LEAD AND OTHER CONTAMINANTS OF TWO SOUTH ASIAN COSMETICS: THE USE OF *SURMA* AND *KAJAL* AMONG SOUTH ASIAN IMMIGRANTS IN WINNIPEG

BY

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ABSTRACT

A body of research suggests that the eye cosmetic *Surma* poses a threat to the health of its users. In particular, *Surma* is frequently found to contain a high percentage of lead in the form of galena (PbS). The South Asian population of Winnipeg, Canada was the target population for this examination of the use and safety of *Surma* and *Kajal*, a similar substance.

The goals of the research were to determine the extent of *Surma* and *Kajal* use in Winnipeg, to identify their contents and contaminants and to collect all data in such a way as to maximize its utility in the event that a significant risk to their users was established.

Fifty informal interviews were conducted. Information regarding informants behavior, history, socio-demographic status and knowledge about *Surma* and *Kajal* was solicited to produce a profile of *Surma/Kajal* users and an understanding of the history and meaning behind the traditions. *Surma* and *Kajal* samples were collected and subjected to analysis of their chemical contents (including lead) and their microbial contaminants.

Many *Surma* samples were found to be heavily contaminated with bacteria, yeasts and molds. As well, thirteen of nineteen contained 50% or more lead. Analysis of *Kajal* samples was less successful, the five subjected to chemical analysis had only small amounts of lead. No link between region of origin of a sample and its contents was observed.

Surma and *Kajal* are used for a variety of reasons including their medicinal properties, aesthetics, warding off the evil eye, and religion. Modern *Surma* and *Kajal* use continues a thousands of years old tradition. While the use of these products is declining somewhat among younger

South Asians, *Kajal* is still used in 24% and *Surma* in 18% of households sampled.

Although acculturation is affecting these traditions, steps are still necessary to ensure that high-lead *Surmas* do not harm those most vulnerable to lead poisoning. Community consultation, discourse with South Asian physicians and the promotion of testing of *Surmas* in use should be undertaken to reduce the risks while maintaining respect for the antiquity and integrity of the traditions.

LIST OF KEY WORDS

Surma, Kajal, Kohl, Lead, Plumbism, Contaminants, Cosmetics, Eyeliner, South Asia, Winnipeg, Canada

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I am also greatly in the debt of all the informants who so graciously gave of their time, knowledge and hospitality, as well as donated samples for laboratory testing. My special thanks go to the anonymous informant who procured a sample from an overseas source, provided me with English translations of important Islamic texts, sent letters to South Asian sources on my behalf and then translated the responses.

Finally, my thanks go to the members of my Thesis Advisory Committee and in particular to my advisor Dr. Jean-Luc Chodkiewicz for guiding my research while allowing me the freedom to pursue the project as I saw fit. I must therefore take full responsibility for all material presented in this thesis; any errors or inconsistencies are entirely my own.

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INTRODUCTION

CHAPTER 1

INTRODUCTION

Surma and *Kajal* are two medicinal eye cosmetics that are used on a daily basis by countless thousands or, in all likelihood, millions of the inhabitants of Pakistan, Bangladesh, India and Sri Lanka. Thousands of years old, these South Asian traditions are maintained in Canada by individuals who have emigrated from these countries and their descendants. These practices, in particular the use of *Surma*, have recently garnered attention in the international medical literature because they are frequently found to contain lead.

I first became aware of the existence of *Surma* through a nurse of German descent. In the maternity ward of a British Columbia hospital, she shared a room with an 'East Indian' lady. When her roommate's child was brought to her after delivery, the mother immediately applied a black eyeliner to its eyes. The nurses then took the child away and washed the make-up off. The mother reapplied it and the nurses removed it several times, causing great distress to the mother, who for a time covered her head with her bedsheet and refused to hold the child. The situation was finally resolved when the child's father arrived and convinced the nursing staff to allow the make-up to remain on. I became curious as to why this cosmetic could be so important to the young mother.

