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A COMPARISON
of
AMERICAN AND FRENCH
PHARMACOLOGY

by

Suzanne Abran Hargrove
Diplome de Pharmacien
Universite d'Alger, 1947

Presented in partial fulfillment of the re-
quirement for the degree of Master
of Science

Montana State University

1949

Approved:



Chairman of Board
of Examiners.



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PREFACE

During World War II France had some difficulty in using the American pharmaceuticals because of the difference in doses. It was thought that the comparison of American and French doses might show that a relationship could be found which would make it easier to use these foreign products in France.

A study of official drugs common to the United States Pharmacopeia XIII, National Formulary VIII and Codex VI, revealed an interesting relationship.

Since some products still kept in the last Codex have been dropped by the United States Pharmacopeia, it was necessary to go through all the United States Pharmacopeias, giving the corresponding doses, and, in order to do this, the investigator found it necessary to go as far back as the eighth revision of the United States Pharmacopeia, 1907. From this vantage point it was possible to compare the progress of both dosages since that year. In spite of the slight variations observed, the relation was quite well maintained. This relation was true for only a percentage of drugs, and the variations found were in accord with the toxicity of the products. All the relationships were established between the United States Pharmacopeias average dose and the Codex VI maximum for one dose.

In order to compare French and American maximum doses, it was necessary to consider non-official but commonly used American pharmaceutical books. The maximum doses found in these books compared favorably with those found in Codex VI.

Therefore, in a general way, it can be said that Codex VI uses the American maximum dose, while the United States Pharmacopeias use the average dose.

Concerning the Codex VI maximum doses for twenty-four hours, which correspond to the American calculated daily doses, a new relationship was found which verifies the previous results in this study.

INTRODUCTION

The dose of a drug to be given to a patient is largely a matter of judgment.

"The United States Pharmacopoeia assigns to each drug and preparation what may be considered an average adult dose, but this average dose may be increased or decreased to meet adequately the existing circumstances.

"The United States Pharmacopoeia and the National Formulary assigned to each drug and to most preparations an official dose. These doses are for adults and are small enough to be safe under nearly all circumstances."¹

The French Codex VI gives the maximum doses. The main reason for this is to give a limitation not for the physician, but for the pharmacist, in order to reduce his responsibility.

According to the French narcotic laws, the physician has to state, "I say," on the prescription if he wants to increase the maximum Codex dose. Without this notation the pharmacist is forbidden to fill the prescription.

The physician has to take in consideration the quantity reaching an organ, and naturally the dose is dependent upon many conditions. The age and sex are important because of differences in weight, in functional peculiarities and in constitutional resistance.

"Usually the question of sex is not considered, although a woman should theoretically receive a

somewhat smaller dose, from one-half to four-fifths, nor is the weight of an adult deemed of sufficient practical significance. The age, however, below twenty (20) and above sixty (60) is almost always considered.

"In general it may be stated that children or older persons require less because of differences in weight and susceptibility.

"The amount to be administered to children is usually calculated in proportion to age, weight or body surface, methods sufficiently exact for practical therapy.

"It should be noted, however, that the very young require even less than the calculated amount and also that these methods do not take into account differences in reactivity to some drugs.

"Thus children are relatively tolerant to cathartics, atropine, alcohol, digitalis--and very susceptible to morphine."²

The amount for aged persons (about 60) is generally from one-half to three-fourths of that for other adults.

For children, the following rules are employed in the United States.

Cowling's Rule: Multiply the average dose by the age at next birthday and divide by the adult age (taken as 24). This is the most common formula; e.g., child 6 years old, dose = $\frac{X \times 6}{24}$

Clark's Rule: Multiply the dose by the weight of the child and divide by the average adult weight (selected as 150 pounds). Clearly this gives the most accurate results; e.g., child 20 pounds, dose = $\frac{X \times 20}{150}$

Young's Rule: Multiply the age in years by the average dose and divide by the age plus 12; e.g., child 6 years old, dose = $\frac{X \times 6}{6 + 12}$

Fried's Rule: (For infants.) Divide the ages in months by 150 and multiply by the average dose; e.g., child 6 months old, dose = $\frac{X \times 6}{150}$

France, up to 1946, was following approximately the same rules.³

Table of Gombins: (For infants.) Under 1 year, 1/16 to 1/12 for children under 2 years, 1/8

"	3	"	1/6
"	4	"	1/4
"	7	"	1/3
"	14	"	1/2
"	20	"	2/3
from	20 to 60		1

Brunton's Law: Multiply the adult dose by the age and divide by the adult age, taken as 25; e.g., child 6 years old, dose = $\frac{X \times 6}{25}$ or $\frac{4X \times 6}{100}$

Martinet's Law: The child's dose is the average adult dose multiplied by number of years plus 1, divided by 20; e.g., child 6 years old, dose = $\frac{X \times (6 + 1)}{20}$

Since those last rules did not seem to be precise enough, the Supplement of Codex VI which appeared in November 1946, gave a table for children's doses,⁴ giving the average daily dose for each drug. On the basis of the rules for dosage used in the United States and those used in France it is possible to note the evolution in dose levels.

DISCUSSION

Comparing the present doses to the ones given in the early Pharmacopeias in the order of their appearance, one can easily see their changes and respective progress.

Starting with the United States Pharmacopeia VIII, 1907, which was the first one to give average doses and with the French Codex V, 1920, it is possible to establish a graph showing that the French doses are still changing and the American doses are becoming stable.*

With the help of the Codex VI list of maximum doses,⁵ a comparison can be established between those doses in Codex VI and those listed in United States Pharmacopeia XIII and National Formulary VIII. The proportions obtained are ratios between the official American average dose and the Codex VI maximum for one dose. Proportions are established between those drugs which are common to these compendia; and to show the relationship often found among them, a common factor is needed. This factor will be common to all the following calculations. It will be 120, and the proportion $120/120$ will be the unit. An American dose, represented by the number 60, will be $60/120$ of the French dose and it will mean, as well, one-half of the French dose.

* See, Tables I, II, III. Figures 1, 2.

On table number IV, after the list of the official doses, a list of their respective ratios is shown. Table number V shows the repartition of those proportions. This repartition is obtained by parting the total of ratios into groups relevant to the unit, one-half and one-fourth of the French doses, bringing always the new division to the largest group.

Approximately fifty per cent of the United States Pharmacopeia XIII and National Formulary VIII average doses vary from one-fourth to one-half of the Codex VI maximum for one dose. More accurately, twenty per cent of them follow the ratio three-tenths of the Codex VI maximum for one dose.

Since a great number of drugs still official in Codex VI are missing in the United States Pharmacopeia XIII and National Formulary VIII, many comparisons have been impossible. By referring to previous Pharmacopeias, one could find almost all the products official in the French Codex VI.

In following the same procedure, a new repartition of ratios is established on table number VII. Once more three-tenths is the ratio found most often between United States Pharmacopeias and French Codex VI doses; again, fifty per cent of the American doses vary from one-fourth to one-half of the French dose. The other fifty per cent differing from the general rule may vary proportionately to the toxicity

of the drugs. In separating Codex VI doses by gram, decigram, centigram and milligram doses, a new comparison can be made with the respective American doses.* On figure number 3 the number of ratios three-tenths appears decreasing from the gram dose to the milligram dose. On the curve, an exception is noted; in the order of the centigram dose, the American doses vary constantly from one-fourth to one-half of the French dose. It is in the order of the centigram that doses give more often the general ratio three-tenths; and the most similar doses (ratio of the unit) are found in the order of the milligram.

All these calculations began with the average United States Pharmacopeias doses. It is interesting to consider now the American maximum doses given by some non-official but commonly-used American pharmaceutical books. From this study of the posology of Pharmaceutical Therapeutics,⁶ two relationships are established, first between American average and maximum doses, and secondly, between American and French maximum doses. It can be stated that American and French maximum for one dose is approximately the same.

If we consider the list given by the United States Dispensatory,⁷ the average United States Pharmacopeias doses are intermediate between the Dispensatory minimum and maximum

* See, Tables VIII, X, XII, XIV.

doses. The ratios between the United States Dispensatory minimum and maximum dose still vary from three-tenths to one-half; so the value of the Dispensatory maximums will certainly be less than that given by Pharmaceutical Therapeutics. In fact, compared to the Codex VI maximum for one dose instead of varying around the unit, the United States Dispensatory maximum dose varies around the ratio three-fifths. Calculations show that the average United States Pharmacopeia dose is about one-half of the maximum Dispensatory dose.

At the present, only the average and the maximum for one dose have been considered. Factors like age, weight, sex, idiosyncrasy, tolerance and disease, modify not only the single dose of a drug, but also the amounts which can be given in twenty-four hours. The frequency of the dosage is determined by the condition of the patient, or if continued effect is desired, by the rate of elimination of the drug. The French Codex VI requires a maximum dose for twenty-four hours; so in order to compare the French and American doses, it is necessary to calculate the American daily doses from the average doses. If it is considered that the administration of the average dose of most of the products can be repeated every four hours, the average American daily dose will be obtained by multiplying the average United States Pharmacopeia dose by six. The calculations show that the American daily doses correspond to the

ratio three-fifths of the Codex VI maximum for twenty-four hours. The Codex VI maximum for twenty-four hours is three times that of the Codex VI maximum for one dose and ten times larger than the average United States Pharmacopoeias dose.

In order to establish the more preferable average or maximum, American or French doses, it is interesting to consider how another country, such as England, has organized its doses and what is the general idea followed. The question is whether their systems are closer to the American or French ones, and whether they are interested in an average or a maximum dose. A study shows that the English Pharmacopoeia⁶ gives two doses: minimum and maximum. The French maximum for one dose is generally greater than both of them, the average United States Pharmacopoeias dose is generally intermediate. So it seems much easier to establish a relationship between English and American doses, than between English and French doses.

It is demonstrated that the English minimum doses correspond to one half of the United States Pharmacopoeias average dose and the English maximum, to three-fifths of the French Codex VI maximum for one dose.

In view of these observations, it is necessary that a systematic presentation of the material be made so that ratios may be established between French and American doses as well as for American, English and French doses. It is with this object in mind that the following tables are presented.

