the density of air contained would tend to increase and the cylinder fall for this reason also. But the present experiment is relatively too crude to show this. For the content of the cylinder e (6 cm. long) may be taken as 33 milligrams of air. The forces registered by the pinhole valve in experiments with resonators did not exceed $dp \mid p = 3 \times 10^{-4}$. Thus the increment of weight of e is but 10^{-2} dyne, which would lower the index of the torsion balance only .3 mm.

3. Finally let the closed cylinder e be replaced by the cylinder r open below and capable of entering the pipe p. Let the length of r be such that the open cylinder is in resonance with p. Then the conditions of the experiment are obviously improved (though not as much so in the experiment as anticipated[1]); but the results will still be the same in character. The open end of r will tend to enter the sounding pipe p; which is the equivalent of the Mayer-Dvorak experiment, here exhibited without any "neck" effect and without air currents.

4. I may add a comparison of the pin-hole compression observed in the given pipe (2.6 cm. diameter and 13 cm. long) when sounding loudly (*i.e.*, when resistance in the telephone circuit has been reduced as much as possible) and the compression observed in the open organ pipe of the standard form on the interferometer. The embouchured organ pipe, tested on the interferometer,[2] showed for the maximum compression $d\rho \mid \rho = 10^{-3} \times 14$ in case of a moderately loud note. The telephone closed pipe, tested with the pin-hole valve at the end of a quill tube thrust well within, gave a displacement of 20 fringes with 2,000 ohms in circuit. This is equivalent to a pressure increment of .0120 cm. of mercury when but 100 ohms are in circuit, as was approximately the case in the experiments of this paragraph. Thus in case of the probe $dp \mid p = 1.6 \times 10^{-4}$. Reservoirs at the U-tube of different volumes showed the same quantitative result. The increment (compression) does not quite vanish even in the plane of the mouth of p, but a little beyond. The ratio of the two compressions is thus 87; but while the interferometer direct gives a fringe displacement rarely exceeding 1, the pin-hole valve, under like conditions, will give fringe displacements easily several hundred times larger, depending on the degree of approach to the critical diameter of the pin hole.

Carl Barus

Brown University, Providence, R. I.

[1] On varnishing the paper resonator to stiffen it, forces above 2 dynes per cm.^{2} were directly measured.

[2] Science, LII., p. 47.

THE KENTUCKY ACADEMY OF SCIENCE

The Kentucky Academy of Science held its eighth annual meeting on May 14th at the University of Kentucky, Lexington. The meeting was called to order at 9:30 o'clock by President Coolidge.

The secretary's report showed 127 members, including 44 national members, 55 local members, 21 corresponding members and 7 honorary members. These represent 37 different lines of activity of which chemistry leads with 26 members. Twenty-one new members were elected.

The report of the committee on legislation proposed a large program to be worked for, including a state appropriation for the support of the academy; awarding prizes for research; increased appropriations for completing the topographical map of the state and soil surveys; a natural history survey of the state and the establishment of a natural history museum; increase in the teaching of science in the high schools; the preservation of the records of drilled wells; the setting aside of areas for preserving natural conditions and the endorsement of the law now before Congress to make Mammoth Cave and its environs a national park. This report was adopted.

The officers elected were:

President, George D. Smith, State Normal School, Richmond, Ky.
Vice-president, Lucien Beckner, Winchester, Ky.
Secretary, A. M. Peter, Experiment Station, Lexington, Ky.
Treasurer, Charles A. Shull, University of Kentucky, Lexington, Ky.
Member of Publications Committee, D. W. Martin, Georgetown College, Georgetown, Ky.
Representative in the Council of the A. A. A. S., A. M. Peter.

The program included an address by Dr. Henry

B. Ward which was the principal feature of the afternoon session.

The following program was rendered:

President's address: *The relation of chemical training to industry:* W. H. COOLIDGE.

