THE QUESTION OF CERIUM OXALATE AS A PROPHYLACTIC AGAINST POSTOPERATIVE VOMITING *

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CERIUM oxalate has been used in medicine since the middle of the last century as a prophylactic against vomiting from different causes, such as in pregnancy, seasickness, air, motor-car and train sickness, toxic vomiting in consumptives and vomiting in fever cures. There are also some reports on very favorable results of cerium oxalate as a prophylactic against postoperative vomiting.

There are at least 70 publications reporting the good therapeutic effect of the cerium oxalate compounds against vomiting in such cases as those mentioned, whereas merely a few isolated investigations have given negative results. A close examination of these reports seems, however, in our view, to show that the importance of the control material has not been sufficiently taken into account in judging the effects of medicaments in these cases of vomiting, which are as a rule markedly susceptible to subjective influences.

In the course of the last few years a comparatively extensive advertising campaign has been carried on in favor of the use of cerium oxalate for different kinds of vomitings. The pharmaceutic specialities which occur in Sweden are Peremesin (Heyden), Ceroletts (Leo) and Vomiletts (The Central Laboratory, Copenhagen). Ceroletts and Vomiletts consist of *Cerosi oxalas* and are sold in tablets of 0.05 and 1.0 gram. Peremesin consists of *Cerosi oxalas* in a colloidal form and is sold in tablets of 0.05 gram as well as in ampules of 0.02 gram cerium oxalate for intramuscular injections.

In reports on the use of cerium oxalate, different explanations of its supposed anti-emetic effect are found. When it is administered by mouth, cerium oxalate is said either to affect the mucosa of the stomach and intestine locally similar to an astringent or, after the resorption of small amounts, to reduce the reflex excitability and thus to lessen the state of irritability of the mucosa. After resorption from the intestinal mucosa, or on parenteral administration, the effect is explained as the result of a more central action, the cerium oxalate being an elective agent for mitigating parasympathetic states of irritation. As shown by the following survey of the literature, however, said pharmacodynamic and therapeutic effects of cerium oxalate are questioned or repudiated in reliable modern textbooks.

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In view of the unsatisfactory solubility and resorption of the cerium oxalate compounds as well as their doubtful pharmacodynamic and therapeutic effects, we considered a renewed investigation to be desirable, with special regard to the importance of the control material.

In our investigation, we have considered it expedient to test the effect of peroral and parenteral administration of cerium oxalate as a prophylactic against postoperative vomiting, as after narcosis such vomiting is less susceptible to subjective influences than in the majority of cases of other kinds of vomiting. For practical reasons, we have used out-patients, who, in view of dietary conditions, the loss of time which the hospital staff would otherwise incur, etc., could not as a rule be sufficiently well prepared for narcosis (ethyl chloride, or ethyl chloride plus ether) and, therefore, should show a relatively high frequency of vomiting. If narcosis is induced with ethyl chloride properly given, vomiting can as a rule be avoided. Ethyl chloride in conjunction with ether for some minutes, on the other hand, is considered to give rise to a somewhat higher frequency of vomiting. As it thus seemed desirable to obtain a prophylactic against postoperative vomiting in certain cases, our investigation appears to be warranted also from this point of view.

SURVEY OF THE LITERATURE

The five authors cited all reported satisfactory results following administration of cerium oxalate as a prophylactic against postoperative vomiting after narcosis.

Meyer (1936) was the first to publish his experiences with cerium oxalate as a prophylactic against postoperative vomiting. This study, so far as we could find, was the only one among the seventy publications on the effect of cerium oxalate on vomiting, in which controls who had not received that drug had been employed. After fasting for at least three hours, 112 patients who were to be subjected to minor surgical operations received 1–2 Peremesin tablets twenty to thirty minutes before the ethyl chloride anesthesia, while the same number of patients were put under ethyl chloride anesthesia without Peremesin. Of the 112 patients who had taken cerium oxalate tablets, 45 vomited after the ethyl chloride anesthesia, whereas no less than 79 of the controls vomited. Thus, the cerium oxalate had apparently had a good effect. The concise report, however, does not show how the patients were grouped in this investigation, so that it can scarcely be regarded as a completely convincing testimony in favor of cerium oxalate as an effective remedy against postoperative vomiting.

