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In his preface to "Experiments and Observations" appears a great quotation of medical history: "I submit a body of facts which cannot be invalidated. My opinions may be doubted, denied or approved according as they conflict or agree with the opinions of each individual who may read them, but their worth will be best determined by the foundation on which they rest—the incontrovertible facts." And again, "Truth like beauty when unadorned is adorned the most." In his notebook, now at the Washington School of Medicine, St. Louis, he wrote: "Of all the lessons which a young man entering upon the profession of medicine needs to learn, this is perhaps the first—that he should resist the fascination of doctrines and hypotheses till he has won the privilege of such studies by honest labor and faithful pursuit of real and useful knowledge."

Alexis St. Martin lived long after the death of his master, near Montreal, in a state of poverty. He had 17 children, 4 of whom reached adulthood. He displayed his fistula in various parts of the country and had offers to exhibit it in Paris and London. When he died in 1880, Sir William Osler attempted to secure the stomach for the Army Medical Museum, but the St. Martin family responded by exposing the body to putrefaction and then burying it in an eight foot deep grave.

The Ethan Allen Beaumont collection is a marvelous store of relics and letters belonging to the great surgeon and his immediate family. It was discovered in 1936 by Dr. Arno Luckhardt and bequeathed to the University of Chicago, where part of it is on permanent display at Billings Library. This, added to the precious materials preserved at the Washington University School of Medicine, constitutes memorabilia that properly should be exhibited like an art treasure everywhere in the country to radiate the spirit of a great American physician.

1853 W. Polk St.

Prognosis in Hypertension.—The character or severity of a hypertensive patient's symptoms, other of course than those which point to cardiac or renal failure, give little clue to his subsequent fate. Headache, for example, has occurred as often in mild as in severe cases. Again, it might well have been expected that the transient cerebral attack ascribed to "angiospasm" would prove to be a curtain-raiser for the subsequent full-length drama of a stroke; but this has not been the case, and the incidence of such cerebral episodes was no higher among patients who subsequently had strokes than in those who did not. Since in addition neither a family history of hypertension nor the existence of a renal basis for the hypertension appears to influence prognosis unduly, assessment of a hypertensive patient must rest fundamentally upon objective findings.

Early recognition of the accelerated form of hypertensive disease is particularly desirable, since it is in this type of case that sympathectomy has most to offer, and operation performed in time may completely transform its character. Appropriate cases, however, will not be selected for sympathectomy unless the practice is adopted of submitting every hypertensive patient under the age of 50 to a systematic assessment with the object of establishing how far the disease has already progressed, for only by relating this to the age of the patient can it be decided whether or not the speed of advance has been excessive.—A. W. D. Leishman, D.M., Observations on Prognosis in Hypertension, *British Medical Journal*, May 23, 1953.

CHEMICAL LABORATORY

Following is the first of several reports on cigarettes, cigarette smoke, and filters by the Chemical Laboratory of the American Medical Association. The work was done by the Laboratory at the request of the Advertising Committee of the American Medical Association. Many of the technical details of the work, which was carried out by Mr. Robert R. Stark of the laboratory staff, have been omitted in this presentation and can be obtained upon request from the Chemical Laboratory.

WALTER WOLMAN, PH.D., *Director.*

A STUDY OF CIGARETTES, CIGARETTE SMOKE, AND FILTERS

1. Filter-Tip Cigarettes

Considerable interest has been expressed concerning the effectiveness of filter-tip cigarettes and the so-called denicotinizing process in reducing the amount of nicotine and tars in cigarette smoke. Because of the scarcity of published data on the subject, the Chemical Laboratory of the American Medical Association has undertaken a study of nicotine and tars in the smoke of filter cigarettes, special low-nicotine cigarettes, and "regular" cigarettes and the effectiveness of filter holders in removing nicotine and tars from cigarette smoke. This first report will deal only with the effect of the filters of the three largest selling filter-tip cigarettes. They represent the three types of filter-tips on the market, namely, paper, asbestos, and cotton. During the course of this investigation changes were made in the filters of each of the three brands, either to improve the filtering efficiency or to change the smoking characteristics of the cigarette. The cigarettes with the original filters are designated as A-1, B-1, and C-1, and the cigarettes with modified filters are designated as A-2, B-2, and C-2 in table 1. A "regular" all-tobacco cigarette, brand D, was also tested. These experiments are not designed to interpret such qualities of cigarettes as flavor, aroma, or smoking characteristics.

