Letters to the Editor

On Tobacco Smoke

Mario Domingues de Campos has published a paper (*An. Fac. farm. odontol. Univ. São Paulo,* 1939–40, **1**, 15) on this subject which came to my attention only recently (*Chem. Abstr.,* 1945, **39**, 5395). He reports, apparently as his discovery, that pyrrole, pyridine, hydrocyanic acid, carbon monoxide, and carbon dioxide were found in tobacco smoke but that he has been unable to detect nicotine. These are statements which need some comment, for the presence of all these compounds, including nicotine, in tobacco smoke was detected a long time ago; in fact, quantitative determinations have already been made in all cases. Out of the long list of nicotine determinations in tobacco smoke only the paper by Barta and Toole (*Angew. Chem.,* 1932, **45**, 671) may be mentioned. They confirmed Lehmann's earlier findings (*Arch. Hig.,* 1909, **68**, 319) that, on the average, 93 per cent of the nicotine appears in the smoke while the rest suffers decomposition. Also, the quantity of hydrocyanic acid in the smoke has been determined repeatedly. Waser and Stähli (*Z. Unters. Lebensm.,* 1934, **67**, 280) confirmed Lehmann's earlier work, finding 0.020–0.0034 per cent of the tobacco weight as hydrocyanic acid in the main (interior) flow of smoke. It is worth noticing that the tobacco itself is free of hydrocyanic acid and that the quantity of the acid formed is independent of the nicotine content. Lehmann has also shown that tobacco smoke contains pyrrole. The writer (*Oesterr. Chem. Ztg.,* 1937, **40**, 434) has performed a series of quantitative determinations of pyrrole in tobacco smoke showing that the main flow contains 20–80 mg. per cent pyrrole. The quantity varies with the speed of smoking and increases with the humidity and the N-content of the tobacco but is independent of its nicotine content. This indicates clearly that pyrrole is not a decomposition product of the nicotine. It was concluded that it is formed by the thermal decomposition of the proteins of the tobacco, as Schützenberger and Bourgeois (*Bul. Soc. chim.,* 1876, 289) had observed this reaction in the case of the destructive distillation of isolated proteins. Also, the determination of pyridine bases in tobacco smoke has been dealt with in several papers; Preiss (*Pharm. Zentralhalle,* 1936, **29**, 437) has given a list of references.

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A Method for the Quantitative Estimation of DDT in Plant and/or Sulfur-containing Materials

The original dehydrohalogenation method (F. A. Gunther. *Ind. eng. Chem.* (Anal. ed.), 1945, **17**, 149–150) for DDT estimation may involve blanks considerably higher than the expected DDT residues and attributable to chloride-contaminated reagents and filter paper and to secondary effects of saponification, *i.e.* fatty acids responding to the silver titration. Sulfur also interferes, and since DDT-sulfur may become an important insecticide, this disadvantage may be serious.

If halogen-free reagents, removable by volatilization or by phase separation, could replace alcoholic potassium hydroxide, nitric acid, barium nitrate, etc., both the reagent and saponification blanks could be reduced. Reduction of reagent blank from 2 mg. to 0 mg. of DDT has been accomplished by substituting 4.5 N ammoniacal methanol as the dehydrohalogenating reagent, which eliminates the necessity for barium precipitation, reduces the amount of nitric acid for neutralization, and usually eliminates the problem of saponification products.

The procedure is adaptable to the determination of DDT in mixtures containing as much as 90 per cent sulfur.

Procedure. Weigh sufficient dry sample to contain 1 or more mg. of DDT, cover with measured amount of benzol, and set overnight. Pour off the extract through a double thickness of "Shark Skin" filter paper, measure the volume, transfer to an Erlenmeyer flask, and evaporate just to dryness as described by Gunther. Add 3 ml. of benzol to the residue with shaking, then 25 ml. of 4.5 N anhydrous ammoniacal methanol solution (for 125-ml. flask; use 50 ml. of reagent if flask is 500-ml. size), cap the flask with a collapsed finger stall, and hold for 16 hours in a 45° C. incubator.

Add 10 ml. of 3 per cent hydrogen peroxide solution and evaporate the ammonia and methanol, on a hot plate, with the aid of a jet of air. To residue add 40 ml. of distilled water and 1 ml. of 2 N nitric acid.

Remove sulfur not reacted with the ammonia solution by filtration (chloride-free paper). If noticeable oily material is present, transfer the sample to a separatory funnel and extract with 35 ml. of diethyl ether. Discard ether extract, and re-extract the aqueous layer with 35-ml. portions of petroleum ether until no more color is extracted.

Titrate chloride ion in the sample with 0.01 N silver nitrate and 0.01 N thiocyanate, according to Gunther, or by his procedure using the Leitz G & D Electro-titrator with 0.05 milliequivalent added sodium chloride present and deducted prior to the calculation which follows:

Each milliequivalent silver nitrate = 0.3545 grams of DDT.