I quickly came upon a small number of recent British medical articles referring to '*Kohl*' or '*Surma*' concerning health risks associated with the cosmetics' ingredients, particularly galena (lead sulphide, PbS). Although these articles contained occasional references to religious or cultural

traditions associated with *Surma* use, these were not explored in detail. When three acquaintances of Asian Indian descent confirmed that *Surma* was indeed used by members of their ethnic group in Winnipeg, I decided to initiate a research project to explore the maintenance of this tradition in Winnipeg. Initially trained as a biological anthropologist, I attempted to follow the trail indicated in the British medical literature and investigate the possible benefits and/or dangers of the use of *Surma* by immigrants from South Asia (India, Pakistan, Bangladesh and Sri Lanka) in Winnipeg.

Statement of the Problem

The goals of this research were fourfold: to determine the extent of *Surma* and *Kajal* use in Winnipeg, to detail the cultural context of their uses, to gather information regarding the contents and safety of locally used *Surmas* and *Kajals*, and to collect all this information in such a way as to maximize its utility in the event that a significant risk to their users was established. This research project is in effect testing the following hypothesis:

> *Surma* and *Kajal* are products that contain contaminants that are potentially harmful to their users. *Surma* and *Kajal* are used by South Asians and Canadians of South Asian descent in Winnipeg. By identifying the socio-demographic profile of the users as part of an ethnographic study, data that could be useful in reducing the health risks associated with the use of *Surma/Kajal* will be produced.

To test the validity of the medical concerns surrounding *Surma*, I secured laboratory testing of *Surma* and *Kajal* samples and conducted

interviews with South Asian immigrants for the purpose of ascertaining the motivations and characteristics of *Surma* and *Kajal* users and non-users. My intent was to use this information to both identify the forces that act on the maintenance/abandonment of these traditional practices and to identify those groups at highest risk of exposure to lead. As well, appropriate strategies to target and educate the members of those groups could be constructed following the collection and analysis of the data.

Sources of Information

Meeting my goals meant composing as comprehensive an image of *Surma* use in Winnipeg as possible. To the best of my knowledge, no other researcher has undertaken a project that comprehensively investigates the microbial, chemical, and ethnographic aspects of *Surma* and *Kajal* use. Holism as a research orientation is usually the arena of the anthropologist and anthropologists up to this point in time have not investigated the cultural context of *Surma* and *Kajal*. It has been necessary, therefore, to rely in part on non-anthropological sources for information on *Surma* and *Kajal*. Sources utilized can be divided into three categories:

1) Library - I have engaged in ongoing library research in the scientific medical literature, in the areas of South Asian and Islamic medicine, in Islamic, Hindu and Sikh religious literature, in the folklore and history of South Asia, in the archaeology of the ancient Indus River Valley, and on South Asians in North America. This has included extensive use of interlibrary loan services as well as material loaned by Dr. Terence Day, Professor at the Department of Religion, University of Manitoba and several local informants.

2) Laboratory - I personally conducted microbial testing on locally collected *Surma* samples. The samples were tested for the presence of bacterial and mould/fungal contaminants. *Surma* and *Kajal* samples were also subjected to chemical analysis by the University of Manitoba Geological Sciences laboratory. A variety of elements, including lead, sulphur and antimony were quantitatively tested for.

3) Field - My general approach to fieldwork and conduct in the field was based in part on Tosuner-Fikes (1982:10-36) and Pelto and Pelto (1990:269-297). I conducted 50 interviews in the course of my research. I visited homes, places of business, and religious gatherings. My sampling methods were derived from Honingman (1970:266-281) and Bernard (1988:82-98). Interviews that took place in the informants' homes provided the best opportunity for informal, friendly discussions. I consulted Bernard (1988:82-98) and Agar (1980:84-90) in developing the interview structure. Containers of *Surma* and *Kajal*, when present in the home were usually voluntarily produced early in the visit. This allowed me to ask for small samples for testing with good chances of success. Additionally the application of the cosmetics and in two cases their preparation were spontaneously demonstrated for my benefit. Other cosmetics and medicinal preparations were occasionally brought out for me to see and taste.