As stated by Bradford, Harlan, and Hanmer,[1] a laboratory smoking process should be sufficiently like human smoking to allow acceptance of the data collected, and it must be reproducible. Puffing the cigarette by mouth with an absorption apparatus placed between the cigarette and mouth meets the first requirement, but is not reproducible. Continuous suction applied to the cigarette as employed by Bogen,[2] Koperina,[3] and others is far from meeting the first requirement as the intensified heat produced from the long incandescent coal changes the composition of the smoke. Constant suction interrupted at timed intervals by a stopcock or valve has been employed by Baumberger,[4] Bogen,[2] Jensen and Haley,[5] and others. This method is open to criticism because the volume of puff varies between cigarettes, depending on differences in tightness of packing. Moreover, the volume increases significantly in each cigarette as the smoking proceeds and the air resistance decreases as the cigarette becomes shorter.

1. Bradford, J. A.; Harlan, W. R., and Hanmer, H. R.: Nature of Cigaret Smoke: Technic of Experimental Smoking, J. Indust. Engin. Chem. 28: 836-839, 1936.

2. Bogen, E.: The Composition of Cigarets and Cigaret Smoke, J. A. M. A. 93: 1110-1114 (Oct. 12) 1929.

3. Koperina, A.: Untersuchung der Stickstoffhaltigen Verbindungen des Tabakrauches, Biochem. Ztschr. 219: 258-276, 1930.

4. Baumberger, J. P.: (*a*) The Carbon Monoxide Content of Tobacco Smoke and Its Absorption on Inhalation; (*b*) The Nicotine Content of Tobacco Smoke; (*c*) The Amount of Smoke Produced from Tobacco and Its Absorption in Smoking as Determined by Electrical Precipitation, J. Pharmacol. & Exper. Therap. 21: 23-57, 1923.

5. Jensen, C. O., and Haley, D. E.: Studies on the Nicotine Content of Cigarette Smoke, J. Agric. Res. 51: 267-275, 1935.

6. Pfyl, B.: Zur Bestimmung des Nicotins im Tabakrauch: II: Normung des kunstlichen Verrauchens der Tabakerzeugnisse, Ztschr. f. Untersuch. d. Lebensmitt. 66: 501-510, 1933.

7. Pyriki, C.: Uber die Verteilung des Nicotins beim Rauchen von Zigaretten, Chem.-Ztg. 58: 279, 1934.

These objections are overcome by a constant volume smoking device, such as that described by Pfyl,[6] in which the cigarette was puffed by air displacing mercury in a tube as the mercury level was lowered by means of a leveling bulb. Pyriki,[7] using Pfyl's apparatus to smoke oriental cigarettes to a 15 mm. butt, taking 40 ml. puffs every 30 seconds, found 19 to 27% of the nicotine in the mainstream smoke (smoke emerging from the puffed end of the cigarette), 37 to 47% in the sidestream (smoke rising from the burning tip), and 13 to 17% in the butts, with a total recovery of 74 to 85% of the nicotine. The remainder of the nicotine is apparently decomposed by the heat of the coal.

The cigarettes in the present tests were smoked with the automatic smoking machine described by Bradford, Harlan, and Hanmer.[4] This is a constant volume smoking device in which the mercury is replaced by water as the operating fluid. The smoke is passed through a glass tube and collected by gravity deposition in a 300 ml. flask to which only two supplementary bubblers are attached. These are specially designed to reduce the back pressure to about two inches of water.

length, that is from a 30 mm. to a 10 mm. butt, the nicotine appearing in the smoke of each cigarette increases from 1.3 mg. to 3.8 mg. These variables may be eliminated by assigning fixed values to each of them. The results of the smoking experiments will depend on the values selected, but under any given set of conditions comparisons between cigarettes and comparisons in the effectiveness of filter-tips are made possible.