DOSE VARIATIONS, U.S.P. VIII TO U.S.P. XIIIFrom U.S.P. XII to U.S.P. XIII

Carbon Tetrachloride	1	increased to 2.5
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From U.S.P. XI to U.S.P. XIII

Ipecac	1	decreased to 0.5
Mercurous Chloride	0.15	decreased to 0.12
Paraldehyde	2	increased to 4
Iodine Tincture	0.1	increased to 0.3

From U.S.P. X to U.S.P. XIII

Atropine	0.0006	decreased to 0.0004
Caffeine	0.15	increased to 0.2
Chloral Hydrate	0.5	increased to 0.6

From U.S.P. IX to U.S.P. XIII

Aconite	0.03	increased to 0.06
Atropine	0.0005	increased to 0.0006
Copper Sulfate	0.25	increased to 0.3
Digitalis	0.06	increased to 0.1
Ergot Extract	0.25	increased to 0.5
Hyoscyamus Extract	0.06	decreased to 0.05
Croton Oil	0.05	increased to 0.06
Iodine	0.005	increased to 0.01
Hyoscyamus	0.25	decreased to 0.2
Mercuric Chloride	0.003	increased to 0.004
Mercuric Iodide	0.003	increased to 0.004
Morphine	0.008	increased to 0.01
Nux Vomica	0.06	increased to 0.1
Phosphorus	0.0005	increased to 0.0006
Scopolamine Hydrobromide	0.0003	increased to 0.0005
Sodium Arsenate	0.005	decreased to 0.003
Sodium Hypophosphite	1	decreased to 0.5
Sparteine Sulfate	0.01	increased to 0.03
Stramonium	0.06	increased to 0.075
Strychnine Sulfate	0.0015	increased to 0.002
Aconite Tincture	0.3	increased to 0.6
Belladonna Tincture	0.75	decreased to 0.6
Digitalis Tincture	0.5	increased to 1
Nux Vomica Tincture	0.5	increased to 1
Opium Tincture	0.5	increased to 0.6
Thymol	1	increased to 2

TABLE I (Continued)

From U.S.P. VIII to U.S.P. XIII

Acetanilid	0.250	decrease to 0.2
Aconite	0.065	decrease to 0.03 USP <u>IX</u>
Belladonna	0.065	decrease to 0.06
Cocaine	0.03	decrease to 0.015
Digitalis	0.065	decrease to 0.06 USP <u>IX</u>
Belladonna Extract	0.01	increase to 0.015
Cannabis Extract	0.01	increase to 0.015
Hyoscyamus Extract	0.065	decrease to 0.06
Hydrastinine Hydrochloride	0.03	decrease to 0.01
Mercurous Chloride	0.125	increase to 0.15 USP <u>IX</u>
Morphine	0.01	decrease to 0.008 USP <u>IX</u>
Morphine Hydrochloride	0.015	decrease to 0.008
Nux Vomica	0.065	decrease to 0.06 USP <u>IX</u>
Opium	0.1	decrease to 0.06
Phenol	0.065	decrease to 0.06
Phenyl Salicylate	0.5	decrease to 0.3
Pilocarpine Hydrochloride	0.01	decrease to 0.005
Pilocarpine Nitrate	0.01	decrease to 0.005
Santonin	0.065	decrease to 0.06
Squill	0.125	decrease to 0.1
Sodium Nitrite	0.065	decrease to 0.06
Stramonium	0.065	decrease to 0.06 USP <u>IX</u>
Strychnine	0.001	increase to 0.0015
Strychnine Sulfate	0.001	increase to 0.0015 USP <u>IX</u>
Aconite Tincture	0.6	decrease to 0.3 USP <u>IX</u>
Belladonna Tincture	0.5	increase to 0.75 USP <u>IX</u>
Cantharidis Tincture	0.3	decrease to 0.1
Cannabis Tincture	0.6	increase to 0.75
Nux Vomica Tincture	0.6	decrease to 0.5 USP <u>IX</u>
Thymol	0.125	decrease to 0.1 USP <u>IX</u>
Creosote	0.2	increase to 0.25

TABLE II
DOSE VARIATIONS, FRENCH CODEX V TO CODEX VI

Pharmaceuticals	Codex V, maximum one dose 24 hours		Codex VI, maximum one dose 24 hours	
Acetanilid	0.3	1.5	decrease to 0.3	1
Aconite	1	5	decrease to 1	1
Atropine	0.0005	0.001	increase to 0.001	0.002
Codeine	0.05	0.2	increase to 0.08	0.3
Codeine Phosphate	0.075	0.3	increase to 0.1	0.4
Conine Hydrobromide	0.03	0.15	decrease to 0.02	0.1
Mercuric Chloride	0.02	0.06	decrease to 0.015	0.03
Mercuric Iodide	0.02	0.08	decrease to 0.02	0.04
Antipyrine	4	8	decrease to 2	8
Pilocarpine Hydrochloride	0.025	0.05	decrease to 0.02	0.05
Piperazine	0.75	3	decrease to 0.6	3
Resorcin	1.25	5	decrease to 0.5	3
Sodium Cacodylate	0.2	0.2	decrease to 0.1	0.2
Sodium Chlorate	1	6	decrease to 1	4
Sodium Methylarsenate	0.2	0.2	decrease to 0.1	0.2
Sparteine Sulfate	0.05	0.25	increase to 0.1	0.3
Digitalis Tincture	1.5	5	increase to 1.5	6

TABLE III
RECAPITULATION OF DOSE VARIATIONS
United States Pharmacopoeias

REVISIONS	YEAR	VARIATIONS	PROPORTION OF ↗*	PROPORTION OF ↘
8	1907	23 ↘ 8 ↗	8/31 624/2418**	23/31 1794/2418
9	1916	5 ↘ 21 ↗	21/26 1953/2418	5/26 465/2418
10	1926	1 ↘ 2 ↗	2/3 1612/2418	1/3 806/2418
11	1936	2 ↘ 2 ↗	2/4 1209/2418	2/4 1209/2418
12	1942	0 ↘ 1 ↗	1 2418/2418	0 0
TOTAL		31 ↘ 34 ↗		

French Codeces

FROM 5 to 6	1920	12 ↘ 5 ↗	5/17 721/2418	12/17 1706/2418
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NOTE: ↗ increases

↘ decreases

* Proportion of Increases included in respective amount of variations.

