Horn

WHEN Dr. W. F. G. Swann, the well-known scientist who is director of the Bartol Research Foundation lifts his baton in his extra-curricular job as conductor of the non-paid Swarthmore (Pa.) Symphony Orchestra he can call into service two novel electrical musical instruments used nowhere else in the world.

Like most non-paid musical units the Swarthmore Orchestra finds difficulty in obtaining a full complement of instruments to render standard symphonic works.

But ingenuity, in the person of the Bartol scientist, Dr. William E. Danforth, has devised electrical apparatus that can pinch-hit for the missing French horn and bass clarinet. A simple elongated box that one holds on the left forearm and plays by moving the fingers on two metal strips does the trick, when linked to radio amplifying apparatus and a loud speaker.

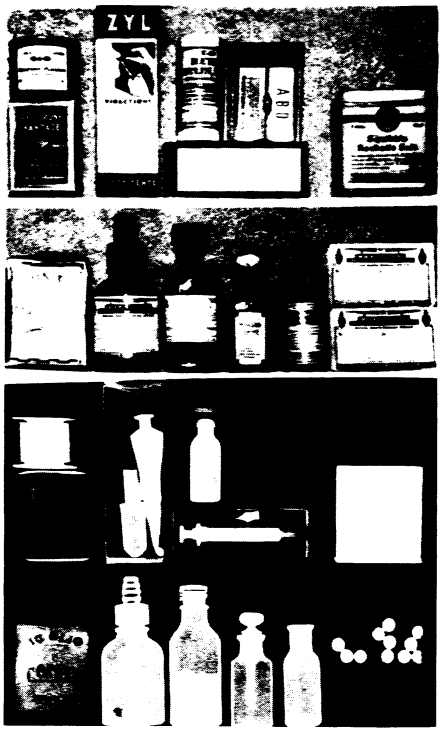
Slight pressure of the right forefinger on one of the strips causes the loud speaker to give a tone controlled in a fashion similar to the fingering of a violin. The loudness of the tone produced is controlled by moving a small lever with the left thumb. The other fingers of the left hand control the range of pitch of the instrument.

Dr. Danforth explained to Science Service that while none of the principles used in the instrument are new to electrical science, certain features of design, ease of playing and "life" of the tone produced, are improved over what has previously been available.

Fundamental to the operation of the "oscillion," explained Dr. Danforth, is a gas discharge oscillator. When the finger is placed on the strip an electrical condenser starts charging up like a small water tank being filled through a pipe.

After a certain amount of electricity is stored up in this way the electricity is discharged through the gas discharge tube. This is as if someone suddenly pulled the bottom out of a water bucket and let the water fall all at once.

After the discharge, the condenser again begins to store (*Turn to Page 332*)



OUTSIDE AND INSIDE

A shelf of medical sundries, such as might be found in almost any household, and the same shelf, as the X-ray sees it. Note that both sides of the bar of castile soap are visible at the same time: the lettering on the back side is reversed.

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pig opened the box. This forced the pig to come to a decision and act on it. But the effort to do this was evidently too much for the pig and within a few days it developed neurotic symptoms. Since its whole disposition has changed and from being friendly and docile it became morose and hostile.

Because the pig or sheep has a simple way of life, uncomplicated and unobscured by the ethical standards and social traditions of human life, it provides an ideal test subject, Dr. Liddell pointed out, for analyzing the essential conditions that produce nervous strain and derangement.

Use Little of Brain

The very small part of man's relatively large brain necessary for intellectual processes, or what is commonly called thinking, was described by Dr. Leland B. Alford of St. Louis.

This might be called the seat of the intellect or the brain center for thought except that such psychological terms have gone out of fashion. It is located, in right-handed persons, at the center of the left side of the brain.

Any other part of the brain can be injured or removed without interfering with intellectual processes, Dr. Alford and other scientists have found. Dr. Alford illustrated this point with several case histories, among them that of a 60-year-old business man. Apoplexy left this man almost completely paralyzed and unable to speak except for one expression of two words and the ability to swear when angry. In spite of this, the patient for two years has been conducting his business and managing several farms through an agent who is able to make out the patient's incoordinated gestures. Although the patient could not write his name upon request, he recently drew a plot of some farms without error. His mentality is excellent, Dr. Alford said, though X-ray pictures show a large part of his brain has been injured.

This and several other cases show that, contrary to general opinion among psychologists, different parts of the brain are responsible for speech and for thinking or intellectual processes. The brain area concerned with speech can be injured without affecting mentality.

The cortex or outer part of the brain is not so much concerned with thinking processes as psychiatrists have believed, Dr. Alford said.

Calcium for Hallucinations

Discovery that calcium, harmless chemical normally present in the body, can be used to calm the excitement and banish the hallucinations of mental disorders was reported by Dr. R. W. Robb of the Osawatomie (Kansas) State Hospital.

Scientists have known many drugs that would produce hallucinations but very few, other than narcotics such as morphine, have been known to relieve hallucinations, Dr. Robb pointed out.

The fact that lack or deficiency of calcium in the body causes nervous irritability is well known. Dr. Robb discovered its soothing effect when he gave it to a patient in the course of certain tests he was making. This patient's improvement led him to try it in 40 other cases of long standing. All were improved by the weekly injections of calcium.

Science News Letter, May 22, 1937

Soviet health officials are to study medical lore of India and Tibet, to see whether certain native remedies may have scientifically sound value.

RADIO

Hope to Predict Radio Conditions in Advance

HOPE that scientists will be able to predict radio transmission conditions a month or more in advance was held out by A. K. Ludy of the U. S. Coast and Geodetic Survey and A. G. McNish of the Carnegie Institution's Department of Terrestrial Magnetism. To correlate more closely the activity of the earth's magnetic field with radio transmission, these scientists are compiling a twice daily measure of the magnetic conditions as observed at seven world-wide stations. These "character figures" will be distributed by Science Service throughout the world and are expected to reveal practical useful relations between radio and earth's magnetism.

Science News Letter, May 22, 1937

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electricity and repeats the process at regular intervals. Thus is produced a rapid succession of electrical pulses which are sent through a radio tube amplifier to a loud speaker. If the pulses come 256 times a second, for example, the note middle C is produced by the instrument.

The frequency of the pulses and therefore the pitch of a note is determined by the value of electrical resistance through which the condenser discharges, just as the speed of filling a water tank depends on the size of the pipe through which the water flows. Movement of the fingers on the strips atop the little instrument box changes the electrical resistance and, hence, the tone produced.

"Admittedly," said Dr. Danforth, "no electrical device at present available can imitate all the effects available in conventional instruments. But electrical systems can simulate these effects and, moreover, can produce effects which the conventional instruments cannot. Among these are unlimited volume, unlimited range of pitch, wide variations in timbre and sensitivity of the instrument to a very light touch. Acceptance of these features must await the day when trained composers are moved to weave them into artistic creations."

Science News Letter, May 22, 1937

Guatemala plans to use airplanes to spray banana plantations.

The decimal system was used in India about 2,700 B. C., judging by discovery of a regularly marked measure.