The smoking conditions adopted by the A. M. A. Laboratory are those of Bradford and co-workers.[4] In this process 47 mm. of each cigarette is smoked (two-thirds of a "standard" 70 mm. cigarette) using 35 ml. puffs of two seconds' duration taken once a minute. The size of the puff is considered reasonable in view of Pfyl's observation that puffs varied among individuals from 27 to 61 ml. The time between puffs is sufficiently long to allow the cigarette to return to a free burning state and to prevent the formation of an unnaturally long and hot coal.

In addition to the variables encountered in the smoking process certain variables are inherent in the cigarettes themselves within a given brand, and the results of the experiments will depend to a certain degree upon them. Variations in type, weight, cut,[8] and tightness of packing of the tobacco may be expected. By careful selection of cigarettes based on their weight, some of these variations can be minimized but they cannot be eliminated completely.

Five cigarettes were smoked for each single determination. The smoking of a larger number of cigarettes (up to 50) did not produce more reliable or consistent results, and the sheer volume of smoke was difficult to collect without losses. The average weight of each lot of cigarettes was determined and only those cigarettes weighing within 20 mg. of this average were smoked to eliminate gross differences in amount of tobacco and tightness of packing. The cigarettes were smoked in a room maintained at 77° F (25° C) and 45% relative humidity.

The mainstream smoke was collected and the nicotine in the smoke determined by the method of Bradford, Harlow, Harlan, and Hanmer.[9] The smoke was collected in a 300 ml. Kjeldahl flask containing 5 ml. of alcohol and 5 ml. of alcoholic 0.5 N sulfuric acid. The smoke was not bubbled through the solution, but the large free space above the solution

TABLE 1.—*Moisture, Nicotine Content, and Physical Characteristics of Four Brands of Cigarettes*

Column	1	2	3	4	5	6	7	8	9
	Type of Filter	Date Sample Obtained	Average Weight of Cigarette, Gm.	Average Weight of Filter-Tip, Gm.	Total Length of Cigarette, Mm.	Average Length of Filter-Tip, Mm.	Average Circumference of Cigarette, Mm.	Moisture in Tobacco, %	Nicotine in Tobacco (Moisture-Free Basis), %
Brand A-1	Paper	May, 1952	1.065	0.165	79.0	11.0	26.0	8.66	1.93
Brand A-2	Fiber	December, 1952	1.123	0.163	69.5	11.3	26.3	9.75	1.92
Brand B-1	Asbestos laminated with paper	April, 1952	1.059	0.159	69.5	10.9	26.7	8.51	1.86
Brand B-2	Asbestos laminated with paper	October, 1952	1.011	0.159	69.5	10.9	26.7	9.84	1.94
Brand C-1	Cotton	May, 1952	1.047	0.168	69.0	10.0	25.3	9.27	2.54
Brand C-2	Cotton	August, 1952	1.033	0.173	69.0	10.0	25.3	10.77	2.44
Brand D	No filter	February, 1953	1.094	.....	70.0	....	26.5	10.71	2.02

TABLE 2.—*Analysis of Smoke from Four Brands of Cigarettes*

Column	1	2	3	4	5	6	7	8	9	10
	Weight of Tobacco Actually Smoked (Dry Weight), Gm.	Average Volume of Mainstream Smoke per Cigarette, Ml.	Weight of Nicotine Found in Mainstream Smoke per Cigarette, Mg.		Reduction of Nicotine in Mainstream Smoke, %	Nicotine in Tobacco Actually Smoked Which is Transferred to Mainstream Smoke, %		Weight of Tars Found in Mainstream Smoke per Cigarette, Mg.		Reduction of Tars in Mainstream Smoke, %
			With Filter-Tip Removed	With Filter-Tip		With Filter-Tip Removed	With Filter-Tip	With Filter-Tip Removed	With Filter-Tip	
Brand A-1	0.929	340	2.35	2.60	9	24	21	15.9	15.1	5
Brand A-2	0.960	351	2.52	2.43	14	22	19	16.8	13.9	17
Brand B-1	0.835	328	2.52	1.00	60	21	8	15.0	6.8	55
Brand B-2	0.891	350	2.49	1.47	41	22	13	16.7	9.4	44
Brand C-1	0.981	461	3.91	3.38	14	23	20	18.5	15.6	16
Brand C-2	0.855	415	4.00	2.93	27	25	18	19.0	15.1	23
Brand D	0.935	350	....	2.74 *	..	..	21 *	....	17.8 *	..

