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THE OPIUM RESEARCH PROGRAMME

Note by the Secretary-General

1. The Commission on Narcotic Drugs[1/] at its ninth session reviewed the programme of scientific research on opium and made recommendations to the Council regarding the future programme of work in this field. At its 18th session the Council adopted resolution 548 D (XVIII) which after reaffirming the importance attached to United Nations research on methods for determining the origin of opium and concluding that the best way of resolving differing points of view and obtaining the widest possible agreement is through the medium of further research, requested governments to provide samples of opium produced either licitly or illicitly within their territories and also samples of opium seizures from the international illicit traffic, and instructed the Secretary-General to request such samples from governments and to develop further the opium research of the Secretariat, in particular to increase the number of analyses, deferring for the time being other laboratory work except that having a direct connexion with the problem of determining the origin of illicit opium. The Council also considered that it would be very useful to set up a United Nations narcotics laboratory, and referred the question of the laboratory to the General Assembly.[2/]

1/ E/2606, paragraphs 95-105.

2/ Report of the Division of Narcotic Drugs, E/CN.7/289, paragraphs 27 to 35.

Receipt and distribution of opium samples

2. Contributions of opium by governments and distribution of opium samples during the period to which the Report of the Division of Narcotic Drugs refers have been mentioned in the report (E/CN.7/289 and Add.1).

3. A summary of the receipt of samples by the Secretariat for the whole period of the research programme up to 1 March 1955 is given in Annex A, together with mention of the countries which have promised samples in the new campaign, up to that date. The distribution of the opium sent by producing countries for this purpose is shown in Annex B for the same period.

4. It will be seen that the situation with respect to samples has improved considerably since it was considered by the Committee of Chemical Experts (Council resolution 477 (XV)). Samples from India, Iran and Turkey will cover all producing districts in those countries. The most important gaps noted by the Committee pertained to Mexico and southeastern Asia. Samples have been received from the Government of Mexico as well as samples of seized opium coming from Mexico furnished by Guatemala and the United States. In the case of southeastern Asia, to supplement the samples formerly available from Laos and Viet-Nam seizure samples have been received from Singapore, and additional samples are promised from Burma, Singapore, and Thailand.

5. Before the meeting of the Committee of Chemical Experts, samples were contributed directly by fifteen countries. Since that time, samples have been contributed or promised by twenty-two countries (including, of course, most of the same producing countries which had previously generously contributed their own opium in some quantity for distribution to scientists). In all, samples have been contributed directly or promised by twenty-seven countries. Six other countries have indicated that they will furnish samples if appropriate seizures are made. (See Annex A).

Research Activities

Role of the Secretariat

6. The Secretariat has led the research in developing a set of methods for ascertaining the origin of opium by macro and micro observations and alkaloidal

analyses. The Secretariat also acts as a clearing house for the receipt of opium samples and their distribution to the other scientists, and for the receipt and publication of papers on the results and findings of the research.

7. Pending the establishment of a United Nations laboratory it has naturally not been practicable for the Secretariat to increase appreciably the amount of analyses. However, narcotine and morphine analyses have been nearly completed for all the available samples, and all new samples are now being run for microscopic test and morphine, codeine, narcotine, and porphyroxine values.

8. The Secretariat's research programme on opium has been carried out with the aid of the material facilities generously provided by the Government of the United States of America.

Role of Co-operating Scientists

9. Scientists of fifteen countries, nominated by their governments and working in their home countries, co-operate in the research. They have devised their own methods of analysing opium and have also tried out some of the methods proposed by the Secretariat. Some, in particular the Canadians, have set up sets of methods by which origin can be determined.

10. Since the last Progress Report (E/CN.7/264/Add.1), papers by scientists from Canada, China, Germany, Greece, India, Japan, and Norway have been received and issued in Series K.[3/] Additional information has been received from Dr. Farmilo, Canada; Mr. Krishnan, India; Mr. Asahina, Japan, and Dr. Small, United States of America.