Gause (1939) reported good results from the use of Peremesin as a prophylactic against vomiting after ethyl chloride anesthesia. He recommended 4–5 tablets for men and 2–3 tablets for women of 0.1 gram each. The number of patients observed was not stated. No controls were employed.

Janke (1941), for prophylactic purposes, gave 75 patients intragluteally an injection of 0.3 to 0.5 ml. of Peremesin half an hour before ether narcosis. Although several patients had to be operated on rapidly (cesarean section, etc.) without sufficient preparation, in no case did vomiting occur.

Jentzsch (1941) studied the effect of Peremesin injections before inhalation narcosis on 100 patients subjected to major and minor surgical operations. The patients who were put under ether narcosis for major operations also received, as usual, morphine-atropine prophylactically. According to this author, the cases of vomiting were reduced by the administration of Peremesin from about 33.33 per cent to merely 5 per cent.

Naegelsbach (1941) likewise reported good effects of Peremesin injections before ether narcosis in certain operations, especially stomach resections.

The authors of modern textbooks on pharmacology and therapy, on the other hand, cast doubt on the therapeutic value of cerium oxalate or declare it to be quite valueless as a prophylactic against vomiting. The following quotations may be adduced.

Liljestrand (1944) stated: "Das oxalsaure Salz, Cerium oxalicum $Ce\ (C_2O_4)_3 + 9\ H_2O$, ein weisses, in Wasser unlösliches, geruch- und gesmackloses Pulver, wurde gegen hartnäckiges Erbrechen, dem keine Magerkrankung zugrunde liegt, z.B. bei Schwangerschaftserbrechen und Seekrankheit, unter dem Namen Peremesin angewandt. Auf welche Weise es wirkt, ist unbekant."

Cushny (1940) stated: "Cerium was formerly used in therapeutics in the sickness of pregnancy and similar conditions, but is valueless. The cerium double salts injected into the blood-vessels of animals are said to depress the heart and cause ecchymoses in the stomach and bowel, and nephritis. The oxalate is insoluble and is not absorbed from the alimentary tract."

Sollmann (1936) stated that "the insoluble cerium oxalate is employed against vomiting, especially in pregnancy (Simpson, 1854; Mills 1876), but is probably useless. It is nontoxic even in large doses. Since cerium oxalate is not absorbed (Bachem 1907), its action must be entirely local and analogous to that of bismuth. This has been demonstrated experimentally by Baehr and Wessler 1909; they found that it had no effect on central vomiting (apomorphine), but that large doses delayed vomiting from local gastric irritation (ipecac). They also showed that central vomiting was not affected even by the soluble and absorbable cerium nitrate."

Other authors, such as *Goodman* and *Gilman* (1943), *Davison* (1944) and *Møller* (1943), do not mention cerium oxalate in their textbooks.

Thus, according to the original literature on the subject, cerium oxalate is regarded as an effective prophylactic against postoperative vomiting. In our opinion, however, the absence of reliable controls, in

conjunction with the chemical and pharmacodynamic properties of cerium oxalate, invalidates the results, a view which is fully shared in the textbooks cited.

PLAN OF INVESTIGATION

The investigation was carried out at the surgical out-patient departments of Karolinska Sjukhuset, both peroral and intramuscular administration of cerium oxalate being tested as a prophylactic against postoperative vomiting. No other medicaments were administered. The anesthetics were administered by interns and students under the supervision of the resident anesthetist or the surgeon.