* Placed in this column for comparison with full-length cigarettes.

8. Wenusch, A.: Influence of the Width of the Cuttings on the Passage of the Nicotine into the Main Smoke Stream, Ztschr. f. Untersuch. d. Lebensmitt. 75: 182-184, 1938.

9. Bradford, J. A.; Harlow, E. S.; Harlan, W. R., and Hanmer, H. R.: Nature of Cigaret Smoke: Volatile Bases and Acids, J. Indust. Engin. Chem. 29: 45-50, 1937.

allowed the smoke to settle undisturbed by subsequent puffs. The effectiveness of gravity deposition of smoke obviated the need for a long absorption train. The two supplementary bubblers filled with glass beads and containing 5 ml. of alcoholic 0.5 N acid and 5 ml. of aqueous 0.5 N acid, respectively, trapped any nicotine not collected in the flask.

The smoke solution was rendered alkaline and the nicotine steam distilled into a dilute acid. The nicotine was then precipitated as the silicotungstate.

The nicotine content of the tobaccos of each of the brands of cigarettes smoked was also determined. The method used was that of the Association of Official Agricultural Chemists.[10]

In separate runs, tars were determined by again collecting the smoke by gravity deposition over 25 ml. of 0.1 N sulfuric acid in the 300 ml. Kjeldahl flask. The two bubbler tubes, loosely packed with asbestos held in place with cotton plugs, were placed between the flask and the smoking machine. Upon completion of a run, the smoke was allowed to settle 20 minutes and then the smoke tube and bubbler tubes were washed into the flask with chloroform. The material in the flask was extracted with chloroform. The chloroform was evaporated, and the tars were dried for three hours at 100° C.

The results of the experiments are given in tables 1 and 2 and in the graph. Table 1 lists the type of filters tested, the physical characteristics of the cigarettes and filters, and the percentage of moisture and nicotine found in the tobacco. Table 2 and the graph give the results obtained from the smoking of the cigarettes. It should be noted that the weights of nicotine and tars found in cigarettes and their smoke will vary in different lots of the same brand of tobacco. The amount of nicotine in the smoke is a function of the amount of nicotine originally present in the tobacco. The nicotine content of tobacco is subject to great variations, depending on the position of the leaf on the plant, weather conditions during the growing season, type of tobacco, region of growth, and cultural practices. The nicotine content of different brands of cigarettes will vary, depending on the blend of tobaccos, and cigarettes of the same brand may vary considerably if the manufacturer's controls are poor or nonexistent.

In table 2, column 2, the figures are obtained by multiplying the average number of puffs required to smoke the cigarette to the 47 mm. mark by the volume of each puff (35 ml.) and represent the average volume of smoke sucked into the absorption train. This mainstream smoke represents the smoke that presumably would reach the smoker's mouth. Columns 3 and 4 of table 2 show the weight of nicotine in this smoke with the filters removed and intact, respectively. The percentage reduction in nicotine in the mainstream effected by the filter is listed in column 5 and is based on the difference between columns 3 and 4.

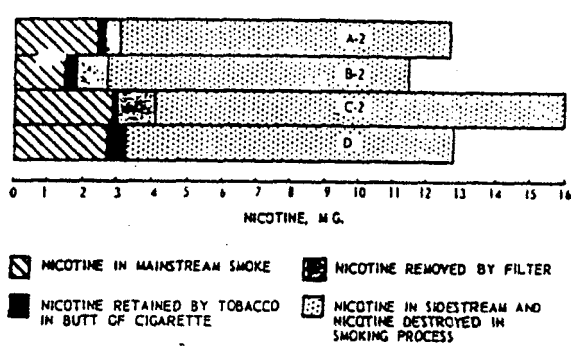
In columns 8 and 9 of table 2, the weights of the tars appearing in the mainstream smoke per cigarette are given without and with the filters attached, respectively. Column 10 lists the reduction in tars in the mainstream effected by the filter. These figures are based on the difference between columns 8 and 9 and are in close agreement with the figures in column 5.