Two Aspects of the Laboratory Research

11. Laboratory research on methods for determining the origin of seized opium has two aspects. One is the development of tests or methods for the analysis of opium; the other consists in accumulating data on samples of different origins and in establishing correlations between analytical values and origins, in order to be able to make determinations of the origin of seizures.

3/ Documents in the series ST/SOA/SER.K...; listed consecutively in Annex C.

12. The research during the past year under these two aspects is discussed in the following paragraphs 13 to 20 and 21 to 28. References to unpublished work both by the Secretariat and by co-operating scientists are included. The same paper may be referred to under both headings, if it relates to development of methods of analysis and also to studies of the correlation of analytical data with origin.

Development of methods of analysis

(a) By the Secretariat

13. In studying the alkaloidal composition of opium, the Secretariat has endeavoured to determine the true percentages of the chief alkaloids in different types of opium. A comparison of certain disagreements between different methods disclosed that a major source of difficulty lay in the extraction of the alkaloids from the solid opium which is the first step in most methods. Disintegration of the opium with glacial acetic acid, followed by dilution with water, has been shown to yield a more effective solution of all the alkaloids than preceding methods which employed a single extraction method. (ST/SOA/SER.K/33).

14. Using acetic-acid extraction, and methods of separation worked out by the Secretariat, a "unified analysis" was developed, by which virtually all the alkaloidal material of a given sample of opium can be accounted for as the following alkaloids or groups: (1) morphine, (2) minor phenolic alkaloids, (3) codeine plus cryptopine, (4) unknown minor base, (5) thebaine, (6) papaverine, (7) narcotine. (ST/SOA/SER.K/34). Results are generally higher than by preceding methods and except for morphine percentages (which in certain cases may be too high) the results are believed to be more accurate than heretofore.

15. The Secretariat has also studied methods of determining the insoluble residue and the proportion of non-alkaloidal material of opium dissolved by petroleum ether. Methods for these determinations have been improved.

16. To examine more samples, faster methods are required. For this purpose the Secretariat has developed a rapid precipitation method for narcotine, based on the Nicholls and Kellett method of ST/SOA/SER.K/5. A rapid "short method" for morphine has also been devised and can be combined with the Secretariat's methods for codeine and porphyroxine (ST/SOA/SER.K/4 and E/CN.7/202), which increases its value for collecting data on new samples.

Development of methods of analysis

(b) By contributing scientists

17. The determination of the true content of the major alkaloids was also studied by Dr. Liang in ST/SOA/SER.K/26. Greater accuracy in the determination of morphine by precipitation and the combination of codeine determination with that of morphine were reported by Mr. Asahina and Mr. Shiuchi in ST/SOA/SER.K/32. Observations on the determination of morphine were also made by Prof. Bruchhausen in ST/SOA/SER.K/29. A preliminary study of the possibility of rapid determinations of some of the alkaloids by means of infra-red spectrophotometry was made by Prof. Jermstad and J. Lothe in ST/SOA/SER.K/24.

18. A method of applying paper chromatography to distinguish qualitative differences between opium samples was studied by Dr. Panopoulos and Mr. Vassiliou (ST/SOA/SER.K/27). Recently methods of quantitative chromatography have been developed at the British Government Laboratory under the direction of Dr. Nichols.

19. The ash analyses by Mr. Bartlet and Dr. Farmilo (ST/SOA/SER.K/30) generally followed standard methods of inorganic analysis and spectroscopy, but basic studies had to be made to apply them effectively to opium ash, and in particular to obtain the actual percentages of the various constituents.

20. Dr. Farmilo is now developing analyses by electrophoresis (electrophoretograms on paper). No details of the method have been received at this date.

Studies of the Correlation of Analytical Data with Origin

(a) By the Secretariat

21. The graphical presentation of alkaloidal analyses of opium samples and the correlation with origin of comparisons between the resultant curves were discussed in ST/SOA/SER.K/31 and K/31/Add.1. The differentiation of Indian and Iranian samples by means of thebaine-papaverine analyses was also included.

