proteins were also tested in deep culture and found to be active.

In each instance stimulation of growth and production of penicillin was obtained with the butyl alcohol soluble fraction. This was attributed to proline or hydroxyproline, and tests in deep culture with continuous shaking showed that pure proline was active but hydroxyproline was inactive.

A straight line relationship existed between the concentration of proline and the yield of mycelium in a basal media containing Czapek-Dox minerals and 4 per cent. lactose. The penicillin assays increased with the yield of mycelium but the yields of penicillin were low as compared to corn-steep liquor.

Other amino acids were investigated separately and in combination with proline. Glutamic acid with proline increased the yield of penicillin, *e.g.*, Czapek-Dox salt solution plus 4 per cent. lactose, 0.1 per cent. proline and 0.1 per cent. glutamic acid, inoculated with spores of the mold and agitated in a shaker, gave a yield of 35 Oxford units of penicillin per cc. Aspartic acid could substitute for glutamic acid. Histidine, methionine, tryptophane, hydroxyproline and phenylalanine had no effect. The addition of arginine to proline had a slight stimulatory effect. A summary of the more significant results is given in Table 1.

TABLE 1

	Age of culture (days)	Wt. of mycelium (gm)	Yield of penicillin (Oxford units per cc)*
Czapek-Dox + 4% lactose	7	0.019	0
	10	....	0–0.1
Czapek-Dox + 4% lactose, + 0.2% proline	7	0.290	4–6
	10	....	9–11
Czapek-Dox + 4% lactose, + 0.2% proline + 0.2% glutamic acid	7	0.358	17–21
	10	....	32–36

* Range of values in triplicate tests. Yields confirmed by extracting the penicillin from the acidified crude medium with amyl acetate and reextracting from amyl acetate into a buffer solution at pH 7 which was then re-essayed.

It is interesting to note that proline and glutamic acid are the amino acids present in the highest concentration in wheat and corn proteins. Details of this research will be published elsewhere.

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AUTOMATIC ELECTRIC SWITCH FOR CONSTANT AIR PRESSURE

IN the measurement of such physiological processes as respiration, photosynthesis and transpiration, by methods involving the continuous flow of air around the plant material, it is often desirable to have the rate of air movement remain uniform during each experiment. A constant air pressure gradient facilitates this end. To accomplish this purpose, under the stress of material shortages and priorities, the writer has devised a pressure switch for the automatic control of an electrically driven air pump, which is thus caused to maintain a fairly constant partial vacuum in an air reservoir.

The general plan of the apparatus and a detailed drawing of the pressure switch are shown in Fig. 1. The air reservoir and pump are drawn on a much

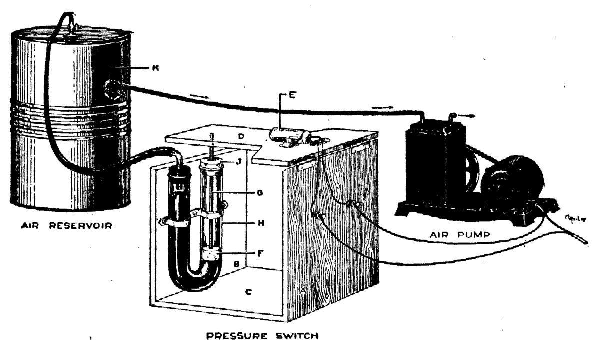

FIG. 1. Automatic pressure switch. Description in text.

smaller scale than the pressure switch. The pressure switch is designed to operate a rocker-type mercury electric switch (E) of suitable capacity. A switch (Central Scientific Co., number 84350C), having a rating of 220V and 1000W, has been quite satisfactory. This mercury switch will make and break contact when tilted through an angle of 3.5 degrees. It is mounted upon a light weight board (D) which is further trimmed to reduce its weight. This board is fastened at one end by hinges to the vertical board (A). The free end of the board (D) rests upon the upper end of a light bamboo rod (G) which passes through a loose-fitting hole in a cork stopper (J) into a cork float (F). The float rides upon the surface of the mercury in one arm of the glass U-tube (H). The bore of the U-tube is 3 cm, but this dimension may be varied, as required, to accommodate a float of sufficient buoyancy to support board (D). The arms of the U-tube are 6 inches in length, which allows for a maximum of about 5 inches, in mercury, of air pressure deficit (suction) in the air reservoir. Values less than 5 inches may be obtained by shortening rod (G). To obtain a larger air pressure deficit would only necessitate using a U-tube with longer arms and increasing the lengths of the vertical supports (A, B) and the bamboo rod (G) proportionately. The length of the bamboo rod is adjusted, by cutting off the top end, so that contact in the mercury switch is broken with the desired amount of depression of mercury in the float containing arm of the U-tube.

