Federal authorities should require the declaration of the fact that the foreign product is not sun-bleached but is "sulphur-bleached."

It is a curious commentary on the literature of the subject that no American work on Pharmacognosy that we have consulted (seven in all) makes any reference to "sulphur-bleached" chondrus, while no foreign authority that we have seen omits mention of the fact. The secret has been well kept so far as the American Drug Trade is concerned.

REFERENCES.

U. S. P. 1820 to 1920.
Foreign Pharmacopœias as mentioned in article.
1845, "Pharmacopœa Universalis" (Weimar).
1861, "Strumpf's Allgemeine Pharmacopœ."
1866, PROC. A. PH. A., 165.
1868, *A. J. P.*, 417.
1874, "Pharmacographia," Flückiger and Hanbury.
1886, *Pharm. Ztg.*, page 87.
1912, "Pharmacognosie," Tschirsch.
1916, "National Standard Dispensatory," Hare, Caspari, Rusby.
1921, "Origin and History of Pharmacopœial Vegetable Drugs, etc.," John Uri Lloyd.
1921, "Handbuch der Praktischen und Wissenschaftlichen Pharmazie," Hermann Thoms.
1922, *Biochem. J.*, 16, 577.
1923, "Marine Products of Commerce," Donald K. Tressler and collaborators.
1926, N. F. V.
1926, "United States Dispensatory," Wood and LaWall.

CONTRIBUTION FROM THE CONSULTING LABORATORY,
LAWALL AND HARRISSON, PHILADELPHIA.

THE BEHAVIOR OF ETHYL NITRITE IN COPAIBA EMULSIONS.*

BY W. G. CROCKETT, W. M. FRAYSER AND G. V. THOMPSON.

This work was undertaken for the purpose of investigating by means of the nitrometer, the rate of decomposition of ethyl nitrite in Copaiba Mixture, N. F. Preliminary experiments showed, however, that a surprisingly small volume of gas is evolved when 25 cc. of fresh Copaiba Mixture is shaken in a nitrometer with potassium iodide T.S. and diluted sulphuric acid. Other experiments showed that a marked deficiency in gas results when 4 cc. of spirit of ethyl nitrite is mixed with 21 cc. of water before introducing into the nitrometer, but that concordant and approximately theoretical results are obtained when 4 cc. of spirit of ethyl nitrite is pipetted into the nitrometer and followed by 21 cc. of water, and then the reagents.

Further work revealed that emulsions of copaiba, when introduced into a nitrometer containing spirit of ethyl nitrite, behave differently from emulsions of certain fixed oils under the same conditions. Due to the foregoing observations this investigation has been restricted chiefly to the action of copaiba emulsions on spirit of ethyl nitrite after introduction into the nitrometer. Two samples of copaiba were used and will be referred to as copaiba No. 1 and copaiba No. 2.

* Section on Practical Pharmacy and Dispensing, A. PH. A., Toronto meeting, 1932.

PROCEDURE.

Emulsions of copaiba were prepared and treated as follows: Quantities: Copaiba 12.5 cc., powdered acacia 3.5 Gm., water to make 100 cc. In each case 4 cc. of freshly assayed spirit of ethyl nitrite was pipetted into the nitrometer and followed, respectively, by 21 cc. of copaiba emulsion, 10 cc. of potassium iodide T.S., U. S. P. and 5 cc. of 10% sulphuric acid. The mercury was then withdrawn from the nitrometer by means of a stop-cock joined to the base, the contents mixed, the mercury readmitted and the reading taken after evolution had ceased. Withdrawal of the mercury was found necessary as some of it became emulsified when the contents of the nitrometer were mixed, thereby rendering accurate readings impossible. Results with copaiba emulsion are recorded in Table I.

TABLE I.—COPAIBA No. 1.

Experiment No.	Theoretical Yield Cc.	Yield Obtained Cc.	Recovery Per Cent.
1	35.45	25.4	71.6
2	35.45	25.6	72.2
3	35.45	24.8	69.9
4	35.45	25.4	71.6
5	32.9	23.9	72.6
6	32.9	27.6	83.9
7	32.9	25.6	77.8

Since results were far too low it was thought advisable to determine whether or not the degree of saturation of the copaiba was responsible for the deficiency. Accordingly, poppyseed oil, cottonseed oil and olive oil were chosen as oils representing different degrees of saturation. A 12.5% emulsion was made of each and the same quantities and procedure employed as previously described. Results are recorded in Tables II, III and IV.

TABLE II.—POPPYSEED OIL EMULSION.

Experiment No.	Theoretical Yield Cc.	Yield Obtained Cc.	Recovery Per Cent.
1	39.5	38.2	96.7
2	39.5	38.6	97.7
3	39.5	39.2	99.2
4	39.5	38.8	98.2
5	39.4	38.5	97.7
6	39.4	38.4	97.4
7	39.4	38.4	97.4
8	39.4	38.2	96.9

TABLE III.—COTTONSEED OIL EMULSION.