In *series I* every other patient who was to be subjected, at the surgical out-patient department, to some operation requiring ethyl chloride anesthesia or ethyl chloride plus ether narcosis, twenty to thirty minutes before the operation received 2.5 grams of cerium oxalate by mouth in the form of 5 tablets (Leo),* which we called "Ceroletts A." Alternate patients received the same number of control tablets, called "Ceroletts B," consisting merely of indifferent ingredients. The duration of the ethyl chloride narcoses varied as a rule between thirty seconds and three minutes. The duration of the ethyl-chloride-plus-ether narcoses varied between one and five minutes, as a rule three or four minutes, in the cases included in this investigation. The operations, generally speaking, consisted of incisions, extirpations, forced dilatation, repositions of fractures, scraping-out of dermoid cysts, etc. In order to avoid subjective influences in judging the results, neither the physicians nor the hospital staff was informed that in some cases the tablet contained merely inactive ingredients. On a separate card for each patient we recorded the name, age, time at which the last meal was taken, nature of the operation, kind of anesthesia, duration of the narcosis, vomiting (none; during, after narcosis), nausea (none; during, after narcosis), any special observations and the name of the physician.

In *series 2*, which was carried out a few months after the termination of the tablet series, exactly the same procedure was adopted, with the following exceptions. Instead of peroral administration of cerium oxalate and indifferent control tablets, respectively, every other patient received intramuscularly 1 ml. of "Peremesin A," containing 0.05 grain of cerium oxalate in a colloidal form, and alternate patients 1 ml. of "Peremesin B," containing merely physiologic saline solution with the addition of fluorescin, to obtain the same color as the "Peremesin" solution.

In the statistical compilation of the material, the following standard formula was adopted:

$$(D) = \pm \frac{p_1(100 - p_1)}{N_1} + \frac{p_2(100 - p_2)}{N_2},$$

* The tablets were kindly supplied to us free of cost by Aktiebolaget Leo. The ampules were received as a gift from Chem. Fabrik von Heyden A.-G.

where (D) = the mean error for the difference p_1 and p_2; p_1 being the percentage for N_1 subjects and p_2 the percentage for N_2 subjects (Dahlberg, 1940).

RESULTS AND DISCUSSION

A survey of the results of the tests is given in table 1. As they are, of course, shown more objectively by the vomiting than by the nausea, we have confined ourselves, in this discussion, mainly to the frequency of vomiting.

Of the 82 patients who had received cerium oxalate by mouth, 19 (23 per cent) showed effects of the narcosis in the form of either vomiting or nausea or both (table 1). Vomiting occurred in 16 per cent of the patients. Of the 83 controls who received sham tablets, 29 per cent had effects, most of them (20 per cent) in the form of vomiting. The table indicates that no difference could be found in the number of patients who showed effects of narcosis, nor in the nature of these effects, between those who were given cerium oxalate for prophylactic purposes and those who received control tablets with merely indifferent ingredients.

TABLE 1

PROPHYLACTIC ADMINISTRATION OF CERIUM OXALATE FOR POSTOPERATIVE VOMITING AND NAUSEA

	Number of patients		Per cent of patients			Number of patients		Per cent of patients		
	Cer. oxalate tabl.	Control tabl.	Cer. oxalate tabl.	Control tabl.	Difference	Cer. oxalate amp.	Salt amp.	Cer. oxalate amp.	Salt amp.	Difference
Patients examined	82	83	100	100	—	32	35	100	100	—
Without effects	63	59	76.8	71.1	+5.7±6.8	26	30	81.2	85.7	−4.5±9.1
With effects	19	24	23.2	28.9	−5.7±6.8	6	5	18.8	14.3	+4.5±9.1
Effects: Vomiting only	4	6	4.9	7.2	−2.3±3.7	2	2	6.3	5.7	+0.6±5.8
Nausea only	6	7	7.3	8.4	−1.1±4.2	1	2	3.1	5.7	−2.6±5.0
Vomiting and nausea	9	11	11.0	13.3	−2.3±5.1	3	1	9.4	2.9	+6.5±5.9
Vomiting with or without nausea	13	17	15.9	20.5	−4.6±6.0	5	3	15.7	8.6	+7.1±8.0

We could not observe any difference in these respects between the 32 patients who were treated with cerium oxalate intramuscularly and the 35 controls who received the same amount of physiologic saline solution. In the first-mentioned group, effects were shown by 19 per cent, in the second-mentioned group (the controls) by 14 per cent.