The lengths of the uprights (A and B) are 7.5 inches and 6.5 inches, respectively. Board (A) needs to be slightly longer than (B) to allow for the lever action of (D). The length of board (C) is 6.5 inches, which makes the horizontal distance between (A) and the bamboo rod 6 inches. This latter distance is critical, as it determines the amount of rise and fall of the bamboo rod hence fluctuation in air pressure, required to make and break the electric circuit in (E). As stated above, this mercury switch will make and break contact when tilted through an angle of 3.5 degrees. Considering the lever arm (D) 6 inches it has been determined by calculation and actual measurement that the total vertical action of the bamboo rod, through make and break of the electric circuit, is 0.6 $\pm$ inches. In other words, with the dimensions as given the mercury level fluctuates up and down over a distance of 0.6 $\pm$ inches with each cycle of start and stop of the electric air pump. If less variation in pressure in the air reservoir is desired one needs only to move (A) and (B) closer together by shortening (C).

A steel drum is being used as the air reservoir. The air pressure in the reservoir is maintained at a deficit, with respect to the atmosphere, by an air pump whose operation is controlled by the automatic pressure switch. A wide-mouth glass bottle of 5-gallon size would probably be quite as satisfactory as the steel drum. A large rubber stopper (K) in the air reservoir is fitted with glass tubes. One of these tubes is connected to the air pump, while the others are connected with absorption towers or other gas analyzing devices as desired.

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DISCUSSION

"TEN-EIGHTY," A WAR-PRODUCED RODENTICIDE

THE work described in this article was one accomplishment resulting from a transfer of funds, recommended by the Committee on Medical Research from the Office of Scientific Research and Development to the Fish and Wildlife Service of the Department of the Interior. Administration of this project and the studies connected with it were conducted by the Wildlife Research Laboratory in Denver as part of its long-established search for new rodenticides. It was aided greatly by chemists at the Economic Investigations Laboratory at the Patuxent Research Refuge in Maryland. During the biennium following the grant of funds more than a thousand substances, largely synthetic in origin, were prepared or obtained from cooperators and bioassayed at the Patuxent Laboratory and the more toxic ones subjected to confirmatory tests at the Denver laboratory.

Initial experimentation was carried out with albino rats, but in view of the inherent limitations in the use of these animals in solving problems associated with wild creatures, the later tests were conducted with captive wild Norway rats, prairie dogs and other field rodents in the control of which the new rodenticides eventually would be used. Subsequent to the laboratory work with caged animals the more promising materials were tested under actual field conditions.

Several potentially effective rodenticides have been disclosed in the course of this work. One, commonly referred to under its laboratory serial number, "1080," but chemically designated as sodium fluoroacetate, has been subjected to sufficiently adequate field testing to warrant the assertion that a promising new rodenticide has been discovered. Although its toxicity to laboratory animals had been known for some time, knowledge of its utility as a practical rodenticide now rests largely on the work to which reference is here made.

Compound "1080" is extremely toxic to a variety of small mammals, a fact which has called for the utmost caution in handling it because of its potential hazard to human beings, domestic livestock and beneficial wildlife that might accidentally come in contact with it. The following approximately LD50 per cent. doses for "1080" when administered in food baits have been determined by those engaged in this study:

Leghorn hens	10.00 mg/kg
Deer mice (*Peromyscus*)	5.0 mg/kg
Wood rat (*Neotoma*)	5.0 mg/kg
Wild Norway rats (*R. norvegicus*)	5.0 mg/kg
Tame white rats	2.5 mg/kg
Black-tailed prairie dogs (*C. ludovicianus*)	2.5 mg/kg
Meadow mice (*Microtus*)	0.5 mg/kg
Domestic dogs	0.35 mg/kg
Fisher's ground squirrel (*C. beecheyi fisheri*)	0.35 mg/kg
Wild black rats (*R. rattus* subsp.)	0.1 mg/kg

In addition to its high toxicity to small mammals, several of the other characteristics of "1080" have a bearing on its ultimate utility as an effective and usable rodenticide. It is very soluble in water, and when this factor is combined with its high toxicity, the very dilute solutions needed reduce to a minimum any objectionable tastes that might lessen acceptance by rodents. Early tests have shown that there is no significant difference in its toxicity with respect to the