** 2418 - Common factor calculated to establish a curve

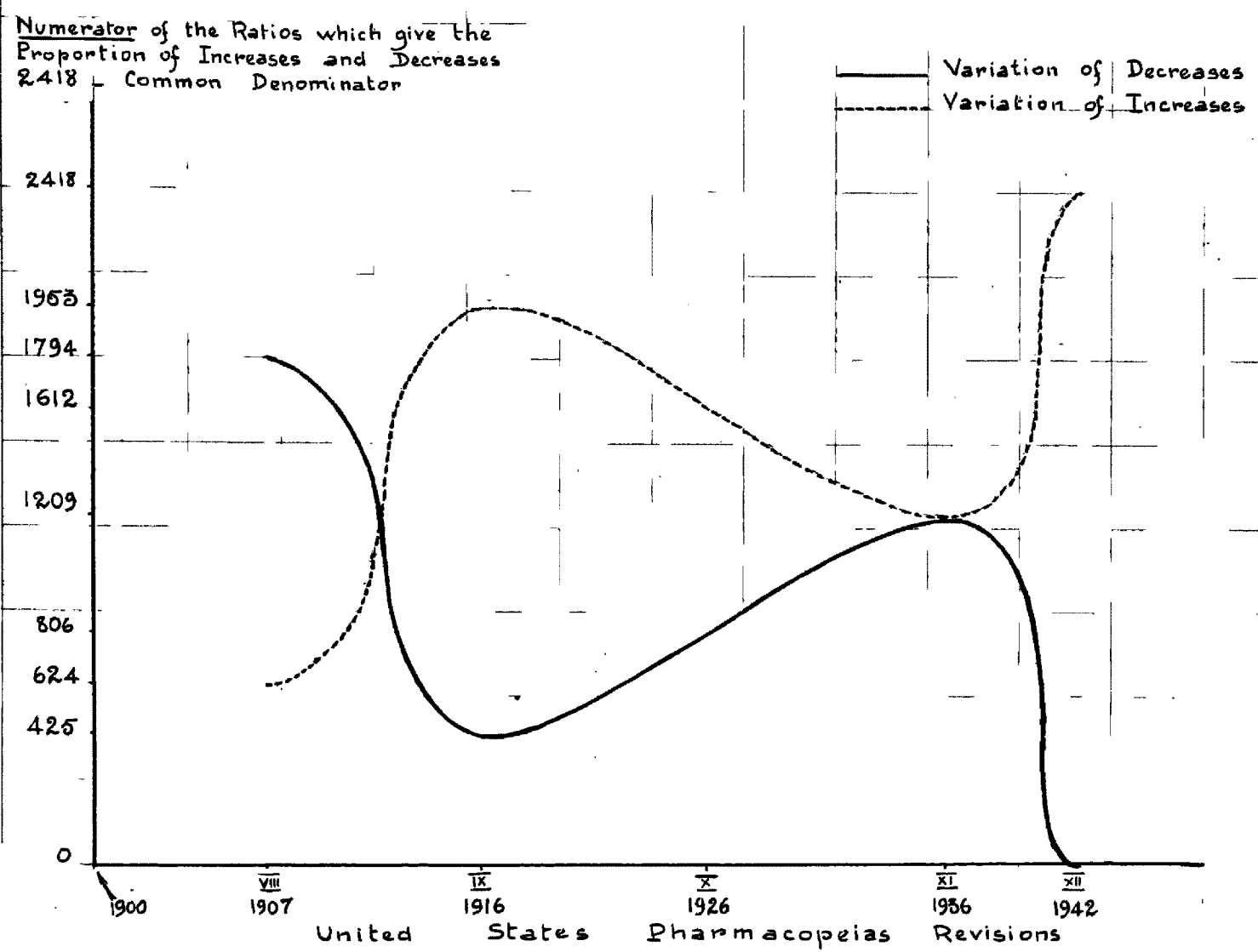


FIGURE 1

VARIATION OF INCREASES AND DECREASES WITHIN THE UNITED STATES PHARMACOPEIAS DOSES

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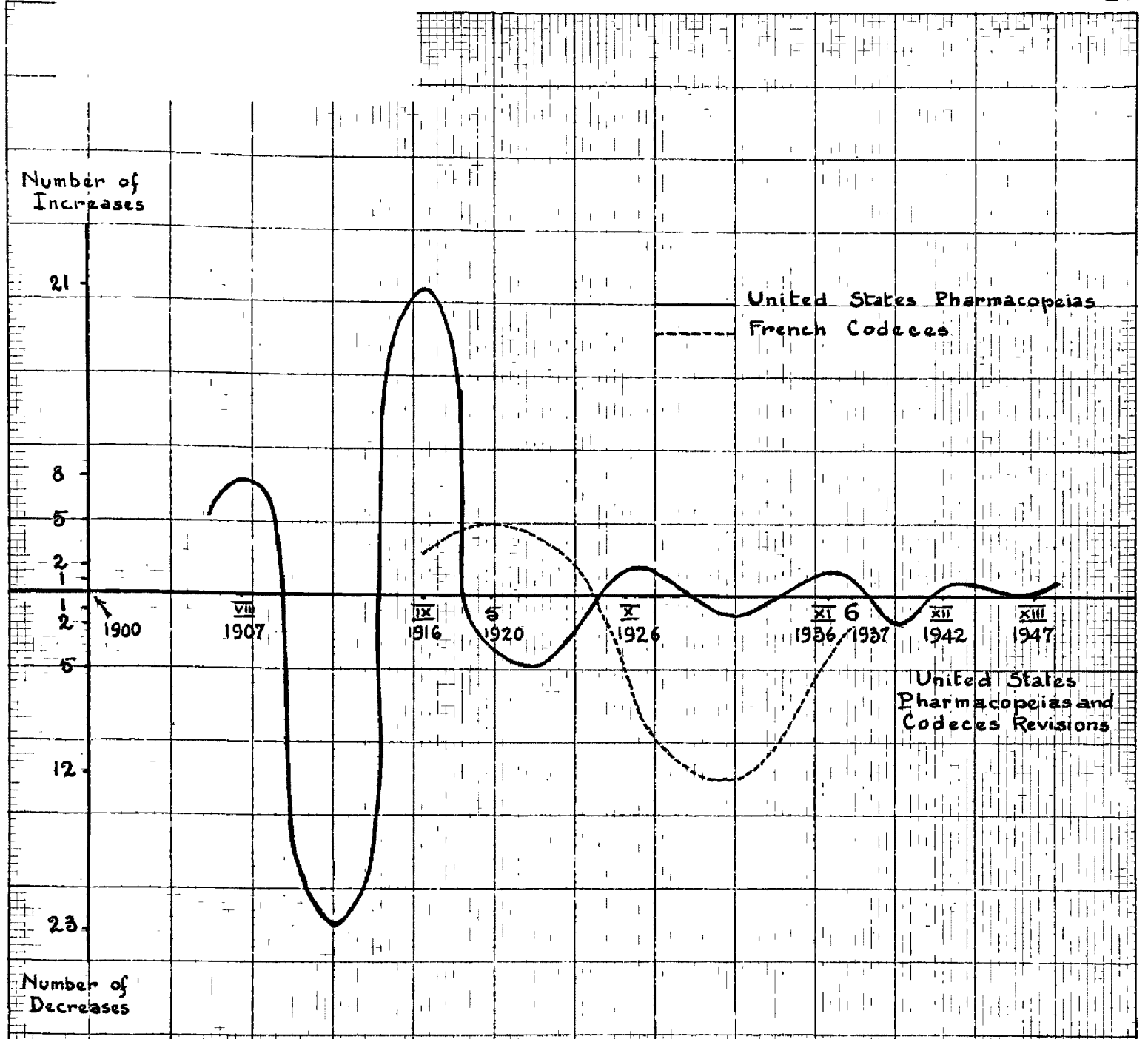


FIGURE 2.

VARIATION OF INCREASES AND DECREASES BETWEEN THE UNITED STATES PHARMACOPEIAS AND THE FRENCH CODECES DOSES

TABLE IV
 OFFICIAL DOSE COMPARISONS
 U.S.P. XIII, N.F. VIII, CODEX VI

Pharmaceuticals	Codex Maximum one dose	U.S.P. Average dose	N.F. Average dose	Ratio American French	Number in 1/120
Acetanilid	0.3	0.2		2/3	80
Aspirin	1	0.3		3/10	36
Aconite	0.05		0.06	6/5	144
Apomorphine Hydrochloride	0.015	0.005		5/15	40
Atropine	0.001	0.0004		4/10	48
Arsenic Triiodide	0.005		0.005	5/5	120
Caffeine	0.5	0.2		2/5	48
Calcium Hypophosphite	0.1		0.5	5/1	600
Carbon Tetrachloride	2.5		2.5	25/25	120
Chloral Hydrate	4	0.6		6/40	18
Cocaine Hydrochloride	0.05		0.015	15/50	36
Codeine	0.08		0.03	3/8	45
Codeine Phosphate	0.1	0.03		3/10	36
Colchicine	0.002	0.0005		5/20	30
Creosote	0.5		0.25	25/50	60
Arsphenamine	0.6	0.3		3/5	72
Digitalis	1	0.1		1/10	12
Ephedrine Hydrochloride	0.1	0.025		25/100	30
Eserine Salicylate	0.001	0.002		2/1	240
Ethyl Morphine Hydrochloride	0.05	0.015		15/50	36
Belladonna Extract	0.03	0.015		15/30	60
Barbital	0.5	0.3		3/5	72
Ergot Extract	1		0.5	5/10	60
Ergot Fluid extract	1		2	2/1	240
Hydrastis Fluid extract	1		2	2/1	240
Ipecac Extract	0.3	0.5		5/3	200
Hyoscyamus Extract	0.1		0.05	5/10	60
Nux Vomica Extract	0.04		0.015	15/40	45
Opium Extract	0.1		0.03	3/10	36
Guaiacol	0.5		0.5	5/5	120
Hydrastinine Hydrochloride	0.05		0.01	1/5	24
Ipecac	2	0.5		5/20	30
Hyoscyamus	0.2	0.2		2/2	120
Laudanum	2.	0.6		6/20	36
Mercuric Iodide	0.02		0.004	4/20	24
Mercurous Chloride	1	0.12		12/100	
Mercurous Iodide	0.05		0.01	1/5	24
Morphine	0.02	0.01		1/2	60
Morphine Hydrochloride	0.02		0.008	8/20	48

TABLE IV (continued)

Pharmaceuticals	Codex Maximum one dose	U.S.P. Average dose	N.F. Average dose	Ratio American French	Number in 1/120
Opium	0.2	0.06		6/20	36
Quabain	0.001	0.00025		25/100	30
Papaverine Hydrochloride	0.05	0.1		10/5	240
Paraldehyde	5	4		4/5	96
Phenyl Salicylate	1		0.3	3/10	36
Phenobarbital	0.2	0.03		3/20	18
Pilocarpine Hydrochloride	0.02		0.005	5/20	30
Pilocarpine Nitrate	0.02	0.005		5/20	30
Ipecac and Opium Powder	1		0.3	3/10	36
Santonin	0.1		0.06	6/10	72
Scopolamine Hydrobromide	0.001	0.0005		5/10	60
Sodium Arsenate	0.01		0.003	3/10	36
Sodium Cacodylate	0.1		0.06	6/10	72
Sodium Hypophosphite	0.1		0.5	5/1	600
Arsenic and Mercuric Iodides Sol.	0.5		0.1	1/5	24
Sparteine Sulfate	0.1		0.03	3/10	36
Strychnine	0.005		0.0015	15/50	36
Strychnine Sulfate	0.006	0.002		2/6	40
Aconite Tincture	0.5		0.6	6/5	144
Cantharidis Tincture	0.5		0.1	1/5	24
Colchicum Tincture	1.5		2	20/15	160
Opium Tincture	2	0.6		6/20	36
Digitalis Tincture	1.5	1		10/15	80
Iodine Tincture	0.3	0.3		3/3	120
Hyoscyamus Tincture	1	2		2/1	240
Lobelia Tincture	1.5		1	10/15	80
Nux Vomica Tincture	1		1	1/1	120
Strophantus Tincture	0.5		0.5	5/5	120
Belladonna Tincture	1	0.6		6/10	72
Thymol	0.5	2		20/5	480

TABLE V

REPARTITION OF DOSE RATIOS ESTABLISHED BETWEEN
U.S.P. XIII, N.F. VIII, CODEX VI

Total	>120	=120	<120	>60	=60	<60	>30	=30	<30
69	12	7	50						
50				8	7	35			
35							20	6	9
	2-5 1-4 5-2 1-5/3 1-4/3 2-6/5	7-1		1-4/5 3-2/3 4-3/5	7-1/2		3-2/5 2-3/8 2-1/3 13-3/10	6-1/4	5-1/5 2-3/20 1-1/10 1-3/25

TABLE VI

DOSE COMPARISONS OF FRENCH CODEX VI
AND UNITED STATES PHARMACOPIAS
INCLUSIVE OF REVISIONS VIII TO XIII

Pharmaceuticals	U.S.P. Average dose	Codex Maximum one dose	Ratio USP Codex	Number in 1/120
<u>U.S.P. XII Codex VI</u>				
Arsenic Trioxide	0.002	0.005	2/5	48
Potassium Antimony Tartrate	0.003	0.1	3/100	
Sodium Nitrite	0.06	0.1	6/10	72
Potassium Arsenite Solution	0.2	0.5	2/5	48
<u>U.S.P. XI Codex VI</u>				
Ammonium Solution	1	1	1/1	120
Silver Nitrate	0.01	0.03	1/3	40
Belladonna Leaves	0.06	0.15	6/15	48
Chloroform	0.3	0.5	3/5	72
Cocaine	0.015	0.05	15/50	36
Copper Sulfate	0.3	0.75	30/75	48
Aminopyrin	0.3	0.5	3/5	72
Ergot	2	1	2/1	240
Cannabis Extract	0.015	0.05	15/50	36
Iodine	0.01	0.02	1/2	60
Mercuric Chloride	0.004	0.015	4/15	32
Nux Vomica	0.1	0.1	1/1	120
Phenol	0.06	0.1	6/10	72
Antipyrin	0.3	2	3/20	18
Resorcin	0.125	0.5	125/500	30
Stramonium	0.075	0.25	75/250	36
Squill Tincture	1	1.5	10/15	80