The figures on reduction in nicotine and tars in columns 5 and 10 favor the filters and are deceptive because the figures for nicotine and tars in the mainstream smoke listed in columns 3 and 8 were obtained from the short cigarettes resulting from the removal of the filters. Tobacco itself is a rather good filter, and, if the filter-tips were to be replaced by an equal length of tobacco, the mainstream smoke from the resulting all-tobacco cigarettes of brands A, B, and C would contain less nicotine and tars than are listed for the shortened cigarettes in column 5 and 10, because the tobacco replacing the filter-tips would remove a certain amount of these substances.

This laboratory has found that, if the paper filter of brand A-1 is replaced by 11 mm. of tobacco, the additional tobacco will remove 8% of the nicotine and tars from the mainstream smoke. This is comparable with the 9% reduction in nicotine and 5% reduction in tars effected by the paper filter of brand A-1. Similar reductions might be expected to occur in columns 5 and 10, table 2, for brands B and C if the removed filter-tips were replaced by equal lengths of tobacco.

In the graph, the distribution of the nicotine from the smoked portion of the cigarette is shown for the brand 2 series of filter-tips and the all-tobacco cigarette, brand D. Comparisons between brand D and other members of the series are difficult to make when the initial nicotine contents of the smoked portions of the cigarettes are different as shown by differences in the total lengths of the bars. A comparison between brand D and brand A-2 can be made because the initial nicotine contents of the smoked portions of the two cigarettes are very nearly equal. It can readily be seen from the graph that the amount of nicotine in the mainstream smoke from the two cigarettes is almost identical. It is also apparent that the amount of nicotine filtered by the tobacco of the butt of cigarette brand D is almost as great as the amount of nicotine filtered by the tobacco remaining in the butt plus the filter of brand A-2. It is interesting to note from the graph that although the total amount of nicotine trapped by the filter of brand C-2 is greater than that trapped by the filter of brand B-2, the percentage efficiency is lower (column 5 of table 2). This is a direct result of the fact that the tobacco of brand C-2 has a larger nicotine content in the portion of the cigarette smoked, and consequently the concentration of nicotine in the smoke passing through the C-2 filter is greater than that passing through the B-2 filter.

Since the amount of nicotine that reaches the smoker's mouth is of primary importance, the practical ineffectiveness



Distribution of nicotine from smoked portion of four brands of cigarettes.

of the filter of brand C-2 is demonstrated by the length of the bar that measures the nicotine in the mainstream smoke. Brand C-2 contains more nicotine in this portion of the smoke than any other brand shown in the graph. Brand C-1, an earlier product of the same brand name, showed an even larger amount of nicotine in the mainstream smoke.

Columns 6 and 7, table 2, show the percentage, expressed as the nearest whole number of the total nicotine in the smoked portion of the tobacco that is transferred to the mainstream smoke without and with the filters. In column 6 the figures are again shown for the shorter cigarette resulting from the removal of the filter. To compensate for the shorter cigarette, corrections may again be used here that are based on the substitution of a length of tobacco equal to the length of the filter. They are proportional to the corrections that may be applied to columns 5 and 10 and would reduce the figures in column 6 by about 2%.

The figures in column 6 show that the proportion of nicotine transferred from the smoked portion of the cigarette to the mainstream smoke is surprisingly constant. If a 2% correction were applied to compensate for the shorter cigarettes, the values would range from 19 to 23%. These corrected figures would be in close agreement with the work of Bradford and co-workers.[9] The values in column 7 for brands A-1, A-2, C-1, C-2, and D agree closely with one another and with the corrected values for the cigarettes without filters.

[10] Association of Official Agricultural Chemists, Official Methods of Analysis, ed. 7, Menasha, Wis., The Collegiate Press, George Banta Publishing Company, 1950, p. 69.