It was my goal not to repeat work that other researchers had already done. While several studies have recorded the presence of lead in *Surma*, all of these studies were limited in one or more ways. First, the studies of lead in *Surma* did not always provide measures of the amount of lead present, nor describe the physical characteristics of 'low-lead' vs. 'high lead' *Surmas*. Those that did measure the amount of lead generally assumed that the lead was present in the form of lead sulphide, but did not test this

assumption. Also, no researchers, with the exception of Aslam *et al.* (1979), tested for alternative ingredients in *Surma*. Antimony sulphide (Stibnite, Sb_2S_3), for example, is frequently indicated in traditional sources as the basic ingredient. Moreover, with the exception of Aslam *et al.* (1979), *Kajal* was not mentioned in the scientific studies, even though its character and use are similar to that of *Surma*.

Additionally, although a small number of researchers have examined the frequency of or reasons behind *Surma* use, these studies were done in a very perfunctory manner, without any consideration for the socio-demographic characteristic of users and non-users. Such factors as economic status, age and religion might reasonably be expected to influence *Surma* and *Kajal* use; yet these have been completely ignored. As previously stated, no studies have combined the scientific and ethnographic approaches to produce a comprehensive profile of use of *Surma/Kajal* in any given population. This is extremely unfortunate, because if *Surma* or *Kajal* pose a risk to their users, many thousands of people in Canada and millions worldwide could be exposing themselves to unnecessary risks. Although mostly used in South Asian and Middle Eastern countries, *Surma* and its counterparts are also found in Africa and in countries into which these groups have migrated (Perry and Eaton, 1991); in other words, almost everywhere.

Targeting the most likely users of *Surma/Kajal* within these groups would mean that dollars that go toward the prevention of *Surma* use could be more effectively allocated. An understanding of the culturally determined value of *Surma* in these societies would not only enrich our knowledge about these cultures but also ensure that any 'educational' programs are designed in a respectful, culturally appropriate, and effective

manner. Finally, if *Surma* use does constitute a health threat, studies done among immigrant populations can be used to encourage closer examination of *Surma* use in home countries where their use is far more frequent. In Indian medical literature, for example, potential dangers associated with the use of *Surma* are barely acknowledged.

Structure of Thesis

The organization of this thesis is as follows: Following the introduction are a demographic profile of the South Asian population in Winnipeg, including a brief history of their immigration to Canada and a description of the sample population (Chapter 2). Next, the properties of *Surma* and *Kajal*, the modes of their production, the means of their application and the antiquity of their use throughout the world are described in Chapter 3. Chapter 4 focuses on the treatment of *Surma/Kajal* in traditional South Asian and Islamic literature. Chapter 5 outlines the methods for the ethnographic portion of the project, and the results of that ethnographic research follow in Chapter 6. Chapter 7 reviews the current scientific and medical literature concerning *Surma* and *Kajal* use and their dangers. Chapter 8 describes the laboratory tests conducted on locally collected *Surma* and *Kajal* samples and their results. Chapters 9 and 10 recapitulate significant findings and indicate further directions for research.

THE POPULATION

CHAPTER 2

THE POPULATION

Canada is a nation that is comprised largely of immigrants and their descendants. In 1986, approximately sixteen percent of the total population of Canada was born in another country (Fleras and Elliot, 1991:45). The balance of new arrivals to Canada has changed over the last century from Anglo-French to other European to most recently Asian and African (Frideres, 1992). Cultural pluralism has become such a prevailing fact of Canadian life that the Federal Government, building on the Commission on Bilingualism and Biculturalism Statement of 1963 and the Federal "Policy of Multiculturalism within a Bilingual Framework" of 1971, passed the Canadian Multiculturalism Act in 1988 (Berry and Laponce, 1994). This bill recognizes, protects and promotes the cultural and racial diversity of Canada and the rights of individuals and communities of all origins.

Immigration to Canada

South Asian immigrants (originating in Pakistan, Bangladesh, India and Sri Lanka) in Canada are largely post World War Two arrivals. The first immigrants from India came to Canada in the mid 1800s when the emancipation of slaves created a shortage of cheap labor in the Americas. Early Indian immigrants were indentured laborers and semi-skilled ex-soldiers (largely Sikh). By the turn of the century demand increased for laborers in logging camps, lumber mills, mines, railroads and construction

work on the West Coast. Steamship companies advertised heavily in the Punjab, promising economic prosperity in Canada. The push of periodic famine, infertile lands and low wages at home combined with the lure of jobs convinced increasing numbers of Indians to set out for Canadian shores (Chandrasekhar, 1986:15-18).