TABLE VI (Continued)

Pharmaceuticals	U.S.P. Average dose	Codex Maximum one dose	Ratio <u>U.S.P.</u> <u>Codex</u>	Number in 1/120
<u>U.S.P. X Codex VI</u>				
Aconitine	0.00015	0.0002	15/20	90
Sulfonal	0.75	1	75/100	90
Colchicum Extract	0.06	0.05	6/5	144
Guaiacol Carbonate	1	0.5	10/5	240
Croton Oil	0.06	0.05	6/5	144
Iodoform	0.25	0.2	25/20	150
Phosphorus	0.0006	0.001	6/10	72
Potassium Chlorate	0.25	1	25/100	30
Salicylic Acid	0.75	1	75/100	90
Squill	0.1	0.5	1/5	24
<u>U.S.P. IX Codex VI</u>				
Bromoform	0.2	0.5	2/5	48
Diacetyl Morphine	0.003	0.01	3/10	36
Ethyl Carbamate	1	2	1/2	60
Squill Fluidextract	0.1	0.2	1/2	60
Jaborandi	2	3	2/3	80
Betanaphtol	0.25	1	25/100	30
Cannabis Tincture	0.75	0.5	75/50	180
<u>U.S.P. VIII Codex VI</u>				
Conium	0.2	0.25	20/25	96
Coca	2	1	2/1	240
Evonymus	0.125	0.1	125/100	150
Hyoscyamine Sulfate	0.0005	0.0005	5/5	120
Sabina	0.5	0.5	5/5	120
Sodium Chlorate	0.25	1	25/100	30
Veratrin	0.002	0.002	2/2	120

TABLE VII

REPARTITION OF DOSE RATIOS ESTABLISHED
 BETWEEN THE UNITED STATES PHARMACOPEIAS
 AND THE FRENCH CODEX VI

Total	>120	=120	<120	>60	=60	<60	>30	=30	<30
144	20	12	82						
82				19	10	53			
53							31	10	12
	2-5 1-4 8-2 1-5/3 1-4/3 2-5/4 5-6/5	12-1		2-4/5 3-3/4 5-2/3 9-3/5	10-1/2		8-2/5 2-3/8 3-1/3 17-3/10 1-4/15	10-1/4	6-1/5 3-3/20 1-1/10 1-3/25 1-3/100

TABLE VIII

COMPARISON OF DOSES IN THE ORDER OF THE GRAM

Pharmaceuticals	Codex Maximum one dose	U.S.P. Average dose	Ratio U.S.P. Codex	Number in 1/120
Aspirin	1	0.3	3/10	36
Ammonium Hydroxide	1	1	1/1	120
Chloral Hydrate	4	0.5	6/40	18
Coca	1	2	2/1	240
Sulfonal	1	0.75	75/100	90
Digitalis	1	0.1	1/10	12
Ergot	1	2	2/1	240
Ethylcarbamate	2	1	1/2	60
Ergot Extract	1	0.5	5/10	60
Ergot Fluidextract	1	2	2/1	240
Hydrastis Fluidextract	1	2	2/1	240
Ipecac	2	0.5	5/20	30
Jaborandi	3	2	2/3	80
Laudanum	2	0.6	6/20	36
Mercurous Chloride	1	0.12	12/100	
Betanaphtol	1	0.25	25/100	30
Paraldehyde	5	4	4/5	96
Phenyl Salicylate	1	0.3	3/10	36
Antipyrin	2	0.3	3/20	18
Potassium Chlorate	1	0.25	25/100	30
Ipecac and Opium Powder	1	0.3	3/10	36
Salicylic Acid	1	0.75	75/100	90
Sodium Chlorate	1	0.25	25/100	30
Belladonna Tincture	1	0.6	6/10	72
Colchicum Tincture	1.5	2	20/15	160
Digitalis Tincture	1.5	1	10/15	80
Hyoscyamus Tincture	1	2	2/1	240
Lobelia Tincture	1.5	1	10/15	80
Nux Vomica Tincture	1	1	1/1	120
Opium Tincture	2	0.6	6/20	36
Squill Tincture	1.5	1	10/15	80

TABLE IX

REPARTITION OF DOSE RATIOS IN
THE ORDER OF THE GRAM

Total	>120	=120	<120	>60	=60	<60	>30	=30	<30
31	6	2	23						
23				8	2	13			
13							5	4	4
	5-2 1-4/3	2-1		1-4/5 2-3/4 4-2/3 1-3/5	2-1/2		5-3/10	4-1/4	2-3/20 1-1/10 1-12/100

TABLE X

COMPARISON OF DOSES IN THE ORDER OF THE DECIGRAM

Pharmaceuticals	Codex	U.S.P.	Ratio	Number 1/120
Acetanilid	0.3	0.2	2/3	80
Belladonna	0.15	0.06	6/15	48
Bromoform	0.5	0.2	2/5	48
Caffeine	0.5	0.2	2/5	48
Calcium Hypophosphite	0.1	0.5	5/1	600
Chloroform	0.5	0.3	3/5	72
Conium	0.25	0.2	20/25	96
Codeine Phosphate	0.1	0.03	3/10	36
Creosote	0.5	0.25	25/50	60
Copper Sulfate	0.75	0.3	30/75	48
Arsphenamine	0.6	0.3	3/6	60
Barbital	0.5	0.3	3/5	72
Aminopyrin	0.5	0.3	3/5	72
Ephedrine Hydrochloride	0.1	0.025	25/100	30
Euonymus Extract	0.1	0.125	125/100	150
Ipecac Extract	0.3	0.5	5/3	200
Hyoscyamus Extract	0.1	0.05	5/10	60
Opium Extract	0.1	0.03	3/10	36
Squill Extract	0.2	0.1	1/2	60
Guaiacol	0.5	0.5	5/5	120
Guaiacol Carbonate	0.5	1	1/5	24
Iodoform	0.2	0.25	25/20	150
Hyoscyamus	0.1	0.1	1/1	120
Nux Vomica	0.1	0.1	1/1	120
Opium	0.2	0.06	6/20	36
Phenol	0.1	0.1	1/1	120
Phenobarbital	0.2	0.03	3/20	18
Potassium Antimony Tartrate	0.1	0.003	3/100	30
Resorcin	0.5	0.125	125/500	30
Sabina	0.5	0.5	5/5	120
Santonin	0.1	0.06	6/10	72
Squill	0.5	0.1	1/5	24
Sodium Nitrite	0.1	0.06	6/10	72
Sodium Cacodylate	0.1	0.06	6/10	72
Sodium Hypophosphite	0.1	0.5	5/1	600
Solution of Potassium Arsenite	0.5	0.2	2/5	48
Arsenic and Mercuric Iodides Sol.	0.5	0.1	1/5	24
Sparteine Sulfate	0.1	0.03	3/10	36
Stramonium	0.25	0.075	75/250	36
Aconite Tincture	0.5	0.6	6/5	144
Cantharidis Tincture	0.5	0.1	1/5	24
Cannabis Tincture	0.5	0.75	75/50	180
Strophantus Tincture	0.5	0.5	5/5	120
Thymol	0.5	2	2/5	48

TABLE XI
 REPARTITION OF DOSE RATIOS IN THE ORDER
 OF THE DECIGRAM

Total	>120	=120	<120	>60	=60	<60	>30	=30	<30
44	7	6	31						
31				8	4	19			
19							11	2	6
	2-5 1-5/3 1-3/2 2-5/4 1-6/5	6-1		1-4/5 1-2/3 6-3/5	4-1/2		6-2/5 5-3/10	2-1/4	4-1/5 1-3/20 1-3/100

TABLE XII

COMPARISON OF DOSES IN THE ORDER OF THE CENTIGRAM

Pharmaceuticals	Codex	U.S.P.	Ratio	Number in 1/120
Aconite	0.05	0.06	6/5	144
Silver Nitrate	0.03	0.01	1/3	40
Cocaine, Nitrate, Hydrochloride	0.05	0.015	15/50	36
Codeine	0.08	0.03	3/8	45
Diacetyl Morphine Hydrochloride	0.01	0.003	3/10	36
Ethyl Morphine Hydrochloride	0.05	0.015	15/50	36
Belladonna Extract	0.03	0.015	15/30	60
Cannabis Extract	0.05	0.015	15/50	36
Colchicum Extract	0.05	0.06	6/5	144
Nux Vomica Extract	0.04	0.015	15/40	45
Croton Oil	0.05	0.06	6/5	144
Hydrastinine Hydrochloride	0.05	0.01	1/5	24
Iodine	0.02	0.01	1/2	60
Mercuric Iodide	0.02	0.004	4/20	24
Morphine Hydrochloride	0.02	0.008	8/20	48
Morphine	0.02	0.01	1/2	60
Papaverine Hydrochloride	0.05	0.1	10/5	240
Pilocarpine, Nitrate, Hydrochloride	0.02	0.005	5/20	30
Sodium Arsenate	0.01	0.003	3/10	36
Mercuric Chloride	0.015	0.004	4/15	32

TABLE XIII

REPARTITION OF DOSE RATIOS IN THE ORDER
OF THE CENTIGRAM

Total	>120	=120	<120	>60	=60	<60	>30	=30	<30
20	4		16						
16					3	13			
13							10	1	2
	1-2 3-6/5				3-1/2		1-2/5 2-3/8 1-1/3 5-3/10 1-4/15	1-1/4	2-1/5

TABLE XIV

COMPARISON OF DOSES IN THE ORDER OF THE MILLIGRAM

Pharmaceuticals	Codex	U.S.P.	Ratio	Number in 1/120
Aconitine	0.0002	0.00015	15/20	90
Apomorphine Hydrochloride	0.015	0.005	5/15	40
Arsenic Triiodide	0.005	0.005	5/5	120
Atropine	0.001	0.0004	4/10	48
Arsenic Trioxide	0.005	0.002	2/5	48
Colchicine	0.002	0.0005	5/20	30
Eserine Salicylate	0.001	0.002	2/1	240
Hyoscyamine Sulfate	0.0005	0.0005	5/5	120
Ouabain	0.001	0.00025	25/100	30
Phosphorus	0.001	0.0006	6/10	72
Strychnine	0.005	0.0015	15/50	36
Strychnine Sulfate	0.006	0.002	2/6	40
Veratrine	0.002	0.002	2/2	120