Therefore:

(1) $[(\text{ml. } AgNO_3 \times N) - (\text{ml. } KSCN \times N)] \times 0.3545 =$ grams of DDT (gross)

(2) grams of DDT (gross) − blank (if present) = grams of DDT (net)

(3) $$\frac{\text{grams of DDT (net)} \times \text{total benzol volume} \times 10^6}{\text{volume filtered extract} \times \text{grams of sample}} =$$ DDT in ppm.

Known quantities from 0.002 to 0.184 gram of DDT, with or without sulfur present, carried through the entire procedure gave recoveries of 91–96 per cent, technical

grade containing some of the o,p′ isomer apparently reacting the same as pure p,p′-DDT. In dried orange and alfalfa meals having zero blanks, added DDT up to 1,000 ppm gave recoveries of the same order, 90–96 per cent. Routine use of the method on dried meal products from experimentally sprayed crops has reproducibly indicated residues of 1–9 ppm.

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Properties of a Virus Inactivator From Yeast

A virus inactivator from yeast has been reported earlier by the undersigned (*Science*, 1942, **95**, 586–587). Simple methods of isolating it and some of its properties have been described in the same publication. From the analysis of its constituent elements, the ratio of C, H, and O, and some qualitative chemical tests, it was believed that the substance is a polysaccharide. Since these results were reported, additional properties have been found and are recorded here.

The virus inactivator was hydrolyzed by heating with 5 per cent HCl or H_2SO_4 until foaming ceased (about 2 hours). The per cent reducing sugar calculated as glucose (Somogyi-Shaffer-Hartmann method) in the neutralized hydrolysate was 85 with HCl and 88 with H_2SO_4. Osazones indistinguishable in appearance from glucosazone were formed in abundance from the hydrolysate, further supporting the view that the substance is composed largely of carbohydrates.

The 12–15 per cent noncarbohydrate residue suggested the possibility that the inactivator may be a glucoside. However, the enzyme, β-glucosidase, prepared according to the procedure of Sumner and Howell (*Laboratory experiments in biological chemistry*. New York: Academic Press, 1944) from fresh almond meal, failed to hydrolyze it or to impair its activity against tobacco mosaic virus.

Longsworth scanning diagrams of a purified solution of inactivator run in a Tiselius electrophoresis cell at pH 7.5 showed but one boundary, indicating that the sample was electrophoretically homogeneous. A mixture of tobacco mosaic virus and a concentration of inactivator sufficient to render 98 per cent of the virus inactive showed two boundaries, one for excess inactivator and a second for inactive virus. A control scanning diagram of tobacco mosaic virus alone could be superimposed on the boundary of the inactive virus, showing that the net charge of the virus particle is not altered by the action of the inactivator. This fact is interpreted to indicate that a general adsorption phenomenon, in the sense that large areas of the virus particle are coated with the inactivator, is not involved; rather, the reaction is presumed to be more selective.

Electron micrographs (RCA Electron Microscope Model B) of purified tobacco mosaic virus which had been inactivated by the yeast inactivator showed no detectable evidence of disintegration or other gross change.

The above results provide further evidence that the inactivator is a polysaccharide and that inactivation is probably brought about by a reaction involving the inactivator and some group in the virus particle which is necessary for its infectivity.

A portion of this work was completed in the laboratories of the Departments of Plant Pathology and Biochemistry, New York State College of Agriculture, Cornell University, Ithaca, New York.

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Book Reviews

The new genetics in the Soviet Union. **P. S. Hudson and R. H. Richens. Cambridge, Engl.: Imperial Bureau of Plant Breeding and Genetics, 1946. Pp. 88. 6s.**

Here is a long-awaited and greatly needed study of the extraordinary developments connected with the name of the Russian agronomist, T. D. Lysenko, from which arose the now famous Genetics Controversy which rocked Soviet biology and aroused the interest of the whole scientific world. What was needed was a sober, careful description of the facts and a reasoned analysis of the interpretations which gave rise to the controversy. This difficult task has been accomplished so well by the two British authors that the importance of their book transcends the limits of this particular controversy and of genetics. It is a contribution to the methodology of scientific discourse which may be read with interest by scientists and philosophers generally. Coming as it does on the heels of the appearance of Lysenko's chief theoretical treatise (*Heredity and its variability*. Translated by Th. Dobzhansky. New York: King's Crown Press, Columbia Univ., 1946; see *Science*, 1946, **103**, 180), it will hasten and facilitate the judgment of scientists on one of the most remarkable controversies of our time.

The study is based on an examination of the original publications, most of them in Russian, in which, between 1932 and 1944, appeared the experimental evidence, theoretical discussions, and polemics of the Lysenko school and its opponents. In addition, the sources of Lysenko's ideas have been traced by reference to the works of Darwin, Naudin, Timiriazev, Burbank, Michurin, and others. These citations, together with a few from modern non-Russian sources, bring the bibliography up to some 300 titles, each with complete listing of author, title, and source in original language and English. There is good evidence that these works were carefully combed and con-