Experiment No.	Theoretical Yield. Cc.	Yield Obtained Cc.	Recovery Per Cent.
1	38.4	36.2	94.2
2	38.4	36.4	94.7
3	38.4	36.3	94.5
4	37.3	34.5	92.4
5	37.3	34.2	91.6
6	37.0	34.4	92.9
7	37.0	34.2	92.4
8	37.0	34.2	92.4
9	37.0	34.2	92.4

(Several determinations run previously on a 25% cottonseed oil emulsion without first withdrawing the mercury showed results varying from 80% to 96%.)

TABLE IV.—OLIVE OIL EMULSION.

Experiment No.	Theoretical Yield Cc.	Yield Obtained Cc.	Recovery Per Cent.
1	40.45	40.1	99.1
2	40.45	40.2	99.3
3	40.45	40.2	99.2
4	40.45	40.2	99.2

In order to investigate further the cause of low results obtained with ethyl nitrite-copaiba emulsions it was thought advisable to separate the oil from the resin and to prepare and assay emulsions made from each. Accordingly, some of the copaiba was distilled in a current of steam until no more oil passed over. The oil was separated from the distillate and made into a 12.5% emulsion with acacia. The resinous residue in the distilling flask was likewise made into a 12.5% emulsion with acacia. The same quantities and procedure were employed as described previously. Results with the oil emulsion are reported in Table V and with the resin emulsion in Table VI.

TABLE V.—COPAIBA NO. 1.—EMULSION OF COPAIBA OIL.

Experiment No.	Theoretical Yield Cc.	Yield Obtained Cc.	Recovery Per Cent.
1	26.5	19.5	73.5
2	26.5	18.8	70.9
3	26.5	20.5	77.3
4	26.5	20.0	75.4
5	47.4	32.0	67.5
6	47.4	30.2	63.7
7	47.4	30.0	63.2
8	47.4	29.4	62.0

TABLE VI.—COPAIBA NO. 1.—EMULSION OF COPAIBA RESIN.

Experiment No.	Theoretical Yield Cc.	Yield Obtained Cc.	Recovery Per Cent.
1	47.4	23.6	49.7
2	47.4	25.6	54.0
3	47.4	25.7	54.2
4	47.4	27.6	58.2

At this stage of the work another sample of copaiba was procured, and this sample, "copaiba No. 2," was used in all experiments which follow. It was purchased two years after the sample used in the preceding investigation. The work which follows was carried out for the purpose of (1) comparing results on two different samples of copaiba, and (2) investigating the effect of using more concentrated reagents. An emulsion was prepared and treated according to the procedure used for Table I. Results are recorded in Table VII. "S. S." indicates saturated solution.

TABLE VII.—COPAIBA NO. 2.

Experiment No.	KI.	Sulphuric Acid.	Theoretical Yield Cc.	Yield Obtained Cc.	Recovery Per Cent.
1	10 cc. T. S.	5 cc. 10%	46.4	26.6	57.3
2	10 cc. T. S.	5 cc. 10%	43.2	24.2	50.6
3	10 cc. T. S.	5 cc. 10%	43.2	25.4	58.8
4	10 cc. T. S.	5 cc. 10%	42.6	22.2	52.1
5	10 cc. S. S.	10 cc. 30%	46.4	36.4	78.4

TABLE VII.—*Continued.*

Experiment No.	KI.	Sulphuric Acid.	Theoretical Yield Cc.	Yield Obtained Cc.	Recovery Per Cent.
6	10 cc. S. S.	10 cc. 30%	46.4	35.6	76.7
7	10 cc. S. S.	10 cc. 30%	43.2	31.8	73.6
8	10 cc. S. S.	10 cc. 30%	43.2	30.6	70.8
9	10 cc. S. S.	10 cc. 30%	43.4	31.8	73.2
10	10 cc. S. S.	10 cc. 30%	43.4	35.0	80.6

Experiments 1 to 4 show a much smaller yield than was obtained with copaiba No. 1, Table I. Experiments 5 to 10 show an increase in yield when more concentrated reagents are used. It was thought that the deficiency in nitric oxide might result from oxidation of nitrous acid to nitric acid by certain substances in the copaiba, and that the presence of hydriodic acid in the copaiba emulsion might prevent this oxidation. Accordingly, more determinations were carried out in which the following order of mixing was employed: Twenty-one cc. of copaiba emulsion were mixed with the solutions of potassium iodide and sulphuric acid, outside the nitrometer, and this mixture introduced into the nitrometer, following the 4 cc. of spirit of ethyl nitrite. Results are recorded in Table VIII.

TABLE VIII.—COPAIBA NO. 2.

Experiment No.	KI.	Sulphuric Acid.	Theoretical Yield Cc.	Yield Obtained Cc.	Recovery Per Cent.
1	10 cc. T. S.	5 cc. 10%	42.8	38.4	89.7
2	10 cc. T. S.	5 cc. 10%	41.8	38.0	90.9
3	10 cc. T. S.	5 cc. 10%	41.8	38.0	90.9
4	10 cc. S. S.	10 cc. 30%	43.4	41.6	95.8
5	10 cc. S. S.	10 cc. 30%	43.4	41.4	95.4
6	10 cc. S. S.	10 cc. 30%	42.8	41.2	96.3
7	10 cc. S. S.	10 cc. 30%	41.8	40.8	97.6

A blank run on the copaiba emulsion and concentrated reagents showed the formation of 0.8 cc. of gas.

