value not only to botanists in diverse fields, but to a great number of individuals interested in various phases of agriculture, forestry, conservation, soil erosion, irrigation and other fields. Fortunately for those who need and must have this work, it is a public document and is so priced as to be available to all.

E. D. MERRILL
NEW YORK BOTANICAL GARDEN

SOCIETIES AND MEETINGS

THE INDIANA ACADEMY OF SCIENCE

THE golden anniversary meeting of the Indiana Academy of Science was held on Thursday, Friday and Saturday, November 15, 16 and 17 at Indianapolis, with the academy as the guest of Butler University. The general meetings were devoted to its history and the honoring of its living founders. At the sectional meetings a total of ninety-eight papers on botany, chemistry, bacteriology, geology, geography, physics, mathematics and zoology were read. The meetings were all well attended.

The principal address of the historical meeting was given by Dr. Will E. Edington, of DePauw University, on the subject, "There Were Giants in Those Days." The address dealt with the various factors that led up to the founding of the academy in 1885, and was illustrated with slides showing the principal founders. Among these were David Starr Jordan, T. C. Mendenhall, John M. Coulter, John C. Branner, Daniel Kirkwood, John Sterling Kingsley, Thomas Gray, Oliver P. Jenkins, Richard Owen, Alexander Smith, Harvey W. Wiley, Joseph Swain, William A. Noyes, Amos W. Butler, Barton W. Evermann, Lillien J. Martin, Carl H. Eigenmann, Willis S. Blatchley, Joseph C. Arthur, Stanley Coulter and others. Following this address ten of the fifteen living founders who were present were introduced to the assembled members of the academy.

The president's address was delivered by Father Julius A. Nieuwland, of the University of Notre Dame, on "The Story of Synthetic Rubber," which was a report on the work for which he has been awarded the Nichols Medal by the American Chemical Society.

The Founders' Dinner was held on the evening of November 16, at the Claypool Hotel with several hundred members in attendance. Following the dinner, the ten living founders who were present gave short talks. These founders are J. C. Arthur, George W. Benton, W. S. Blatchley, J. B. Burris, Amos W. Butler, Stanley Coulter, Robert Hessler, David M. Mottier, William A. Noyes and A. J. Phinney. They were presented with certificates of appreciation for their service to science and to the academy, John S. Wright, of the Eli Lilly Company, acting as master of this ceremony.

Several scientific men from without the state were present. Of these particular mention may be made of Dr. Henry B. Ward, permanent secretary of the American Association for the Advancement of Science. Dr. Ward attended the meetings of the executive committee and made a short address at the founders' dinner in which he discussed the meeting of the association to be held in Indianapolis in 1937.

The Junior Academy, composed of a number of high-school science clubs, held its meetings on Saturday morning. These included scientific exhibits.

There were on display a number of scientific exhibits and also an exhibit of photographs of all the past presidents of the academy and a majority of the founders. It is the intention of the academy to file these photographs, slides made from them and other historical material in the State Library, so that it will be accessible for use in lectures and other work. At the request of Dr. Ward photographs of all the past presidents are to be exhibited at the St. Louis meeting of the American Association for the Advancement of Science.

The following officers were chosen for 1935: *President,* Will Scott, Indiana University; *Vice-President,* Will E. Edington, DePauw University; *Secretary,* Ray C. Friesner, Butler University; *Treasurer,* William P. Morgan, Indiana Central College; *Editor of the Proceedings,* Paul Weatherwax, Indiana University; *Press Secretary,* Thomas R. Johnston, Purdue University. The next winter meeting will be held at Crawfordsville, Indiana, with Wabash College as host.

WILL E. EDINGTON

SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE NICOTINE VAPORIZER, A DEVICE FOR UTILIZING NICOTINE IN THE CONTROL OF INSECT PESTS

FOR many years nicotine has been available in commerce in the form of nicotine sulfate having a content of 40 per cent. nicotine alkaloid. In the control of insect pests attacking vegetation under outdoor conditions, this material has been utilized in two ways, as an aqueous spray solution and as a dust mixture. The insecticidal action appears to be due very largely

to the volatilization of the nicotine. In order to produce a more rapid liberation of the nicotine, various "activator" substances, such as hydrated lime, lime-sulfur, an ammonium sulfate, have been added to the spray and dust. Attempts have also been made to increase the effectiveness of nicotine dust by discharging into the blast of dust the exhaust of the gasoline engine operating the blower, the slightly higher temperature tending to liberate the absorbed nicotine and produce a greater degree of volatilization.