An experiment in mental and physical correlation: J. J. TIGERT, University of Kentucky, Lexington, Ky. By title.

Summary of the Thurstone intelligence tests for college freshmen and high-school seniors: WALTER E. ERVIN, Centre College. The average of 58 freshmen tested was 83, ranging from 30–39 (one student) to 150–159. The author remarks that such tests are not conclusive as to the mental equipment of any boy or girl, but they are helpful by placing the student in the school with more fairness.

The tragedy of the passenger pigeon: GEORGE D. SMITH, Eastern Kentucky State Normal School. The author described his observation of the wholesale destruction of the pigeons in their roosting place in a marsh, at night, by persons who came for miles around for this purpose, and hauled away the dead birds by the wagon load. This incident seems to have been one of the final stages in the extermination of the pigeon.

The last warning of the rattler: GEORGE D. SMITH, Eastern Kentucky State Normal School. The paper describes a fight which the author observed between a diamond rattlesnake and a large blue racer. The fight was long and fierce and ended in the destruction of the rattler. During the fight the racer is badly bitten by the rattler, hastens to a patch of weeds and bites several of the weeds, sucking out the juice. He then hastens back to renew the combat. In the progress of the fight the juice of the weed was applied a second time and the racer rushed back to renew the fight as before.

Absorption in the corn grain: CHARLES A. SHULL, University of Kentucky.

Orthogenesis in the Membracidæ: W. D. FUNKHOUSER, University of Kentucky. The attempt to explain the remarkable developments of the pronotum in the family Membracidæ by natural selection fails in the cases of the most bizarre and curious tropical forms. Poulton and others have suggested explanations based on protective coloration and mimicry which must be carried into the realm of speculation when applied to certain exotic species. Certain genera, including *Heteronotus, Centrotus, Pyrgonota* and *Spongophorus,* seem to show very regular pronotal development along definite lines when traced from the more generalized to specialized forms. This is particularly true of the length and position of the suprahumeral, dorsal and posterior horns. These developments seem in many cases to be entirely without regard to utility and even to threaten the existence of the species. In comparison with the classical example of the Irish elk, many species of Membracidæ seem to show even greater evidence of orthogenesis.

The progress of Kentucky in the second decade of the twentieth century: EDWARD TUTHILL, University of Kentucky

Kentucky petroleum problems: LUCIEN BECKNER. Kentucky offers many problems in petroleum geology which the consulting geologist and the geologist of the private company seldom have time to solve. The larger anticlines, the Cincinnati, north and south, and the Kentucky, east and west, present their peculiar characters that are not yet well understood. The author points out many problems which, could they be solved, would save the useless expenditure of thousands of dollars and probably result in the production of much wealth.

The first food of young black bass: H. GARMAN, Experiment Station, Lexington, Ky. A study of the food by use of the microscope on the stomach contents of both large- and small-mouthed black bass, taken from the State Hatchery pools at Forks of Elkhorn, Kentucky, showed that the dietary of both species during the first five weeks of their active lives consists of small crustaceans belonging to the orders Cladocera and Entomostraca, and of insect larvæ belonging to the dipterous family Chironomidæ. The percentages of the different kinds of food were determined and, as far as practicable, an exact determination was made of the crustacean species most prevalent in the dietaries. The purpose of the study was to learn just what food was most relished and how it might be influenced artificially for the benefit of young fishes produced at the hatchery.

The tolerance of hogs for arsenic: D. J. HEALY and W. W. DIMOCK, Experiment Station, Lexington. There is a popular belief that hogs are not very susceptible to arsenical poisoning and an examination of the literature failed to disclose a record of arsenical poisoning in hogs. The results of four tests made by administering arsenic trioxid are given. The total of 11 shoats received large doses of arsenic trioxid; in some

cases the doses were enormous. Nine of the shoats received, in addition to the arsenic, hog cholera virus. One animal died from acute arsenical poisoning, one from acute cholera, and one from an undetermined cause. It would appear from these results that young hogs possess a marked tolerance for arsenic trioxid.