Thus, contrary to the previously cited reports in the literature, we could not observe any prophylactic effect of the cerium oxalate on vomiting resulting from narcosis before operation. As already pointed out, we do not consider the results obtained by *Gause* (1939), *Janke* (1941), *Jentzsch* (1941) and *Naegelsbach* (1941) to be convincing, in

view of the lack of controls. Nor can the investigation made by *Meyer* (1936) with controls be regarded as cogent evidence of a favorable effect of cerium oxalate, as the brief report does not show how the investigation was carried out, especially with respect to the grouping of the patients who were given cerium oxalate and those who did not receive the tablets.

The frequency of effects (vomiting, nausea or both) after narcosis seems to us surprisingly high in the "tablet series," of which nearly 30 per cent of the 83 controls showed effects, 20 per cent of them in the form of vomiting. On the other hand, as regards the 35 controls in the "ampule series," which was carried out at a later date, the corresponding percentages were merely 14 and 9, respectively. The difference in the frequency of vomiting with regard to the controls in the two series would be statistically probable (table 1), if the material admitted of such a comparison. This difference may possibly be due to the fact that these two series were carried out at different dates and that the narcosis in the later series was performed by other physicians. On the other hand, the difference in question can scarcely be explained by the circumstance that tablets were used for the one group of controls and injections for the other. We have considered it desirable to draw attention to the above-mentioned conditions regarding the frequency of vomiting in order to stress the importance of obtaining, so far as practicable, an unimpeachable material for comparison.

As the scanty reports in the literature regarding the *frequency* of vomiting and nausea after different forms of narcosis are incomplete, no direct comparison with our material can be made. *Jentzsch* (1941), in regard to patients subjected to major and minor surgical operations, reported that the frequency of vomiting after narcosis averaged 30 per cent, although these patients, as a prophylactic measure, usually received morphine-atropine. So far as we could find, no surveys on this subject on out-patients have been published from Swedish hospitals.

A study of the material also shows that the nature and duration of the narcosis may be of some interest. As ethyl chloride was used as a rule for thirty seconds to three minutes, we have included in our material only patients who had been under that narcosis for at most three minutes. With regard to the combined ethyl-chloride-ether narcosis, for a similar reason, we have included only patients who had been under the narcosis for at most five minutes. The application of these rules has led to the exclusion of merely 7 patients of our original 232. We are convinced that this exclusion has in no way affected our results and conclusions. If the frequency of unpleasant effects among the patients who had received *ethyl chloride* only is compared with that among those who had been treated with *ethyl chloride plus ether* (table 2), we find a probable difference in regard to the total effects and a statistically significant difference with respect to vomiting. From the first-mentioned group, 10 out of 63 (16 per cent) showed effects, merely 4 (6 per

TABLE 2

FREQUENCY OF VOMITING AND NAUSEA UNDER ETHYL CHLORIDE ONLY AND ETHYL CHLORIDE + ETHER

	Number of patients		Per cent of patients		
	Ethyl chloride	Ethyl chloride + ether	Ethyl chloride	Ethyl chloride + ether	Difference
Patients examined	63	169	100	100	—
Without effects	53	125	84.1	74.0	+10.1±5.7
With effects	10	44	15.9	26.0	−10.1±5.7
Effects: Vomiting only	3	11	4.8	6.5	− 1.7±3.3
Nausea only	6	10	9.5	5.9	+ 3.6±4.1
Vomiting and nausea	1	23	1.6	13.6	−12.0±3.1
Vomiting with or without nausea	4	34	6.4	20.1	−13.7±4.4

cent) of whom vomited, whereas in the latter group 44 out of 169 (26 per cent) showed effects, 34 of whom (20 per cent) vomited.