22. Preliminary observations by the Secretariat and scientists of Turkey (not published) and India (ST/SOA/SER.K/25) had indicated that, in spite of liability to disturbance by adulteration, useful information might be gained from the

percentages of insoluble matter and of fatty substances soluble in petroleum ether. Additional research undertaken by the Secretariat showed, however, that with more accurate methods some of the differences noted between samples of different origin tended to diminish or become less definite. These determinations may still have some value, but in general do not seem to give clear distinctions for origin determinations.

23. Determinations of narcotine and morphine have been made on numerous samples. The morphine values are largely used as a basis for computing ratios and making allowance for possible adulteration. The older samples had been previously examined for codeine and porphyroxine, and the new data therefore make new comparisons possible by means of the narcotine and morphine percentages, and the ratios of narcotine, codeine, and porphyroxine to morphine. Charts correlating the data with origins have been prepared by the Secretariat but not yet published.

Studies of the Correlation of Analytical Data with Origin

(b) By contributing scientists

24. Analyses for various alkaloids in the government laboratories of India, Japan, and Turkey, which have not all been published in Series K, have indicated that even though the methods are different, similar results to those of the Secretariat are obtained if charts are made of narcotine against morphine percentages, codeine:morphine ratio against narcotine:morphine ratio, etc.

25. Using both standard methods and some of the methods suggested in earlier papers (E/CN.7/117 and ST/SOA/SER.K/2 for microscopic test, ST/SOA/SER.K/20 for codeine, ST/SOA/SER.K/7 for narcotine and meconic acid) Indian scientists, (Messrs. T.S.T. Chari, C. Parthasarthy, N. Rajagopolan, and K.S. Subramanian) carried out a study of correlation of data with origin on the samples that they had received from the United Nations (ST/SOA/SER.K/25). Although only tentative conclusions were drawn from the limited number of samples, the results so far tend to confirm those of the Secretariat.

26. The paper chromatography of samples supplied by the United Nations, carried out by Dr. Panopoulos and Mr. Vassiliou, indicated that certain distinctions of origin could be observed (ST/SOA/SER.K/27). Some recent observations by Prof. Jermstad (not published) have led to a similar conclusion, although the

chromatograms are not the same. The extensive chromatographic analyses of Dr. Nichols may also show correlations with origin, but no details are yet available.

27. A preliminary study of the correlation of spectrographic data on the ash of opium was carried out by Prof. Jermstad and Tor Waaler of Norway (ST/SOA/SER.K/23).

28. J.C. Bartlet and C. Farmilo (Canada) made a thorough study of analyses of the ash both for major and minor constituents and developed a set of methods for determining origin by means of ash analyses (ST/SOA/SER.K/30). They successfully applied their ash methods, together with methods developed by the Secretariat, to the identification of the origins of twenty "unknowns" (ST/SOA/SER.K/28).

29. Thirty additional "unknowns" have been sent to Dr. Farmilo and Mr. Bartlet for further trials. Most of these were of origins known to the Secretariat, but they included some new types and some seizures of uncertain origin. Not all of them have been reported yet. Thus far, including the first set of "unknowns", Dr. Farmilo and Mr. Bartlet have reported on thirty-five samples of known origin produced in countries from which previous samples have been examined, with only one incorrect conclusion regarding origin, on a sample which was stated to be "not typical by either set of methods".

ANNEX A

Receipt of Opium Samples by the United Nations

A collection of opium samples was turned over to the Secretariat by the United States Government for research purposes in the latter part of 1949. These samples numbered about ninety, of which eighty-five could be identified as to origin.

This collection had been assembled by the United States in preparation for studies on determining the origin of opiums, and included samples turned over to United States authorities by the following countries for this purpose:

India - 16 samples, representing production in different states and provinces.

Iran - 7 samples, representing production in different provinces.