TABLE XV

REPARTITION OF DOSE RATIOS IN THE ORDER OF THE MILLIGRAM

Total	>120	=120	<120	>60	=60	<60	>30	=30	<30
13	1	3	9						
9				2		7			
7							5	2	
	1-2	3-1		1-3/4 1-3/5			1-3/10 2-1/3 2-2/5	2-1/4	

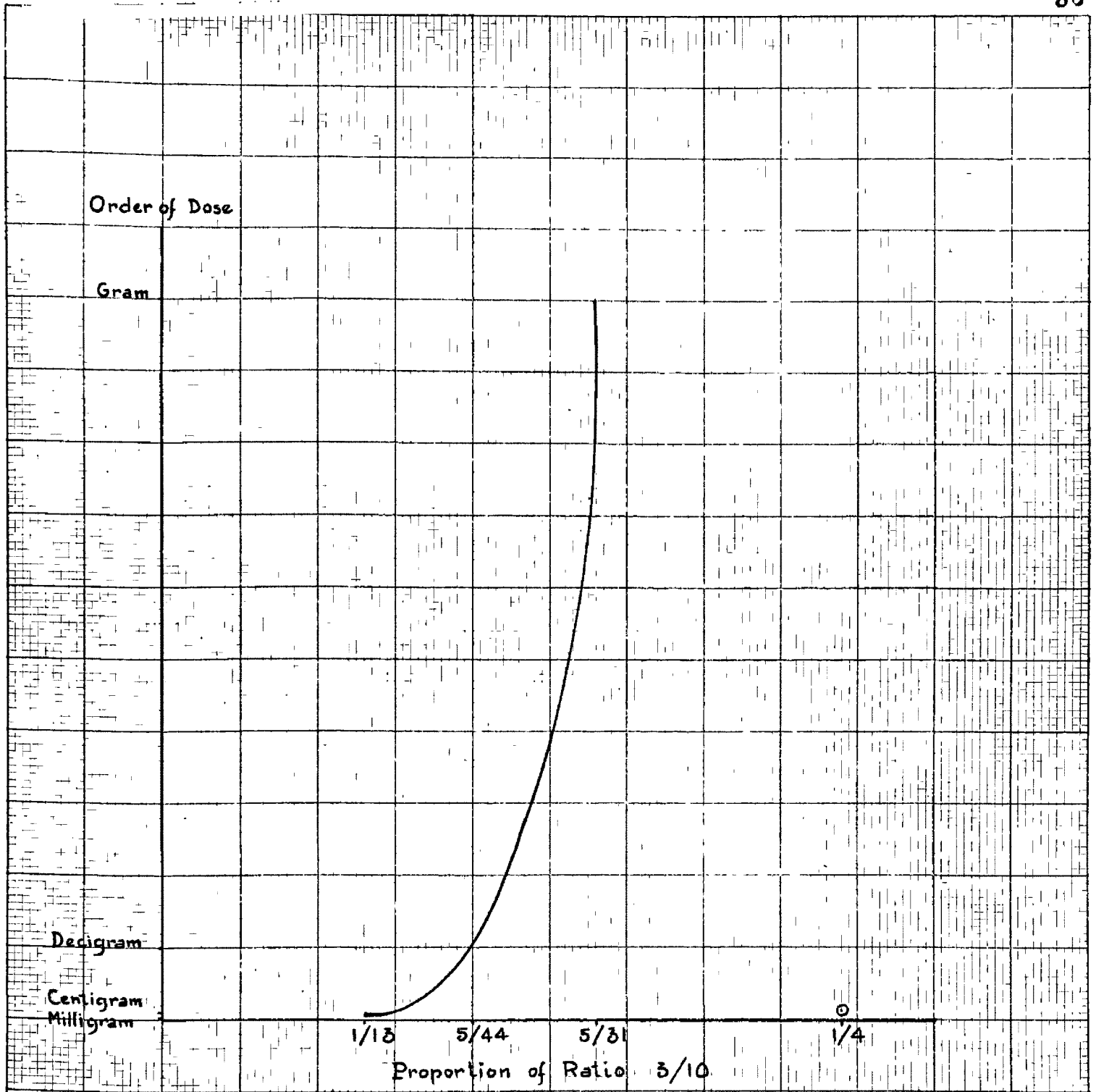


FIGURE 3

VARIATION OF THE RATIO THREE-TENTHS
IN REGARD TO THE TOXICITY

TABLE XVI

STUDY OF DOSIS GIVEN BY "PHARMACEUTICAL THERAPEUTICS" LYNN

Pharmaceuticals	Maximum	Average	Codex Maximum one dose	Ratio		Number in 1/120	Ratio Maximum Codex	Number in 1/120
				Average Maximum	Maximum			
Acetanilid	0.5	0.2	0.3	2/5	5/3	48	5/3	200
Aspirin	1.2	0.3	1	3/12	12/10	30	12/10	144
Aconite	0.12	0.06	0.05	6/12	12/5	60	12/5	188
Apomorphine Hydrochloride	0.015	0.001	0.015	1/15	15/15	8	15/15	120
Silver Nitrate	0.03	0.01	0.03	1/3	3/3	40	3/3	120
Arsenic Trioxide	0.006	0.002	0.005	2/6	6/5	40	6/5	144
Atropine Salts	0.001	0.0005	0.001	5/10	1/1	60	1/1	120
Belladonna Leaves	0.2	0.06	0.15	6/20	20/15	36	20/15	160
Calcium Hypophosphite	1.2	0.5	0.1	5/12	12/10	50	12/10	144
Carbon Tetrachloride	3	2.5	2.5	25/30	30/25	100	30/25	144
Chloral Hydrate	2	0.6	4	6/20	2/4	36	2/4	60
Chloroform	0.6	0.3	0.5	3/6	6/5	60	6/5	144
Cocaine and Salts	0.06	0.015	0.05	15/60	6/5	30	6/5	144
Codeine and Salts	0.06	0.03	0.1	3/6	6/10	60	6/10	72
Colchicine	0.001	0.0005	0.002	5/10	1/2	60	1/2	60
Epinephrine	0.001	0.0005	0.001	5/10	1/1	60	1/1	120
Creosote	0.5	0.25	0.5	25/50	5/5	60	5/5	120
Copper Sulfate	0.6	0.25	0.75	25/60	60/75	50	60/75	80
Diamorphine Hydrochloride	0.015	0.005	0.01	5/15	15/10	40	15/10	180
Digitalis powder	0.2	0.1	1	1/2	2/1	60	2/1	240
Ephedrine and Salts	0.2	0.025	0.1	25/200	2/1	15	2/1	240
Ergot	4	2	1	2/4	4/1	60	4/1	480
Ethyl Carbamate	2	1	2	1/2	2/2	60	2/2	120
Hydrastis Extract	1	0.5	1	5/10	1/1	60	1/1	120
Hyoscyamus Extract	0.12	0.05	0.1	5/12	12/10	50	12/10	144
Nux Vomica Extract	0.06	0.015	0.04	15/60	6/4	30	6/4	180

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TABLE XVI (Continued)

Pharmaceuticals	Maximum	Average	Codex Maximum one dose	Ratio Average Maximum	Number in 1/120	Ratio Maximum Codex	Number in 1/120
Opium Extract	0.06	0.03	0.1	3/8	60	6/10	72
Guaiacol	0.6	0.5	0.5	5/6	100	6/5	144
Guaiacol Carbonate	1.2	1	0.5	10/12	100	12/5	288
Croton Oil	0.12	0.06	0.05	6/12	60	12/5	288
Hydrastine Hydrochloride	0.06	0.01	0.05	1/6	20	6/5	144
Iodine	0.03	0.01	0.02	1/3	40	3/2	180
Ipecac	2	0.06	2	6/200		2/2	120
Hyoscyamus	0.3	0.2	0.2	2/3	80	3/2	180
Mercuric Chloride	0.015	0.004	0.015	4/15	32	15/15	120
Mercuric Iodide	0.015	0.004	0.02	4/15	32	15/20	90
Mercurous Chloride	0.6	0.15	1	15/60	30	6/10	72
Mercurous Iodide	0.06	0.01	0.05	1/6	20	6/5	144
Morphine and Salts	0.03	0.008	0.02	8/30	32	3/2	180
Nux Vomica	0.25	0.1	0.1	10/25	48	25/10	300
Opium	0.2	0.06	0.2	6/20	36	2/2	120
Quabain	0.0006	0.0005	0.001	5/6	100	6/10	72
Papaverine Salts	0.5	0.06	0.05	6/50		50/5	1200
Paraldehyde	5	2	5	2/5	48	5/5	120
Phenol	0.2	0.06	0.1	6/20	36	2/1	240
Phenyl Salicylate	2	1	1	1/2	60	2/1	240
Phosphorus	0.002	0.0006	0.001	6/20	36	2/1	240
Pilocarpine Salts	0.015	0.005	0.02	5/15	40	15/20	90
Ipecac and Opium Powder	1.2	0.3	1	3/12	30	12/10	144

TABLE XVI (Continued)

Pharmaceuticals	Maximum	Average	Codex Maximum one dose	Ratio Average Maximum	Number in 1/120	Ratio Maximum Codex	Number in 1/120
Resorcin	0.6	0.125	0.5	125/600	25	6/5	144
Santonin	0.3	0.06	0.1	6/30	24	3/1	360
Scopolamine Hydrobromide	0.0006	0.0005	0.001	5/8	100	6/10	72
Sodium Arsenate	0.006	0.003	0.01	3/6	60	6/10	72
Sodium Nitrite	0.2	0.06	0.1	6/20	36	2/1	240
Sodium Cacodylate	0.12	0.06	0.1	6/12	60	12/10	144
Sodium Hypophosphite	2	0.5	0.1	5/20	30	20/1	2400
Potassium Arsenite Solution	0.6	0.2	0.5	2/6	40	6/5	144
Sparteine	0.1	0.03	0.1	3/10	36	1/1	120
Aconite Tincture	1	0.6	0.5	6/10	72	10/5	240
Belladonna Tincture	2	0.6	1	6/20	36	2/1	240
Cantharidis Tincture	0.6	0.1	0.5	1/6	20	6/5	144
Cannabis Tincture	4	1	0.5	1/4	30	40/5	960
Iodine Tincture	0.3	0.1	0.3	1/3	40	3/3	120
Hyoscyamus Tincture	3	2	1	2/3	80	3/1	360
Lobelia Tincture	2	1	1/5	1/2	60	20/15	160
Nux Vomica Tincture	2	1	1	1/2	60	2/1	240
Opium Tincture	2	0.6	2	6/20	36	2/2	120
Strophantus Tincture	1	0.5	0.5	5/10	60	10/5	240
Thymol	2	0.12	0.5	12/200		20/5	480
Ethyl Morphine Hydrochloride	0.045	0.015	0.05	15/45	40	45/50	108
Belladonna Extract	0.06	0.015	0.03	15/60	30	6/3	240
Cannabis Extract	0.1	0.015	0.05	15/100	18	10/5	240