These values and the bars of the graph indicate that the filters are responsible for removing very little of the total nicotine in the smoked portion of the cigarette. The bulk of this nicotine, about 75% in the case of "regular" cigarettes, is lost in the sidestream or is destroyed by the burning coal.

On the basis of results obtained in the smoking experiments, it can be seen that the over-all effectiveness of the filters of brands A and C is not significant. Indeed, it can be seen from column 4 of table 2 and from the graph that the nicotine content of the mainstream smoke of brand C is exceptionally high—higher than that of "regular" cigarettes. The filter of brand B-1 is the most effective in removing nicotine and tars from the mainstream smoke. However, the sample of later manufacture, brand B-2, is much less effective, as the filter is more loosely packed, apparently in an effort to improve the smoking qualities.

In all cases the fraction of nicotine removed by the filter from the smoked portion of the cigarette is small. Even in a "regular" cigarette with no filter-tip only 21% of the total nicotine reaches the smoker in the mainstream smoke. In recent advertisements calculations have been contrived to advance claims for very low percentages of nicotine in the mainstream smoke. Widely divergent values can be obtained from the same analytical data choosing different bases for the calculations. For example, an extremely low value can be obtained by basing the calculation on the total weight of the cigarette. Using this stratagem in calculating, the figure 0.25% nicotine in the smoke of the "regular" cigarette, brand D, is obtained. Thus an apparently low figure is obtained from a normal nicotine content.

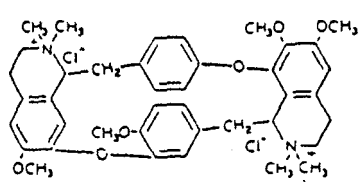
COUNCIL ON PHARMACY AND CHEMISTRY

NEW AND NONOFFICIAL REMEDIES

The following additional articles have been accepted as conforming to the rules of the Council on Pharmacy and Chemistry of the American Medical Association for admission to New and Nonofficial Remedies. A copy of the rules on which the Council bases its action will be sent on application.

R. T. STORMONT, M.D., *Secretary.*

Dimethyl-Tubocurarine Chloride.—Mecostrin Chloride (Squibb).—$C_{40}H_{46}Cl_2N_2O_6$.—M.W. 723.71.—O-Methyl-*d*-tubocurarine chloride.—Dimethyl ether of *d*-tubocurarine chloride.—The structural formula of dimethyl-tubocurarine chloride may be represented as follows:



Actions and Uses.—Dimethyl-tubocurarine chloride has the same actions and uses as dimethyl-tubocurarine iodide and tubocurarine chloride except that the efficacy of the methylated derivatives in the treatment of spastic diseases has not yet been determined. (See the monographs on dimethyl-tubocurarine iodide and tubocurarine chloride.)

Dosage.—Dimethyl-tubocurarine chloride has approximately the same ratio of potency as dimethyl-tubocurarine iodide when compared with tubocurarine chloride, but on the basis of the difference in the molecular weights of the two salts, 0.8 mg. of dimethyl-tubocurarine chloride provides a dose equivalent to 1 mg. of the iodide. Like the iodide, dimethyl-tubocurarine chloride is administered only by slow intravenous injection over a period of 30 to 60 seconds. For muscle relaxation in surgery, the average initial dose for adults is 2 to 3 mg. If needed, 1 to 1.5 mg. can be added in 3 to 5 minutes. After 45 minutes an additional dose of 1.5 to 2 mg. may be administered. With ether anesthesia the dose of dimethyl-tubocurarine chloride should be about one-third that used with other anesthetic agents. For shock therapy and manipulative therapy the average dose is calculated on the basis of 0.025 mg. per pound of body weight, using 1 mg. less than this amount for the initial dose in adults. The safe upper limit of dosage is 0.037 mg. per pound of body weight. As a diagnostic agent in myasthenia gravis, the dose is one-fortieth to one-tenth of the adult shock therapy dose (i. e., 0.0006 to 0.0025 mg. per pound of body weight), administered intravenously. The test should always be terminated within 2 or 3 minutes by the intravenous injection of 1.5 mg. of neostigmine methylsulfate with 0.6 mg. of atropine sulfate. The same precautions and contraindications should be observed as with other purified derivatives of curare.