The immigrant Indian population of British Columbia increased from 258 in 1904 to 1500 in 1906. Increasing resistance and protest from whites about the ever-larger number of Asian arrivals conflicted with the Canadian Federal Government's desire to expand the industrial and manufacturing sectors with the use of Asian labor (Chandrasekhar, 1986:17-19) but in 1908 the Federal Government capitulated. The minimum cash-in-pocket on arrival demanded of Asian immigrants was raised from $25 to $200 and arrivals were limited to those who had arrived via a non-stop voyage. In 1914 a group of Sikhs residing in Hong Kong decided to test the laws by chartering a boat for a non-stop voyage to British Columbia (Jensen, 1988:130). Only 22 passengers (out of 376) who could prove Canadian residency were allowed to disembark the ship (Chandrasekhar, 1986:19-21). In what was to become known as the Komagata Maru (the ship's name) Affair, a two month standoff ensued, characterized by food shortages aboard the ship and violent resistance to an attempt to tow the boat out of harbor. Finally, negotiations led to the departure of the ship (Jensen, 1988:135). Following this incident the door to immigration from India was virtually closed for the next 37 years (Chandrasekhar, 1986:19-21).

In 1951, special agreements were made with the governments of India, Pakistan and Sri Lanka to admit 150 Indians, 100 Pakistanis and 50 Sri Lankans each year, plus additional relatives to those immigrants already in Canada. By the 1960s immigration policy was becoming increasingly color-

blind, and in 1967 official racial quotas and limitations based on race, national origin, color or religion were eliminated. The resident Asian Indian population in Canada, which had remained steady at about 2000 then rose in 1961 to 6,774, to 68,000 in 1971 and to 118,000 in 1976. The type of immigrant coming from India in the latter half on the 20th century was different from the earlier arrivals. He was likely to be highly educated, well qualified and fluent in the English language (Chandrasekhar, 1986:22-25). Today, most Asian Indians prefer to live in urban areas (95% as of 1981) and most have settled in British Columbia and Ontario (see Table 1). Economic incentives and family ties continue to draw recent immigrants to these provinces in far larger numbers than to the prairie provinces, the Maritimes or Quebec (Ram, 1986:83,85).

South Asians in Winnipeg

Winnipeg is the capital and largest city of Manitoba (Marsh, 1985:1950). Its population, as of 1991 was 652,354 (Statistics Canada, 1993:10). Winnipeg lies at approximately the geographic center of Canada 100 km north of the Minnesota border. The city's economic base grew out of its position as the focus for western expansion of the railroads and from the marketing, distribution and shipping of agricultural and wholesale products. Winnipeg, like many cities, is notable for its ethnic variety, which it celebrates every year at its Folklorama festival (Marsh, 1985:1951). Winnipeg's total South Asian population as of 1991 was 9,870 (Statistics Canada, 1994).

Initially, Asian Indians alone were intended to be the target population of this study. The difficulty in accomplishing this became

Table 1 Distribution of Immigrants from India by Province of Destination in Canada

Province of Destination	Years of Immigration				
	1960-63	1964-66	1967-72	1973-77	1978-81
Newfoundland	0.5	0.4	0.7	0.3	0.3
Prince Edward Island	0.2	0.1	0.2	0	0
Nova Scotia	2.8	4.3	2.5	0.9	0.6
New Brunswick	0.8	1.1	0.9	0.9	0.3
Quebec	16.7	17.3	10.6	8.3	7.1
Ontario	27.7	41.9	43.3	48.2	41.8
Manitoba	2.6	2.7	3.2	3.5	3.8
Saskatchewan	3.7	2.9	2.3	0.7	0.7
Alberta	5.8	5.3	6	5.1	8.7
British Columbia	39	23.9	30.2	32.5	36.4
Yukon & N.W. Territories	0.1	0	0.1	0	0.1
Not Stated	0	0	0	0	0.1
Total	100	100	100	100	100
Number	2683	5628	28622	44503	26316

(Source: Ram, 1986:83)

immediately apparent with my first examination of the census data (Statistics Canada, 1993) to be used in identifying and characterizing the population. Canadian census data recorded the 'ethnic origin' of respondents, not country of origin, so a 'Bengali' could presumably be from either India or Bangladesh, and an 'East Indian' could mean an individual from Eastern India, not necessarily an 'East Indian' as defined by mainstream Canadian culture. Respondents filled in a blank with the ethnic label that they felt best described their origins. This self-identification led to overlap and confusion and made it extremely difficult for me to define my target population.