TABLE XVII

REPARTITION OF RATIOS WHICH COMPARE AVERAGE AND
MAXIMUM DOSE GIVEN BY
PHARMACEUTICAL THERAPEUTICS LYNN

TOTAL	> 60	= 60	< 60	> 30	= 30	< 30
72	8	19	45	26	8	11
45	4-5/8 2-3/5 2-2/3	19-1/2		3-5/12 3-2/5 8-1/3 9-3/10 3-4/15	8-1/4	1-5/24 1-1/5 3-1/6 1-3/20 1-1/8 1-3/25 1-1/15 1-3/50 1-3/100

TABLE XVIII

REPARTITION OF RATIOS WHICH COMPARE MAXIMUM DOSES
GIVEN BY *PHARMACEUTICAL THERAPEUTICS* LYNN
AND FRENCH CODEX MAXIMUM FOR ONE DOSE

TOTAL	> 240	= 240	< 240	> 120	= 120	< 120
72	10	12	50	24	14	12
50	1-20 1-10 1-8 2-4 2-3 1-5/2 2-12/5	12-2		1-5/3 5-3/2 2-4/3 15-6/5 1-12/5	14-1	1-9/10 2-3/4 6-3/5 2-1/2 1-2/3

TABLE XIX

STUDY OF DOSES GIVEN BY THE "UNITED STATES DISPENSATORY" 24th EDITION

Pharmaceuticals	Codex	U.S.P.	Minimum U.S.D.	Maximum U.S.D.	Ratio Minimum Codex	Number in 1/120	Ratio Minimum Maximum	Number in 1/120
Acetanilid	0.3	0.2	0.2	0.7	7/3	280	2/7	34
Aspirin	1	0.3	0.3	0.6	6/10	72	3/6	60
Aconite	0.05	0.06	0.03	0.06	6/5	144	6/6	120
Ammonium Hydroxide	1		0.5	2	2/1	240	6/20	36
Apomorphine Hydrochloride	0.015	0.005	0.004	0.006	6/15	48	5/6	100
Arsenic Trioxide	0.005		0.0015	0.003	3/5	72	15/30	60
Arsenic Triiodide	0.005	0.005	0.003	0.012	12/5	288	5/12	50
Atropine	0.001	0.0004	0.0003	0.0012	12/10	144	4/12	40
Belladonna	0.15		0.03	0.12	12/15	96	3/12	30
Caffeine	0.5	0.2	0.2	3	30/5	720	2/30	8
Calcium Hypophosphite	0.1	0.5	0.5	8	80/1		5/80	
Cantharidis	0.03		0.004	0.003	3/3	120	4/30	16
Carbon Tetrachloride	2.5	2.5	2.5	40	400/25	1920	25/400	
Chloral Hydrate	4	0.6	1	2	2/4	60	6/20	36
Chloroform	0.5		0.3	1	10/5	240	3/10	36
Cocaine and Salts	0.05	0.015	0.015	0.03	3/5	72	15/30	60
Codeine Phosphate	0.08	0.03	0.03		3/8	45		
Colchicine	0.002	0.0005	0.0005		5/20	30		
Creosote	0.5	0.25	0.25		100/50	240		
Diamorphine Hydrochloride	0.01		0.0025	0.008	8/10	96	25/80	
Arsphenamine	0.6	0.3	0.2	0.4	4/6	80	3/4	90
Sulfonal	0.5	0.3	0.32	0.65	65/50	156	30/65	
Ephedrine Hydrochloride	0.1	0.025	0.015	0.05	5/10	60	25/50	60
Ergot	1		1	4	4/1	480	1/4	30
Eserine Salicylate	0.001	0.002	0.0006	0.002	2/1	240	2/2	120
Ethyl Morphine Hydrochloride	0.05	0.015	0.008	0.06	6/5	144	15/60	30
Belladonna Extract	0.03	0.015	0.01	0.02	2/3	80	15/20	90
Colchicum Extract	0.05		0.016	0.065	65/50	156	16/65	

TABLE XIX (Continued)

Pharmaceuticals	Codex	U.S.P.	Minimum U.S.D.	Maximum U.S.D.	Ratio Minimum Codex	Number in 1/120	Ratio Minimum Maximum	Number in 1/120
Ergot Extract	1	0.5	0.5		5/10	60		
Ipecac Extract	0.3	0.5	0.5	2	20/3	800	5/20	30
Hyoseyamus Extract	0.1	0.05	0.03	0.13	13/10	156	5/13	
Nux Vomica Extract	0.04	0.015	0.015	0.03	3/4	90	15/30	60
Opium Extract	0.1	0.03	0.01	0.06	6/10	72	3/6	60
Iron Arsenate	0.05		0.006	0.008	8/50		6/8	90
Guaiacol	0.5	0.5	0.3	0.6	6/5	144	5/6	100
Croton Oil	0.05		0.03	0.12	12/5	288	3/12	30
Hydrastinine	0.05	0.01	0.05	0.1	1/5	24	1/10	12
Iodine	0.02		0.005	0.065	65/20	390	5/65	
Iodoform	0.2		0.03	0.2	2/2	120	3/20	18
Ipecac	2	0.5	1	2	2/2	120	5/20	30
Hyoscyamus	0.2	0.2	0.12	0.3	3/2	180	2/3	80
Laudanum	2	0.6	0.3	0.6	6/20	36	6/6	120
Mercuric Chloride	0.015		0.0015	0.008	8/15	64	15/80	
Mercuric Iodide	0.02	0.004	0.003	0.005	5/20	30	4/5	96
Mercuric Cyanide	0.01		0.004	0.01	1/1	120	4/10	48
Mercurous Chloride	1	0.12	0.12	0.3	3/10	36	12/30	48
Mercurous Iodide	0.05	0.01	0.01	0.03	3/5	72	1/3	40
Morphine	0.02	0.01	0.005	0.016	16/20	96	10/16	75
Morphine Hydrochloride	0.02	0.008	0.005	0.03	3/2	80	8/30	32
Betanaphtol	1		0.12	0.3	3/10	36	12/30	48
Opium	0.2	0.06	0.03	0.2	2/2	120	6/20	36
Ovabain	0.001	0.00025	0.00025	0.0005	5/10	60	25/50	60
Papaverine Hydrochloride	0.05	0.1	0.06	0.2	2/5	48	1/2	60
Paraldehyde	5	4	2	6	6/5	144	4/6	80
Pelletierine	0.4		0.2	0.3	3/4	90	2/3	80
Phenyl Salicylate	1	0.3	0.3	1	1/1	120	3/10	36
Phenobarbital	0.2	0.03	0.015	0.12	12/20	72	3/12	30
Aminopyrine	2		0.3	1	1/2	60	3/10	36

TABLE XIX (Continued)

Pharmaceuticals	Codex	U.S.P.	Minimum U.S.D.	Maximum U.S.D.	Ratio Maximum Codex	Number in 1/120	Ratio Minimum Maximum	Number in 1/120
Phosphorus	0.001		0.0005	0.002	2/1	240	5/20	30
Pilocarpine Hydrochloride	0.02	0.005	0.003	0.006	6/20	36	5/6	100
Piperazine	0.3		0.3	0.6	6/3	240	3/6	60
Potassium Antimony Tartrate	0.1		0.0015	0.008	8/100		15/80	
Ipecac and Opium Powder	1	0.3	0.2	0.6	6/10	72	3/6	60
Ruta	0.5		0.6	2	20/5	480	6/20	36
Santonin	0.1	0.06	0.06	0.2	2/1	240	6/20	36
Scopolamine Hydrobromide	0.001	0.0005	0.0005	0.001	1/1	120	5/10	60
Sodium Nitrite	0.1		0.06		6/10	72		
Sodium Chlorate	1		0.3	1	1/1	120	3/10	36
Sodium Methylarsenate	0.1		0.02	0.06	6/10	72	2/6	40
Trinitrin Solution	0.1		0.06		6/10	72		
Sparteine Sulfate	0.1	0.03	0.01	0.12	12/10	144	3/12	30
Strychnine	0.005	0.0015	0.001	0.004	4/5	96	15/40	45
Strychnine Sulfate	0.006	0.002	0.001	0.004	4/6	80	2/4	60
Stramonium	0.25		0.06	0.2	20/25	96	6/20	36
Aconite Tincture	0.5	0.6	0.3	1	10/5	240	6/10	72
Belladonna Tincture	1	0.6	0.3	1	1/1	120	6/10	72
Cantharidis Tincture	0.5	0.1	0.06	0.2	2/5	48	1/2	60
Colchicum Tincture	1.5	2	0.6	2	20/15	160	2/2	120
Digitalis Tincture	1.5	1	0.3	2	20/15	160	1/2	60
Iodine Tincture	0.3	0.3	0.06	0.3	3/3	120	3/3	120
Hyoscyamus Tincture	1	2	2	4	4/1	480	2/4	60
Lobelia Tincture	1.5	1	0.6	2	20/15	160	1/2	60
Nux Vomica Tincture	1	1	0.6	2	2/1	240	1/2	60
Opium Tincture	2	0.6	0.3	0.6	6/20	36	6/6	120
Squill Tincture	1.5		0.3	2	20/15	160	3/20	18
Strophantus Tincture	0.5	0.5	0.2	0.5	5/5	120	5/5	120
Yohimbine Hydrochloride	0.01		0.005		5/10	60		
Zinc Phosphide	0.008		0.003		3/8	45		