The last-mentioned differences, however, seem to have been primarily not the result of the nature of the narcosis, but of its *duration*. When a comparison was made between the patients who had received ethyl chloride only and those who had been given ethyl chloride plus ether during the same time for both groups, *viz*, thirty seconds up to three minutes, no difference was found with respect to the frequency of the total effects or the frequency of vomiting, whereas a probable to significant difference was found between the patients who had been thus narcotized for thirty seconds to three minutes and those who had been under this narcosis for a time ranging between over three minutes and at the most five.

On the other hand, if the frequency of effects of narcosis among the patients who had received ethyl chloride only was compared with that among those who had been put under ethyl chloride plus ether for over

TABLE 3a

BEARING OF DURATION OF NARCOSIS ON FREQUENCY OF EFFECTS

	Number of patients		Per cent of patients			Number of patients		Per cent of patients		
	Cl+E ½-3	Cl+E >3-5	Cl+E ½-3	Cl+E >3-5	Difference	Cl ½-3	Cl+E ½-3	Cl ½-3	Cl+E ½-3	Difference
Patients examined	92	77	100	100	—	63	92	100	100	—
Without effect	75	50	81.5	64.9	+16.6±6.8	53	75	84.1	81.5	+2.6±6.1
With effect	17	27	18.5	35.1	−16.6±6.8	10	17	15.9	18.5	−2.6±6.1
Effects: Vomiting only	3	8	3.3	10.4	− 7.1±3.9	3	3	4.8	3.3	+1.5±3.3
Nausea only	6	4	6.5	5.2	+ 1.3±3.6	6	6	9.5	6.5	+3.0±4.5
Vomiting and nausea	8	15	8.7	19.5	−10.8±5.4	1	8	1.6	8.7	−7.1±3.4
Vomiting with or without nausea	11	23	12.0	29.9	−17.9±6.2	4	11	6.4	12.0	−5.6±4.6

TABLE 3b

BEARING OF DURATION OF NARCOSIS ON FREQUENCY OF EFFECTS

	Number of patients		Per cent of patients		
	Cl 1-3	Cl + E >3-5	Cl 1-3	Cl + E >3-5	Difference
Patients examined	63	77	100	100	—
Without effects	53	50	84.1	64.9	+19.2±7.1
With effects	10	27	15.9	35.1	−19.2±7.1
Effects: Vomiting only	3	8	4.8	10.4	− 5.6±4.4
Nausea only	6	4	9.5	5.2	+ 4.3±4.5
Vomiting and nausea	1	15	1.6	19.5	−17.9±4.8
Vomiting with or without nausea	4	23	6.4	29.9	−23.5±6.1

three minutes and at most five, a statistically significant difference was found between the groups. Thus, the addition of ether to the ethyl chloride as a rule did not entail any additional discomfort for the patients, provided that the duration of the narcosis had not exceeded three minutes. On the other hand, if the ether narcosis was prolonged beyond that time, the ether entailed a risk of unpleasant effects in the form of vomiting or nausea on return to consciousness.

The time for the taking of food or drink before narcosis varied considerably, from half an hour to seven or eight hours. No correlation between the frequency of vomiting or nausea and the time at which food or drink was taken could be found in our small series.

SUMMARY

Investigations were made into the efficacy of cerium oxalate as a prophylactic against postoperative vomiting after ethyl chloride narcosis for thirty seconds to three minutes, or ethyl chloride plus ether narcosis for one to five minutes, on out-patients subjected to minor surgical operations.

In a test series of 165 patients, every other patient received 2.5 grams of cerium oxalate by mouth, in the form of 5 tablets, twenty to thirty minutes before narcosis; alternate patients received the same number of tablets with indifferent ingredients. In another series of 67 patients, in which investigation was carried out two months after the termination of the first series, a similar procedure was adopted, except that every other patient, instead of the tablets, received intramuscularly 0.05 gram of cerium oxalate in colloidal form in a 1 ml. solution, and alternate patients 1 ml. of physiologic saline solution with the addition of a suitable amount of fluorescein to obtain the same color as that of the cerium oxalate solution.