SUMMARY AND CONCLUSIONS.

When 4 cc. of spirit of ethyl nitrite is mixed with 21 cc. of water outside the nitrometer and the mixture assayed immediately, there is a marked deficiency in the gas evolved. When the spirit is pipetted into the nitrometer and followed by 21 cc. of water and then the reagents, approximately the theoretical yield of gas is obtained. When 4 cc. of the spirit is pipetted into the nitrometer and followed in order by 21 cc. of 12.5% emulsion of copaiba, 10 cc. of potassium iodide T.S. and 5 cc. of 10% sulphuric acid, a marked deficiency in gas is observed. One sample of copaiba (copaiba No. 1) showed a percentage recovery varying from 69.9% to 83.9% while another sample (copaiba No. 2) varied from 50.6% to 58.8%.

Emulsions of poppyseed oil, cottonseed oil and olive oil, when treated in the same way, showed average percentage recoveries of 97.6%, 93.0% and 99.2%, respectively. The fact that unsaturated fixed oils yield approximately theoretical results, indicates that the unsaturation of copaiba is not responsible for the discrepancy.

When copaiba No. 1 was distilled in a current of steam and emulsions were made of the oil and resin, respectively, the oil emulsion showed an average re-

covery of 69.2% and the resin emulsion 54.0%, which indicates that the substance responsible for the low yield is present in both the oil and the resin.

Emulsions of copaiba No. 2, which formerly gave an average recovery of 52.2%, were reassayed using 10 cc. of saturated solution of potassium iodide and 10 cc. of 30% sulphuric acid. The average recovery was then found to be 75.5%. When these same emulsions were assayed again by introducing 4 cc. of the spirit into the nitrometer and following it with a mixture of: Twenty-one cc. copaiba emulsion, 10 cc. saturated solution of potassium iodide and 10 cc. of 30% sulphuric acid, the average yield was found to be 96.3% and results checked more closely than before. Since the presence of a reducing agent, hydriodic acid, in copaiba emulsion increases the yield, it would seem that oxidation is at least in part responsible for low results. No work has been done toward investigating the cause for increased yield when more concentrated reagents are used.

MEDICAL COLLEGE OF VIRGINIA,
SCHOOL OF PHARMACY,
RICHMOND, VA.

ABSTRACTS OF PAPERS, SCIENTIFIC SECTION.

The following papers were presented by James C. Munch for himself and co-workers, summarized by brief statements regarding the work in each of them:

"Bioassay of Propadrin Solutions," by James C. Munch, Walter H. Hartung and Thomas S. Githens.—A number of methods have been studied quantitatively for the bioassay of Propadrin (phenyl-propanol-amine-hydrochloride). It has been found possible to obtain results agreeing within 20% by following the effect upon the blood pressure of anesthetized dogs. Various details which play an important rôle in the assay are discussed.

"The Effect of Variations in Alcohol Content upon the M. S. D. of Digitalis and Allied Drugs," by James C. Munch and Arnold Quici.—U. S. P. X requires that dilutions of Digitalis and similar drugs shall not contain more than 20% of alcohol when injected into the ventral lymph sac of frogs. Our investigations have shown, that no essential or consistent differences are obtained provided the alcohol content does not exceed 30%. Since tincture of digitalis contains approximately 70% of alcohol this obviates the necessity for concentrations and re-dilution of tincture of digitalis in making U. S. P. assays.

"The Electrocardiographic Study of Snake Venoms," by Jose Zozaya, James C. Munch and Joseph B. Wolffe.—The acute action of various snake venoms upon the electrocardiographic and respiratory action of dogs has been followed. Some work has been undertaken upon chronic poisoning by rattle snake venom. It is found that different venoms differ greatly in their pharmacodynamic activity.

"The Seasonal Variation in M. S. D. of Ouabain," by James C. Munch. Results obtained in a collaborative study by twelve laboratories, during 1932, confirmed the seasonal variation in the M. S. D. of Ouabain by the U. S. P. X one-hour frog method. Results obtained in the summer were numerically larger than those obtained in the winter. However, this seasonal variation does not effect the validity of Ouabain as a reference standard. It is recommended that the present value of 0.5 mg. of Ouabain per kilo be retained in U. S. P. XI.

"The Effect of Brucine on the Toxicity of Strychnine," by James C. Munch and Harry J. Pratt.—The toxicity of strychnine and of brucine, as well as various proportions of these alkaloids, has been determined upon earthworms, goldfish, mice, rats, guinea pigs, rabbits, cats and dogs. In addition the minimum concentrations possessing just detectable bitterness have been determined on a number of men. It has been found that the presence of brucine alters the toxicity of strychnine. In general the toxicity is increased. The determination of total alkaloids in nux vomica and its preparations is not a suitable index of physiological activity, nor is the determination of strychnine alone, unless a constant proportion exists between strych-