TABLE XX

REPARTITION OF RATIOS WHICH COMPARE MINIMUM AND
MAXIMUM DOSES GIVEN BY THE *UNITED STATES DISPENSATORY
24th EDITION

TOTAL	>120	=120	<120	>60	=60	<60	>30	=30	<30
80		7	72						
72				13	17	42			
42							22	9	12
		7-1		3-5/6	17-1/2		1-6/13	9-1/4	1-16/65
				1-4/5			1-5/12		2-3/20
				3-3/4			2-2/5		2-3/15
				3-2/3			1-5/13		1-1/10
				1-5/8			1-3/8		1-1/13
				2-3/5			10-3/10		3-1/16
							1-2/7		1-2/15
							1-4/15		1-1/15
							3-1/3		

TABLE XXI

REPARTITION OF RATIOS WHICH COMPARE *UNITED STATES
DISPENSATORY 24 *MAXIMUM DOSES AND FRENCH CODEX VI
MAXIMUM FOR ONE DOSE

TOTAL	>240	=240	<240	>120	=120	<120	>60	=60	<60
88	11	9	58						
58				14	11	33			
33							22	6	15
	1-80	9-2		1-3/2	11-1		5-4/5	6-1/2	3-2/5
	1-16			4-4/3			2-3/4		2-3/8
	1-20/3			3-13/10			4-2/3		5-3/10
	1-6			6-6/5			10-3/5		2-1/4
	3-4						1-8/15		1-1/5
	1-13/4								1-4/25
	2-12/5								1-2/25
	1-7/3								

TABLE XXII

COMPARISON OF AMERICAN DAILY DOSES AND FRENCH
CODEX VI. MAXIMUM DOSES FOR TWENTY-FOUR HOURS

Pharmaceuticals	Calculated American daily dose	Codex Maximum for 24 hours	Ratio <u>daily</u> Maximum	Number in 1/120
Acetanilid	(0.2) 6-1.2	1	12/10	144
Aspirin	(0.3) 6-1.8	6	18/60	36
Aconite	(0.06) 6-0.36	0.15	36/15	288
Apomorphine	(0.005) 6-0.03	0.015	30/15	240
Arsenic Trioxide	(0.005) 6-0.03	0.015	30/15	240
Atropine	(0.0004) 6-0.0024	0.002	24/20	144
Caffeine	(0.2) 6-1.2	2	12/20	72
Calcium Hypophosphite	(0.5) 6-3	0.5	30/5	720
Carbon Tetrachloride	(2.5) 6-15	2.5	150/25	720
Chloral Hydrate	(0.6) 6-3.6	12	36/120	36
Cocaine	(0.015) 6-0.09	0.15	9/15	72
Codeine	(0.03) 6-0.18	0.3	18/30	72
Codeine Phosphate	(0.03) 6-0.18	0.4	18/40	54
Colchicine	(0.0005) 6-0.003	0.004	3/4	90
Creosote	(0.25) 6-1.5	1.5	15/15	120
Arsphenamine	(0.3) 6-1.8	0.6	18/6	360
Sulfenal	(0.3) 6-1.8	1	18/10	216
Digitalis	(0.1) 6-0.6	1	6/10	72
Ephedrine Hydrochloride	(0.025) 6-0.15	0.3	15/30	60
Eserine	(0.002) 6-0.012	0.003	12/3	480
Ethyl Morphine Hydrochloride	(0.015) 6-0.09	0.2	9/20	54
Belladonna Extract	(0.015) 6-0.09	0.1	9/10	108
Ergot Extract	(0.5) 6-3	5	3/5	72
Ergot Fluidextract	(2) 6-12	5	12/5	288
Hydrastis Extract	(2) 6-12	4	12/4	480
Ipecac Extract	(0.5) 6-3	0.3	30/3	12
Hyoscyamus Extract	(0.05) 6-0.3	0.3	3/3	120
Nux Vomica Extract	(0.015) 6-0.09	0.1	9/10	108
Opium Extract	(0.03) 6-0.18	0.3	18/30	36
Guaiacol	(0.5) 6-3	1.5	30/15	240
Hydrastinine	(0.01) 6-0.06	0.15	6/15	48
Ipecac	(0.5) 6-3	2	3/2	180
Hyoscyamus	(0.2) 6-1.2	0.6	12/6	240
Laudanum	(0.6) 6-3.6	6	36/60	72
Mercuric Iodide	(0.004) 6-0.024	0.04	24/40	72

TABLE XXII (Continued)

Pharmaceuticals	Calculated American daily dose	Codex Maximum for 24 hours	Ratio daily Maximum	Number in 1/120	
Mercurous Chloride	(0.12)	6-0.72	1	72/100	
Mercurous Iodide	(0.01)	6-0.06	0.2	6/20	36
Morphine	(0.01)	6-0.06	0.08	6/8	90
Morphine Hydrochloride	(0.008)	6-0.048	0.08	48/80	72
Opium	(0.06)	6-0.36	0.6	36/60	72
Quabain	(0.00025)	6-0.0015	0.003	15/30	60
Papaverine Hydrochloride	(0.1)	6-0.6	0.25	60/25	288
Paraldehyde	(4)	6-24	10	24/10	288
Phenyl Salicylate	(0.3)	6-1.8	6	18/60	36
Phenobarbital	(0.03)	6-0.18	0.5	18/50	
Philocarpine Hydrochloride	(0.005)	6-0.03	0.05	3/5	72
Ipecac and Opium Powder	(0.3)	6-1.8	4	18/40	54
Santonin	(0.06)	6-0.36	0.3	36/30	144
Scopolamine	(0.0005)	6-0.003	0.003	3/3	120
Sodium Arsenate	(0.003)	6-0.018	0.02	18/20	108
Sodium Hypophosphite	(0.5)	6-3	0.5	30/5	720
Sodium Cacodylate	(0.06)	6-0.36	0.2	36/20	216
Arsenic and Mercuric Iodides Sol.	(0.1)	6-0.6	1.5	6/15	48
Sparteine Sulfate	(0.03)	6-0.18	0.3	18/30	72
Strychnine	(0.0015)	6-0.009	0.015	9/15	72
Aconite Tincture	(0.6)	6-3.6	1.5	36/15	288
Belladonna Tincture	(0.6)	6-3.6	4	36/40	108
Cantharidis Tincture	(0.1)	6-0.6	1.25	60/125	
Colchicum Tincture	(2)	6-12	6	12/6	240
Digitalis Tincture	(1)	6-6	6	6/6	120
Iodine Tincture	(0.3)	6-1.8	3	18/30	72
Hyoscyamus Tincture	(2)	6-12	4	12/4	360
Lobelia Tincture	(1)	6-6	5	6/5	144
Nux Vomica Tincture	(1)	6-6	5	6/5	144
Opium Tincture	(0.6)	6-3.6	6	36/60	72
Strophantus Tincture	(0.5)	6-3	1.5	30/15	240
Thymol	(2)	6-12	4	12/4	360

TABLE XXIII

REPARTITION OF RATIOS WHICH COMPARE
 AMERICAN DAILY DOSES AND FRENCH CODEX VI
 MAXIMUM DOSES FOR TWENTY-FOUR HOURS

TOTAL	>240	=240	<240	>120	=120	<120	>60	=60	<60
67	13	6	48						
48				8	4	36			
36							21	2	13
	3-6	6-2		2-9/5	4-1		4-9/10	2-1/2	1-12/25
	2-4			1-3/2			2-3/4		3-9/20
	3-3			5-6/5			1-18/25		2-2/5
	5-12/5						15-3/5		1-9/25
									5-3/10
									1-1/10

TABLE XXIV

COMPARISON OF AMERICAN, FRENCH AND ENGLISH DOSES

Pharmaceuticals	English Minimum	English Maximum	French Maximum one dose	American Average one dose	Ratio Minimum codex	Number in 1/120	Ratio Minimum U.S.P.	Number in 1/120	Ratio Maximum Codex	
Aspirin	0.3	1	1	0.3	3/10	36	3/3	120	1/1	
Epinephrine	0.0001	0.0005	0.001		1/10	12			5/10	
Ammonium Diluted	0.6	1.2	1		6/10	72			12/10	
Apomorphine Hydrochloride	0.001	0.002	0.015	0.005	1/15	8	1/5	24	2/15	16
Silver Nitrate	0.008	0.016	0.03		8/30	32			16/30	64
Arsenic Trioxide	0.001	0.005	0.005		1/5	24			5/5	120
Arsenic Triiodide	0.004	0.016	0.005	0.005	4/5	96	4/5	96	16/5	384
Atropine	0.00025	0.001	0.001	0.0004	25/100	30	25/40	75	1/1	120
Belladonna	0.03	0.2	0.15		3/15	24			20/15	160
Caffeine	0.12	0.3	0.5	0.2	12/50		12/20	72	3/5	72
Carbon Tetrachloride	2	4	2.5	2.5	20/25	96	20/25	96	40/25	192
Chloral Hydrate	0.3	1.2	4	0.6	3/40	9	3/6	60	12/40	36
Chloroform	0.06	0.3	0.5		6/50				3/5	72
Cocaine and Hydrochloride	0.008	0.016	0.05	0.015	8/50		8/15	64	16/50	
Codeine and Phosphate	0.016	0.06	0.1	0.03	16/100		16/30	64	6/10	72
Creosote	0.12	0.6	0.5	0.25	12/50		12/25		6/5	144
Copper Sulfate	0.3	0.6	0.75		30/25	48			60/75	96
Diamorphine Hydrochloride	0.0025	0.008	0.01		25/100	30			8/10	96
Digitalis	0.03	0.1	1	0.1	3/10	36	3/10	36	1/10	12
Ephedrine Hydrochloride	0.016	0.1	0.1	0.025	16/100		16/25		1/1	120
Ergot	0.3	1	1		3/10	36			1/1	120
Belladonna Extract	0.015	0.06	0.03	0.015	15/30	60	15/15	120	6/3	240
Colchicum Extract	0.015	0.06	0.05		15/50	36			6/5	144

TABLE XXIV (Continued)