Mexico - 1 sample (illicit prcduction)

Peru - 1 sample (illicit production)

Turkey - 7 samples, representing production in different provinces.

Yugoslavia - 1 sample.

Other samples represented legal imports into the United States, seizures, and samples obtained by the United States occupation authorities in Japan and Korea.

In the United Nations programme the Secretariat requested and received opium samples as indicated in the following tabulations.

Samples from Opium-producing Countries

Country	Amount	Designation*	Received
China (illicit production)	6 kg	UN 37 A - D	1951
France for Laos	8 kg	UN 26 A - C, UN 27 A - B	1950
France for Viet-Nam	5 kg	UN 28 a - p	1950
Greece	7 kg	UN 25 a - j	1950
India	12 kg	UN 34 - 36	1951
India	12 kg	UN 59 - 62	1952
Iran	6 kg	UN 47 - 52	1951
Japan (Korean opium)	6 kg	UN 58 A - G	1952
(This opium was originally produced in Korea while it was part of the Japanese empire)			
Korea (illicit production)	6 kg	UN 16 - 17	1950
Korea (illicit production)	6 kg	UN 83 A - F	1953
Mexico (illicit production)	1 kg	UN 97 - 98	1954
Pakistan	8 kg	UN 68	1952
Pakistan	8 kg	UN 100	1954
Turkey	48 kg	UN 1 - 15	1950
(Samples UN 1-14 each consisted of several separate lumps so that actually there were 60 samples representing the production of 14 different provinces, and the export opium.)			
Turkey	8 kg	UN 29 - 31	1950
Yugoslavia	6 kg	UN 24 a - k	1950
Yugoslavia	15 kg	UN 38 a - q	1951

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* The symbols given under the heading "Designation" constitute references used by the Secretariat to identify individual opium samples, the capital letters applying to large lumps and the small letters to small pieces.

Samples from Other Countries

Country	Designation	Received
Denmark	UN 113	1955
France	UN 39, 45, 46, 54	1951
France	UN 56, 66	1952
France	UN 87, 90	1954
Guatemala	UN 112 A-C	1955
United Kingdom (for Singapore)	UN 105 to 110	1955
United States	UN 18-23, 32-33	1950
United States	UN 40-44, 53	1951
United States	UN 55, 57, 63-65, 67, 69-75	1952
United States	UN 76-82, 84-85	1953
United States	UN 86, 88-89, 91-96, 99, 101-104	1954
United States	UN 111	1955

The samples contributed by the United States included certain seizures made in other countries and transmitted by the United States Narcotics Bureau in collaboration with the narcotics authorities of the seizing countries. Thus UN 55, 69, 72 and 80 represent seizures made in Rotterdam, Hamburg, Trieste, and Quito respectively, and samples UN 92 and 99 represent seizures made in Italy.

Samples Promised in the New Campaign

In the new campaign, in addition to samples already received, replies promising samples of their own opium have been received from the following countries:

Burma	Korea
Ecuador	Nepal
India	Pakistan
Iran	Turkey
Japan	Yugoslavia

Samples of seizures from the international illicit traffic have been promised by:

France
Iraq
Lebanon
Philippines
Syria
Thailand
United Kingdom (for Singapore)
United Kingdom (for other territories)
United States

The following countries have indicated that they will send samples if any important seizures should be made:

Australia
Austria
Brazil
Ireland
New Zealand
Union of South Africa

DISTRIBUTION OF UNITED NATIONS OPIUM SAMPLES*

	Austria	Canada	China	Denmark	France	Germany	Greece	India	Israel	Japan	Netherlands	Norway	Turkey	U. K.	U. S. A.	Left in stock
China UN 37	B	B, C, D		B	C		B	B, C, D	C	B	A	D	B	C, D	B, C, D	D
Greece UN 25	d	x, g	e h	x	e	e, f		x, h, i	x	g	x	x, g		j, k	a, j	X
India UN 34	U	U	U	U	U		U	*	U	U	U	U	U	U	U	
UN 35	U	U	U	U	U		U	*	U	U	U	U	U	U	U	
UN 36	U	U	U	U	U		U	*	U	U	U	U	U	U	U	
UN 59		U	U							U				U	U	U
UN 60		U	U							U				U	U	U
UN 61		U	U							U				U	U	U
UN 62		U	U							U				U	U	U
Iran UN 47		U	U					U		U		U	U	U	U	
UN 48		U	U					U		U		U	U	U	U	
UN 49		U	U					U		U		U	U	U	U	
UN 50		U	U					U		U		U	U	U	U	
UN 51		U	U					U		U		U	U	U		
UN 52		U	U					U		U		U	U	U	U	

* The symbols used in this tabulation refer to the designations employed in the tabulations in Annex A (see footnote 1 in this Annex). In addition, the capital letter U indicates that the opium in question was uniform, so that all the samples distributed under one number are essentially the same; the small x indicates small pieces distributed without the Secretariat giving them separate designations and retaining portions for control purposes; and the large X indicates that various undesignated small pieces are still in stock.

		Austria	Canada	China	Denmark	France	Germany	Greece	India	Israel	Japan	Netherlands	Norway	Turkey	U. K.	U. S. A.	Left in stock
Korea	UN 16	U	U	U	U	U		U	U	U	U	U	U	U	U	U	U
	UN 17	U	U	U	U	U		U	U	U	U	U	U	U	U	U	
	UN 58		C, E, F	A, B, C, D					A, B, C, E, F						A, B, C, G	A, B, C	A, B, C, G
	UN 83		A, D						A, C, D		A				A, C, E	C, F	A, C, E
Laos	UN 26	B	A, B	A, B	A	B		A	A, B	A	B	A	A, B	A	B, C	B	B
	UN 27	B	A, B	B	A	B		B	A, B	A	B	A	A, B	A	A, B	B	B
Mexico	UN 97		U												U		U
	UN 98		U												U		U

		Austria	Canada	China	Denmark	France	Germany	Greece	India	Israel	Japan	Netherlands	Norway	Turkey	U. K.	U. S. A.	Left in stock
Pakistan	UN 68		U	U					U		U				U	U	U
	UN 100		U		..										U	U	U
Turkey	UN 1	C	A, D, E, F	C, D	C			C	B, D, E, F	C	D, E	B	B, C, G		A		
	UN 2	B	A, B, C	B, C	B	B		B	A, B, C	A	B, C	A	B, C		C	C	C
	UN 3	B	A, B, C, D	C, D	B	B		B	A, D	A	B, C, D		B, C		A		
	UN 4	B	B, C, D	B, D	A	C		B	B, C, D	B	C	B	A, C		D	D	D
	UN 5	B	A, C, D	C, D	B	B		B	B, C	C	C, D	B	B, D		C	C	C

	Austria	Canada	China	Denmark	France	Germany	Greece	India	Israel	Japan	Netherlands	Norway	Turkey	U. K.	U. S. A.	Left in stock
Turkey																
UN 6	B	A, C, D, E	C, D	A	B		B	A, D, E	B	C, D	A	A, B		D, E		
UN 7	B	B, C, D	C, D		C		C	B, C	B	D	A	A, D		C	C	C
UN 8	B	B, C	C	B	B		B	B, C	B	B, C	B	B, C		C	C	C
UN 9	B	A, B, D	B, C	B	B		B	A, B, C, D	B	B, C	A	B, D		B		
UN 10	B	A, C	C	B	B		B	B, C	B	C	A	A, B		C	C	C
UN 11	B	A, B, C	B, C	B	C		B	A, B, C	A	B, C	A	B, C		B		B