Various insects attacking plants in greenhouses have been controlled by the vapor of nicotine produced by burning tobacco stems or a material on which nicotine has been placed, and by placing nicotine on a heated object.

The new device, which we have designated a nicotine vaporizer, has been designed with the object of effecting the control of insect pests of orchard, garden and field crops by means of nicotine sulfate or any form of nicotine concentrate applied as a vapor produced by heat or as a vapor-like mist produced by atomization. The essential features of the device provide for atomizing the nicotine, conveying the mist through a heated chamber where it is vaporized with the formation of dense fumes, and thence conveying the vapor through a blower to the vegetation; or the finely atomized nicotine may be conveyed through the blower to the vegetation without being vaporized.

The machine which we have built and tested operates in the manner described as follows: The nicotine is contained in two chambers connected through a pressure regulator to a compressed air tank. Tubes arranged to produce atomization lead from the chambers and discharge into two copper pipes 2 inches in diameter and 30 inches in length. The pipes are inclosed in a shield to conserve heat. They are heated to a temperature of approximately 350° C. by a gas burner, utilizing compressed gas, extending lengthwise below them. The pipes extend into the intake of the blower of a standard type of duster used in insect control work. The blast of air from the blower carries the nicotine vapor or the atomized nicotine to the vegetation. The rate with which the nicotine is fed through the atomizer is governed by the pressure regulator.

Tests made with the vaporizer in the control of the codling moth, *Carpocapsa pomonella* Linn., have indicated that nicotine applied as a vapor is far more potent as an insecticide than where applied in the usual form of a spray or a dust. It is a well-known fact that nicotine has no appreciable effect on the codling moth where applied as a dust, or as a spray at the usual concentration of one pint of nicotine sulfate to 100 gallons of water. An apple tree having a volume of approximately 4,000 cubic feet requires about 20 gallons of spray in order to effect a thorough coverage. With this quantity of spray the tree receives 90 cubic centimeters of nicotine sulfate. Tests have shown that 10 cubic centimeters of nicotine sulfate properly applied with the vaporizer will kill all the moths in a tree of this size.

The effectiveness of the treatment depends upon the concentration of the vapor in the atmosphere surrounding the insect and upon the length of time the insect is subjected to the vapor. The maximum degree of effectiveness is secured by discharging the vapor under a canvas cover dragged over the crop to be treated. For the treatment of orchard trees we have built and tested, with a fair degree of satisfaction, a device by means of which large trees may be inclosed and treated at the rate of one tree each half minute. This device consists of a transverse boom extending over two rows of trees, supporting a large canvas cover, adjustable for trees of different sizes, and provided with two curtains which permit inclosing the trees quickly and completely, all mounted on an automobile truck.

The development reported in this article owes its origin to a suggestion to try burning nicotine, made by the junior author, Mr. Persing, in connection with tests on fumigating with hydrocyanic acid to control the codling moth.

RALPH H. SMITH
HENRY U. MEYER
CHARLES O. PERSING

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PRODUCING BRAIN LESIONS IN RATS WITHOUT OPENING THE SKULL

HERETOFORE all localized brain lesions in experimental animals have been produced by opening the skull and introducing some destructive agent, usually a knife or a thermocautery. Using heat as the destroying agent, we have found it possible to shorten and simplify the older procedure considerably by applying the cautery point *extracranially*. If a knife is used, it is of course necessary to trepine the skull. Heat, however, will readily penetrate the unremoved bony shell sufficiently to coagulate the underlying tissues. This technique is especially feasible when the skull bones are thin, as in the rat.

On some occasions, there may be good reasons for the use of a cutting edge and hence for removal of a portion of the skull. Even when tissue is destroyed by heat, there may be occasions when the heat should