However, as ethnic origin, mother tongue and home language are all asked on census forms, I determined that if I targeted a combined South Asian population, including immigrants from India, Bangladesh, Pakistan and Sri Lanka and their descendants, data on ethnicity and language would allow for a more complete, concise profile to be created. This in turn would assist me in ensuring that my chosen sample did not grossly misrepresent the population as a whole.

Canadian census data for 1991 obtained from Statistics Canada (Statistics Canada, 1994) made possible an analysis of the characteristics of the South Asian population in Winnipeg (a "Target Group Profile") that could be compared to the general composition of the city of Winnipeg as a whole (Statistics Canada, 1992(A):10-14, (B):10-18). This profile confirms that South Asians in Winnipeg are largely new arrivals, with 86.23% of immigrants having arrived since 1971. Immigrants from all countries combined are split about 50-50 before and after this date. Most South Asians (70.77%) arrived as adults (20+years), a more mature immigrant group than that of all immigrants combined, where only 59.47% arrived after 20 or

more years of age (see Table 2). South Asians are more likely to be married and less likely to be divorced or separated than the general population. The importance of family life in this group is attested to by the small percentage of individuals who live alone (19.91%) in comparison with Winnipegers in general (59.48%). The importance of caring for the elderly in South Asian groups is dramatically demonstrated by the fact that only 14.83% of individuals 65 years of age and older who live neither with their spouse or their unmarried children live alone. In the general population that rate is 86.96% (see Table 3).

In terms of education and economics, South Asians fare quite well for an immigrant group. They are more than twice as likely to have a University degree than the population at large (see Table 4; the country in which the degree was obtained is not stated). Incomes are only slightly lower than the Winnipeg average ($34,614 vs. $36,088 for males, $22,705 vs. $24,765 for females). The unemployment rate for South Asian men is only slightly lower than that of all men in Winnipeg (9.8% compared to 9.2%) but this rate is much lower for women (12.6% compared to 8%). The profile of occupations for South Asian men is very similar to the overall male profile, the most notable difference being a higher percentage engaged in Industry and Transport (39.40 to 31.37%) which may be attributable in part to the large number of South Asians, in particular Sikhs, who own and/or operate taxicabs. South Asian women are less likely to be engaged in Professional occupations (23.68% vs. 31.73%) and much more likely to be engaged in Industry and Transport (22.3% vs. 6.39%). (See Table 5) The reasons for these differences cannot be conclusively stated, but women's income in general is often seen as supplementary and sometimes careers may be considered less important for women than they are for men. Additionally, immigrant

Table 2 Immigration to Winnipeg

		All Groups *	%	South Asians **	%
Ethnic Origins	Single origin	393300	60.29%	7975	80.80%
	multiple origin	252310	38.68%	1900	19.25%
Citizenship	Canadian	611110	93.68%	7420	75.18%
	Other	34500	5.29%	2455	24.87%
Immigration	Non-immig.pop	529215		3280	
	Immig. pop'n	113170		6465	
	Immig born India	3810	3.37%	3640	56.30%
	Born other Asia	30030	26.54%	990	15.31%
	Immig before '61	34555	30.53%	70	1.08%
	1961-1970	18145	16.03%	825	12.76%
	1971-1980	27445	24.25%	2850	44.08%
	1981-1991	33020	29.18%	2725	42.15%
Age at Immigration	0-4 yrs	14000	12.37%	520	8.04%
	5-19 yrs	31870	28.16%	1365	21.11%
	20+ yrs	67300	59.47%	4575	70.77%