As shown by table 1, the cerium oxalate had no effect on the frequency of vomiting or nausea after narcosis.

In about 20 per cent of our patients, unpleasant effects, in the form

TABLE 4a

COMPARISON OF FREQUENCY OF EFFECTS IN TABLET AND AMPULE SERIES, 232 CASES

	Number of patients		Per cent of patients		
	Cerium oxalate + controls		Cerium oxalate + controls		Difference
	Tabl.	Amp.	Tabl.	Amp.	
Patients examined	165	67	100	100	—
Without effects	122	56	74.0	83.6	−9.6±5.7
With effects	43	11	26.0	16.4	+9.6±5.7
Effects: Vomiting only	10	4	6.0	6.0	+0.0±3.4
Nausea only	13	3	7.9	4.4	+3.5±3.3
Vomiting and nausea	20	4	12.1	6.0	+6.1±3.9
Vomiting with or without nausea	30	8	18.1	12.0	+6.1±5.0

TABLE 4b

COMPARISON OF FREQUENCY OF EFFECTS IN TABLET AND AMPULE SERIES, CONTROLS ONLY

	Number of patients		Per cent of patients		
	Controls		Controls		Difference
	Tabl.	Amp.	Tabl.	Amp.	
Patients examined	83	35	100	100	—
Without effects	59	30	71.1	85.7	−14.6±7.7
With effects	24	5	28.9	14.3	+14.6±7.7
Effects: Vomiting only	6	2	7.2	5.7	+ 1.5±4.8
Nausea only	7	2	8.4	5.7	+ 2.7±5.0
Vomiting and nausea	11	1	13.3	2.9	+10.4±4.7
Vomiting with or without nausea	17	3	20.5	8.6	+11.9±6.5

of vomiting, nausea or both, ensued after the narcosis. About 15 per cent of them vomited.

No difference in the frequency of vomiting or nausea between the patients who had received ethyl chloride solely and those who were put under ethyl chloride plus ether could be observed in cases in which the duration of the narcosis did not exceed three minutes. On the other hand, a greater frequency of vomiting owing to the ether was shown by the group of patients who had been put under ethyl chloride plus ether for more than three minutes.

In evaluating earlier publications regarding the favorable effect of cerium oxalate as a prophylactic against vomiting, the authors stress the importance of an unimpeachable control material.

REFERENCES

Cushny, Arthur R.: Pharmacology and Therapeutics, ed. 12, Lea & Febiger, 1940.
Dahlberg, G.: Statistical Methods for Medical and Biological Students, Allen & Unwin, 1940.
Davison, F. R.: Synopsis of Materia Medica, Toxicology, and Pharmacology for Students and

Practitioners of Medicine, ed. 3, Mosby Co., 1944.
Gause, G.: München. Med. Wehnschr. 25: 960, 1939.
Goodman, L., and Gilman, A.: The Pharmacological Basis of Therapeutics, MacMillan Co., 1943.
Janke, G.: Beitrag zur Behandlung des Narkoseerbrechens, München. Med. Wehnschr. 88: 77 (Jan. 17) 1941.
Jentzsch, H.: Med. Klin. 35, 1941.
Liljestrand, G.: Poulsson's Lehrbuch der Pharmakologie, 1944.
Meyer, W.: München. Med. Wehnschr. 21: 849, 1936.
Møller, K. O.: Farmakologi, 1943.
Naegelsbach F. W.: München. Med. Wehnschr. 51: 1354, 1941.
Sollmann, T.: A manual of Pharmacology, ed. 5, Saunders Co., 1936.