Tests and Standards.—

Physical Properties: Dimethyl-tubocurarine chloride is a white, odorless, crystalline powder. It decomposes with evolution of gas when heated to about 236°. It is soluble in water and diluted sodium hydroxide; sparingly soluble in alcohol and diluted hydrochloric acid; very slightly soluble in chloroform; and practically insoluble in benzene and ether.

Identity Tests: Prepare a solution of about 50 mg. of dimethyl-tubocurarine chloride in 30 ml. of water. To 5 ml. of the solution add several drops of nitric acid and 1 ml. of silver nitrate T.S.: a curdy white precipitate forms that is soluble in ammonia T.S. (*presence of chloride*). The solution also responds to the second, third and fourth identity tests in the monograph for dimethyl-tubocurarine iodine.

The specific rotation, $[\alpha]^{25}_D$, of a solution of 0.25 gm. of dimethyl-tubocurarine chloride in 50 ml. of water is between 185 and 195°.

A 0.005% solution of dimethyl-tubocurarine chloride, prepared as directed in the assay in the monograph for dimethyl-tubocurarine iodide, exhibits an absorption maximum at about 2800 Å [specific absorbancy, $E(1\%,1\text{ cm.})$, about 89].

Purity Tests: Dry about 0.3 gm. of dimethyl-tubocurarine chloride, accurately weighed, in a vacuum at 60° over phosphorus pentoxide for 4 hours: the loss in weight is not more than 14.0%.

Assay: (Dimethyl-tubocurarine Chloride) Transfer 25 mg. of dimethyl-tubocurarine chloride, accurately weighed, to a 500 ml. volumetric flask and proceed as directed in the spectrophotometric assay in the monograph for dimethyl-tubocurarine iodide starting with, ". . . add 10 drops of hydrochloric acid . . ."

The concentration of the final solution (0.005%) in mg./ml. = optical density at 2800 Å ÷ 8.9. The amount of dimethyl-tubocurarine chloride present is not less than 98.0 nor more than 102.0%.

(Nitrogen) Transfer about 0.2 gm. of dimethyl-tubocurarine chloride, accurately weighed, to a semimicro Kjeldahl flask and proceed as directed in the assay for nitrogen in the monograph for dimethyl-tubocurarine iodide starting with, ". . . digest it with 7 ml. of sulfuric acid . . ." The amount of nitrogen present is not less than 3.60 nor more than 3.90%, equivalent to not less than 93.0 nor more than 100.8% of dimethyl-tubocurarine chloride.

Dosage Forms of Dimethyl-tubocurarine Chloride

SOLUTION. ***Identity Tests:*** The solution responds to the identity tests in the monograph for dimethyl-tubocurarine iodide.

Assay: (Dimethyl-tubocurarine Chloride) Transfer to a 50 ml. beaker an exactly measured volume of solution equivalent to about 5 mg. of dimethyl-tubocurarine chloride and proceed as directed in the assay for dimethyl-tubocurarine iodide solution starting with, ". . . and carefully evaporate it to dryness . . ." The concentration of the final solution (0.005%) in mg./ml. = optical density at 2800 Å ÷ 8.9. The amount of dimethyl-tubocurarine chloride present is not less than 95.0 nor more than 105.0% of the labeled amount.

E. R. Squibb & Sons, Division of Mathieson Chemical Corporation, New York.

Solution Mecostrin Chloride: 10 cc. vials. An isotonic salt solution containing 1 mg. of dimethyl-tubocurarine chloride in each cubic centimeter. Preserved with 0.9% benzyl alcohol.

Aluminum Hydroxide Gel-U.S.P. (See New and Nonofficial Remedies 1952, p. 306).

Physicians' Drug & Supply Company, Philadelphia.

Tablets Dried Aluminum Hydroxide Gel: 0.3 and 0.65 gm.

Cortisone Acetate (See New and Nonofficial Remedies 1952, p. 322).

Schering Corporation, Bloomfield, N. J.

Tablets Cortogen Acetate: 5 mg.