Growing seedlings in test tubes with only filter paper pulp and distilled water: Mary Didlake, Experiment Station, Lexington. The lower third of a test-tube is filled loosely with crumpled strips of filter paper, enough water to cover the paper is added and the tube plugged with cotton and sterilized in the autoclav. Sterilized seeds may be dropped in and allowed to germinate and grow. Soybean, cowpea, garden bean, garden pea, Canada field pea, vetch, alfalfa, red clover, Japan clover, velvet bean, peanut, locust, acacia, corn, wheat, hemp, and morning glory have been grown successfully in this way. Plants will grow thriftily for a month or six weeks.

Effect of frost and "soil stain" on the keeping quality of sweet potatoes: A. J. Olney, University of Kentucky. When the vines were cut away before frost, only 4 per cent. of the potatoes spoiled after storage at about 60 to 65° F. When the vines were cut immediately after a freeze, no loss occurred. When the vines were cut 5 days after the freeze the loss was 88 per cent. Potatoes badly affected with soil stain (*Monilochaetes infuscans*) but otherwise sound, sustained a loss of 55 per cent., while healthy checks suffered a loss of 12 per cent. Potatoes wrapped with paper sustained a loss of 20 per cent., as against 12 per cent. in those unwrapped.

Attempted inter-species crosses of the genus Nicotiana: G. C. Routt. Crosses were attempted among 7 species of *Nicotiana*. Of 911 flowers experimented with, 201 set seed. Only 4 of the 19 combinations proved fertile in both crosses and reciprocals, 4 proved fertile in one way only, and 11 proved infertile. Plants have not yet been grown from the seed obtained.

The production of antitoxin: Morris Scherago, University of Kentucky. The method of producing diphtheria and tetanus antitoxin is described from the time the flasks of media are inoculated for the production of the homologous toxin until the antitoxin is ready for distribution. The factors influencing the potency of a toxin are discussed and the method of estimating the M. F. D. is outlined. The immunization of horses is discussed including the types of animals desired, preliminary treatment, dosage and time of injection. The time for taking trial bleedings and regular bleedings is indicated and the standardization of antitoxin is briefly discussed. The method of concentrating antitoxin is also described and discussed.

The inefficiency of the efficiency expert: P. K. Holmes, University of Kentucky. Efficiency is the keynote in modern industry. Our modern "captains of industry" are giant efficiency experts. They often fail at the vital point because they do not apply their principles of efficiency to their own living, although they demand it of their employees who handle delicate machinery or assume big responsibilities for them. Big business can not long be efficiently done on artificial stimulants and by flabby muscles and shortness of wind. In the struggle for business supremacy only the strong survive. We must no longer be satisfied to live on a low health plane. We must have as our standard positive, and not negative, health. Such only is the basis of general efficiency.

On the trail of the Alaska salmon: Dr. Henry B. Ward, University of Illinois. The marvelous life history of the Alaska salmon has been worked out by the combined efforts of many investigators. In the early summer the adult fish appear off the coast, move forward into the inlets, start up stream, ultimately reach their spawning grounds, and having spawned, die. No adult salmon ever returns to salt water. The eggs rest in their gravel nests over winter and hatch out in the spring; the young fry play about in fresh water, descending slowly the streams until they disappear into the ocean. The markings on the scales carry a precise record of the age and wanderings of the fish in fresh water and in the ocean. Reasons for their movements in fresh water are not yet so well determined. The course they follow is very precise but the influences that direct it are still unknown. Partial explanations of the movements are to be found in the influences of the current of the stream and the temperature of the water. The application of these principles to special instances indicates the extent to which they serve to explain the complex problems involved in migration. The author described many of his observations while studying the salmon in Alaskan waters. He also brought out forcibly the importance of Alaska's natural resources, of which the salmon is one of the greatest.

Alfred M. Peter,
Secretary