Pharmaceuticals	English Minimum	English Maximum	French Maximum one dose	American Average one dose	Ratio Minimum Codex	Number in 1/120	Ratio Minimum U.S.P.	Number in 1/120	Ratio Maximum Codex	
Ergot Fluidextract	0.6	1.2	1	2	6/10	72	6/20	36	12/10	---
Ipecac Extract	0.03	0.12	0.3	0.5	3/30	12	3/50		12/30	48
Hyoscyamus Extract	0.016	0.06	0.1	0.05	16/100		16/50		6/10	72
Nux Vomica Extract	0.06	0.2	0.04	0.015	6/4	180	60/15	480	20/4	600
Opium Extract	0.015	0.06	0.1	0.03	15/100	18	15/30	60	6/10	72
Guaiacol	0.3	0.6	0.5	0.5	3/5	72	3/5	72	6/5	144
Iodoform	0.03	0.2	0.2		3/20	18			2/2	120
Ipecac	1	2	2	0.5	1/2	60	10/5	240	2/2	120
Laudanum	0.3	2	2	0.6	3/20	18	3/6	60	2/2	120
Mercuric Chloride	0.002	0.004	0.015		2/15	16			4/15	32
Mercuric Iodide	0.002	0.004	0.02	0.004	2/20	12	2/4	60	4/20	24
Mercuric Chloride	0.03	0.2	1	0.12	3/10	36	1/12	30	2/10	24
Betanaphtol	0.3	0.6	1		3/10	36			6/10	72
Nux Vomica	0.06	0.25	0.1		6/10	72			25/10	300
Opium	0.03	0.2	0.2	0.06	3/20	18	3/6	60	2/2	120
Paraldehyde	2	8	5	4	2/5	48	2/4	60	8/5	192
Phenol	0.06	0.2	0.1		6/10	72			2/1	240
Antipyrin	0.3	0.6	2		3/20	18			6/20	36
Pilocarpine	0.003	0.012	0.02	0.005	3/20	18	3/5	72	12/20	72
Potassium Chlorate	0.3	0.6	1		3/10	36			6/10	72

TABLE XXIV (Continued)

Pharmaceuticals	English		French		American		Number Ratio		Number Ratio		
	Minimum	Maximum	Maximum	one dose	Average	Ratio	in	Minimum		in	Maximum
			one dose	one dose	one dose	U.S.P.	1/120	U.S.P.	1/120	Codes	
Resorcin	0.06	0.3	0.5	0.5	0.06	6/50	72	6/6	120	3/5	240
Santonin	0.06	0.2	0.1	0.1	0.06	6/10	72	6/6	120	2/1	48
Scull	0.06	0.2	0.5	0.5	0.06	6/50	72	6/6	120	2/5	60
Epinephrine Sol. 1/1000	0.12	0.5	1	1	0.06	12/100	12	6/6	120	5/10	120
Potassium Arsenic Solution	0.12	0.5	0.5	0.5	0.06	12/50	12	6/6	120	5/5	24
Mercuric Chloride Solution	2	4	20	20	0.06	2/20	12	6/6	120	4/20	24
Arsenic and Mercuric Iodides Sol.	0.3	1	0.5	0.5	0.06	30/50	72	3/1	360	10/5	240
Trinitrine Solution	0.03	0.12	0.1	0.1	0.06	3/10	36	3/1	360	12/10	144
Stramonium	0.03	0.2	0.25	0.25	0.06	3/25	48	20/15	160	20/25	96
Strychnine Hydrochloride	0.002	0.008	0.005	0.005	0.0015	2/5	48	20/15	160	8/5	192
Belladonna Tincture	0.3	2	1	1	0.6	3/10	36	3/6	60	2/1	240
Colchicum Tincture	0.3	1	1.5	1.5	2	3/15	24	3/20	18	10/15	80
Digitalis Tincture	2	6	1.5	1.5	1	20/15	160	2/1	240	60/15	480
Hyoscyamus Tincture	2	4	1	1	2	2/1	240	2/2	120	4/1	480
Lobelia Tincture	0.3	1	1.5	1.5	1	3/15	24	3/10	36	10/15	80
Nux Vomica Tincture	0.6	2	1	1	1	6/10	72	6/10	72	2/1	240
Opium Tincture	0.3	2	2	2	0.6	3/20	18	3/6	60	2/2	120
Scull Tincture	0.3	2	1.5	1.5	0.5	3/15	24	12/50	72	20/15	160
Strophantus Tincture	0.12	0.3	0.5	0.5	2	12/50	24	3/200	60	3/5	72
Thymol	0.03	0.12	0.5	0.5	2	3/50	24	3/200	60	12/50	160

TABLE XXV

REPARTITION OF RATIOS WHICH COMPARE ENGLISH MINIMUM
AND FRENCH MAXIMUM FOR ONE DOSE

TOTAL	>120	=120	<120	>60	=60	<60	>30	=30	<30
63	3	1	59						
59				10	2	47			
47							11	2	34
7									3/20

TABLE XXVI

REPARTITION OF RATIOS WHICH COMPARE ENGLISH MINIMUM
AND AMERICAN AVERAGE DOSES

TOTAL	>120	=120	<120	>60	=60	<60	>30	=30	<30
38	5	4	29						
29				10	8	11			
11							3	1	7
8					1/2				

TABLE XXVII

REPARTITION OF RATIOS WHICH COMPARE ENGLISH MAXIMUM
AND FRENCH MAXIMUM FOR ONE DOSE

TOTAL	>120	=120	<120	>60	=60	<60			
63	32	11	30						
30				16	2	12			
10				3/5					

CONCLUSION

Twenty per cent of the sixty-nine pharmaceuticals official in the United States Pharmacopoeia XIII and the National Formulary VIII follow the ratio three-tenths, and about fifty per cent vary between one-fourth and one-half of the Codex VI maximum for one dose, (Table V.). The same observation may be made concerning all the United States Pharmacopoeias average doses, and the French Codex VI maximum doses. Among 144 pharmaceuticals, twelve per cent follow the ratio three-tenths. fifty per cent vary between one-fourth and one-half, (Table VII).

Generally, United States Pharmacopoeias doses vary between one-fourth and one-half of the Codex VI doses and, more accurately the ratio three-tenths is the one which persists. The other fifty per cent of the pharmaceuticals deviating from the rule vary in proportion to their toxicity. In the order of the gram doses, (Table IX), among thirty-one pharmaceuticals, fifteen per cent follow the ratio three-tenths, while another fifteen per cent give the ratio two to one (double of the Codex VI doses).

In the order of the decigram doses, (Table XI), among forty-four pharmaceuticals, about eleven per cent follow the ratio three-tenths while fourteen per cent are similar to the French doses.

In the order of the centigram doses, (Table XIII), among twenty pharmaceuticals, twenty-five per cent follow the ratio three-tenths, fifteen per cent correspond to one-half of the French doses.

In the order of the milligram doses, (Table XV), among thirteen pharmaceuticals, only eight per cent follow the ratio three-tenths, while twenty-three per cent are similar to the French doses.

The curve in Figure number 3 shows that the percentage within the ratio three-tenths varies in inverse proportion with the toxicity of the drugs, except for the doses of the centigram in which the percentage of ratio three-tenths is greater than all the others and in which the greatest percentage of drugs (seventy per cent) varies between one-fourth and one-half of the French doses. Also it is shown, (Table XV), that the greatest percentage of American doses similar to the French ones is found in the order of the milligram.

The two lists of American maximum doses given by the two following non-official books do not give the same answer.

Pharmaceutical Therapeutics* shows that their average doses vary between the ratios three-tenths and

* See, Table XVI, XVII, XVIII.

one-half of their maximum doses in a range of two to ten, while the Pharmaceutical Therapeutics maximum doses vary between the unit and six-fifths of the Codex VI maximum in the same range of two to ten. It is a kind of verification. The American maximum doses are nearly equivalent to the French maximum for one dose; the range of variation is similar when the American average doses are compared to the American or French maximums.

The results given by the United States Dispensatory are different, (Table XIX). The average United States Pharmacopias doses are intermediate to the Dispensatory minimum and maximum doses. The ratios established between these two preceding doses still vary from three-tenths to one-half, (Table XX); so those maximum doses are certainly inferior to the ones given by Pharmaceutical Therapeutics. In fact, they vary around three-fifths of the Codex VI maximum for one dose, (Table XXI). Since the average United States Pharmacopias doses are equivalent to three-tenths of the Codex dose, it can be stated that United States Pharmacopias average doses are equal to one-half of the United States Dispensatory maximum doses.

After a comparison of average and maximum American doses to the Codex VI maximum for one dose, it is interesting to compare the American daily doses to the Codex VI maximum doses for twenty-four hours, (Table XVIII). As twenty per

cent of those ratios vary around three-fifths, the following conclusions can be made:

In all the foregoing calculations, the French Codex VI maximum for one dose has been taken as a unit.

Three kinds of doses then appear:

Codex VI maximum for one dose	- the unit
U.S.P. XIII average dose	- $\frac{3}{10}$ of the unit
American dose for 24 hours	- $\frac{3}{5}$ of the Codex VI maximum for 24 hours.

The American doses for twenty-four hours have been calculated as six times the average United States Pharmacopoeias doses and correspond to eighteen-tenths of the unit. That makes the Codex VI maximum for twenty-four hours three times greater than the Codex VI maximum for one dose. It has been established that:

Codex VI maximum for one dose	- $\frac{1}{3}$ of Codex VI maximum for 24 hours
U.S.P. XIII average dose	- $\frac{3}{10}$ of Codex VI maximum for one dose, or $\frac{1}{10}$ of Codex VI maximum for 24 hours.

To decide which is the most useful of all those doses, the study of a third pharmacopoeia is interesting.*

The minimum and maximum English doses have been studied and have shown that the minimum English doses vary around the ratio three-twentieths of the French maximum for one dose and one-half of the average United States

* See, Tables XXIV, XXV, XXVI, XXVII.

Pharmacopeias doses, while the maximum English doses correspond to the ratio three-fifths of the French maximum for one dose. Since the United States Dispensatory maximum doses are also in the ratio three-fifths of the French maximum for one dose, it has been established that the English minimum dose equals one half of the United States Pharmacopeias average dose and that the English maximum doses are similar to the United States Dispensatory doses.

SUMMARY

From all these calculations, the ratio three-tenths appears to be the best comparison between American and French official doses.

While the United States Pharmacopeia is interested in average doses and the French Codex in maximum doses only, the English Pharmacopeia makes both of them official, but keeps its standard a little closer to the American one.

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