	Austria	Canada	China	Denmark	France	Germany	Greece	India	Israel	Japan	Netherlands	Norway	Turkey	U. K.	U. S. A.	Left in stock
Turkey UN 12	C	B, E, F	D, E, F	B	C		C	B, E, F	B	D, E, F	A	B, C		E, F	F	
UN 13	B	A, C	A, C	B	C		B	B, C	B	B, C	B	B, C		C		C
UN 14	C	B, D, E	C, D, E	B	C		C	B, E	C	D, E	B	B, D		A	D	
UN 15	U	U	U	U	U	U	U	U	U	U	U	U		U	U	U
UN 29								A, B				B				A, B
UN 30					U			U				U				U
UN 31		U						U				U				U

	Austria	Canada	China	Denmark	France	Germany	Greece	India	Israel	Japan	Netherlands	Norway	Turkey	U. K.	U. S. A.	Left in stock
Vietnam UN 28	k	x, g, j, o, p	g, j, m, o	d	i		e	x, j, m	x	x, g, o	x	c, f	x	j, m, n, o	a, b, o	
Yugoslavia UN 24	x	x	x	x	x		x	x, j, k	x	x	x	x	x	j	j	X
UN 38	c	m	x, m	x	c	d, e, f	c	x, n, o, p, q	x	x, m		x		n	a	X

This table shows that the samples supplied by opium-producing countries have been distributed among co-operating scientists of fifteen nations. In addition, portions of some other samples not in sufficient supply for the more general distribution, have been sent to some of the scientists active in the programme in Canada, India, Norway, United Kingdom, and United States of America.

ANNEX C

Since the last progress report, the following papers have been issued in Series K (the first six of them were however available to the last session of the Commission):

ST/SOA/SER.K/23 - "Preliminary Analyses of Ash from Different Kinds of Opium". By Prof. A. Jermstad and Mr. Tor Waaler, The Pharmaceutical Institute of Oslo University, Oslo, Norway.

ST/SOA/SER.K/24 - "Preliminary Report on the Quantitative Determination of Some Opium Alkaloids by means of Infra-Red Spectrophotometry". By Prof. A. Jermstad, the Pharmaceutical Institute of Oslo University, and J. Lothe, The Central Institute for Industrial Research, Oslo, Norway.

ST/SOA/SER.K/25 - "A Preliminary Investigation of Methods for Determining the Origin of Opium". By T.S.T. Chari, C. Parthasarthy, N. Rajagopolan, and K.S. Subramanian, Central Revenues Control Laboratory, Government of India.

ST/SOA/SER.K/26 - "A Systematic Determination of the Principal Alkaloids in Raw Opium". By C.K. Liang, Director, Narcotics Bureau, Taipei, Taiwan, China.

ST/SOA/SER.K/27 - "A Study of Paper Chromatography". By Dr. George Panopoulos, General Director, and Mr. A. Vassiliou, General Chemical States Laboratory, Athens, Greece.

ST/SOA/SER.K/28 - "Trials of Unknown Opiums by Canadian Scientists for Origin Determinations". (A report by the Secretariat showing the results of the Canadian trials).

ST/SOA/SER.K/29 - "Observations on the Determination of the Morphine Content of Raw Opium". By Prof. F. von Buchhausen, Director of the Institute of Pharmaceutical Chemistry of the Technical College, Brunswick, Germany.

ST/SOA/SER.K/30 - "The Determination of Countries of Origin of Opium Samples by means of the Composition of the Opium Ash." By J.C. Bartlet and C. Farmilo, Food and Drug Laboratories, Ottawa, Canada.

ST/SOA/SER.K/31 - "Graphical Comparison of Analyses of Opium Samples"; Add.1 - "Annex A - Charts". (Secretariat)

ST/SOA/SER.K/32 - "Determination of Morphine and Codeine in Opium". By Haruyo Asahina and Yoshihiko Shiuchi, National Hygienic Laboratory, Tokyo, Japan

ST/SOA/SER.K/33 - "Researches on Extracting the Alkaloids from Solid Opium" (Secretariat)

ST/SOA/SER.K/34 - "A Unified Analysis of Opium for Alkaloids". (Secretaria

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