MORTON CENTENNIAL, OCTOBER 15, 16, AND 17, 1946

AMERICAN SOCIETY OF ANESTHESIOLOGISTS, INC., AND NEW ENGLAND SOCIETY OF ANESTHESIOLOGY HEADQUARTERS: HOTEL SHERATON, BAY STATE ROAD, BOSTON

Tuesday, October 15—

9 a.m. to 12 noon. Operative Clinics: A, Boston City Hospital; B, Massachusetts Memorial Hospital; C, a.m. and p.m.: Symposia at the Massachusetts General Hospital.

4 p.m. to 5 p.m. Cocktail Hour, Hotel Sheraton (guests of the societies).

6 p.m. to 8 p.m. Informal Dinner, Hotel Sheraton.

8 p.m. to 10:30 p.m. Combined Meeting of the A.S.A. and N.E.S.A., Hotel Sheraton.

Speakers and Topics:

I. "Anesthesia's Aid to Surgery," Frank Lahey, M.D., Boston, Massachusetts.

II. "Ether Anesthesia, Yesterday, Today and Tomorrow," Albert Miller, M.D., Providence, Rhode Island.

Discussor: H. K. Beecher, M.D., Boston, Massachusetts.

Wednesday, October 16—

9 a.m. to 12 noon. Operative Clinics: A, Lahey Clinic; B, St. Elizabeths Hospital.

12:30 to 2 p.m. Luncheon, Hotel Sheraton.

2 p.m. to 4 p.m. Afternoon Lectures, Hotel Sheraton, Dr. Lundy presiding.

Speakers and Topics:

I. 2–2:30 p.m. "Carbon Dioxide Absorption, Its History in Anesthesia," Ralph M. Waters, M.D., Madison, Wisconsin.

2:30–2:40 p.m. Discussor: J. Adriani, M.D., New Orleans, Louisiana.

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prepared or can be prepared to offer serious, industrious and enlightened efforts for the training of their charges. They must be constantly alert to recognize the individual of unusual talent for teaching or research. They must assiduously cultivate those talents when they are discovered, and spare no effort in bringing them to a successful fruition, even if they recognize in their bearers a David who may some day threaten their kingdom. We have been besought by "the tragic gap between the thinking and the doing." Our opportunity is here, now, in education.

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II. 2:40–3:10 p.m. "Gaseous Anesthetics," W. Bourne, M.D., Montreal, Canada.
3:10–3:20 p.m. Discussor: H. Livingstone, M.D., Chicago, Illinois.
III. 3:20–3:50 p.m. "Chloroform," H. W. Featherstone, M.D., Burton-on-Trent, England.
3:50–4:00 p.m. Discussor: H. J. Shields, M.D., Toronto, Canada.

8 p.m. to 11 p.m. Guests of the Massachusetts General Hospital to the Centennial Meeting at Sanders Theatre.

Thursday, October 17—

9 a.m. to 12 noon. Operative Schedule: A, Massachusetts General Hospital; B, Faulkner Hospital.

12:30 to 2 p.m. Luncheon, Hotel Sheraton.

2 p.m. to 4 p.m. Afternoon Lectures, Hotel Sheraton, Dr. Hand presiding.

Speakers and Topics:

I. 2–2:30 p.m. "Curare, Historical Review and Present Experiences," Stuart C. Cullen, M.D., Iowa City, Iowa.
2:30–2:40 p.m. Discussor: H. Griffith, M.D., Montreal, Canada.
II. 2:40–3:10 p.m. "Regional Anesthesia," P. D. Woodbridge, M.D., Reading, Pennsylvania.
3:10–3:20 p.m. Discussor: R. Whitacre, M.D., East Cleveland, Ohio.
III. 3:20–3:50 p.m. "Intravenous Anesthesia," R. C. Adams, M.D., Rochester, Minnesota.
3:50–4:00 p.m. Discussor: Ralph M. Tovell, M.D., Hartford, Connecticut.

8 p.m. to 11:30 p.m. Formal Dinner, Hotel Sheraton.
Toastmaster: H. K. Beecher, M.D., Sterling Professor of Physiology, Yale University School of Medicine.