* Source: Statistics Canada, 1992(A):10-14, (B):10-18

** Source: Statistics Canada, 1994

Table 3 Marriage and Residence in Winnipeg

		All Groups *	%	South Asian **	%
Marital Status 15+	Total Pop'n	514170		7125	
	Single	162340	31.57%	2110	29.61%
	Married	273620	53.22%	4400	61.75%
	Separated	16050	3.12%	140	1.96%
	Widowed	37490	7.29%	300	4.21%
	Divorced	31205	6.07%	175	2.46%
Residence;Non-family persons	Total	115080		1105	
	Living w. relatives	20950	18.20%	715	64.71%
	living w. non-rel. only	25670	22.31%	175	15.84%
	Living alone	68455	59.48%	220	19.91%
Residence;Non-family persons 65+ yrs.	Total	33180		230	
	Living with relatives	4920	14.83%	200	86.96%
	living w. non-rel. only	1320	3.98%	0	0.00%
	living alone	26935	81.18%	30	13.04%
Residence;# persons	in economic families	543970	85.25%	9425	96.03%
	unattatched individuals	94125	14.75%	390	3.97%

* Source: Statistics Canada, 1992(A):10-14, (B):10-18

** Source: Statistics Canada, 1994

Table 4 Education in Winnipeg

		Winnipeg *	%	South Asian **	%
Pop 15-24 yrs	Total	95700		1710	
	Not attend school	38485	40.21%	425	24.85%
	Attend full time	50215	52.47%	1155	67.54%
	Attend part time	7000	7.31%	135	7.89%
Pop'n 15+yrs	Total	514170		7125	
	<Grade 9	55415	10.78%	660	9.26%
	9-13 w.o. 2nd cert	143430	27.90%	1495	20.98%
	9-13 w. 2nd cert	64405	12.53%	800	11.23%
	Trades cert. or diploma	15405	3.00%	105	1.47%
Other non-Univ. Education	W.O. certificate	30690	5.97%	250	3.51%
	With certificate	74365	14.46%	795	11.16%
University	W.O. degree	63755	12.40%	1025	14.39%
	W.O. cert.	37195	7.23%	640	8.98%
	With certificate	26555	5.16%	385	5.40%
	with degree	66705	12.97%	1985	27.86%

* Source: Statistics Canada, 1992(A):10-14, (B):10-18

** Source: Statistics Canada, 1994

Table 5 Employment and Income in Winnipeg

		Winnipeg *	%	South Asian **	%
Males 15+ yrs	In labor force	188340	76.13%	3070	82.64%
	employed	171105	69.16%	2765	74.43%
	unemployed	17235	6.97%	305	8.21%
	unemployment rate	9.2		9.9	
	Participation rate	76.1		82.6	
Females 15+ yrs	Total	266770		3410	
	In labor force	163925	61.45%	2295	67.30%
	Employed	150775	56.52%	2010	58.94%
	Unemployed	13150	4.93%	290	8.50%
	Unemployment rate	8		12.6	
	participation rate	61.4		67.3	
Labor force-Males	All occupations	185665		3020	
	Professional	52175	28.10%	890	29.47%
	Clerical, sales&service	58415	31.46%	855	28.31%
	Industry & Transport	58235	31.37%	1190	39.40%
	Primary Occupations	4500	2.42%	20	0.66%
	Other	12330	6.64%	65	2.15%
Labor force-Females	All occupations	161275		2175	
	Professional	51165	31.73%	515	23.68%
	Clerical, sales&service	95580	59.27%	1130	51.95%
	Industry & Transport	10300	6.39%	485	22.30%
	Primary Occupations	1075	0.67%	0	0.00%
	Other	3145	1.95%	20	0.92%
Income-Males	Worked full time	$36,088		$34,614	
Income-Females	Worked full time	$24,765		$22,705	

* Source: Statistics Canada, 1992(A):10-14, (B):10-18

** Source: Statistics Canada, 1994

women from many ethnic groups are no strangers to factory and textiles work and unskilled, low-paid employment (Ralston, 1988).

Among Winnipeg's South Asian peoples, Sikhs comprise the single largest group (32.57%), followed by Hindus, Christians, Muslims and Buddhists (see Table 6). Ethnically, as one might expect, they are more homogeneous than the population as a whole, with 80.80% claiming single ethnic origin (compare with 60.29%). Many (78.42%) have knowledge of a language spoken/known in South Asian countries, most commonly Punjabi and Hindi.

The Sample population

The representativeness of the sample population in this study can be examined in comparison to the census data. Because over half the interviews had been completed by the time the census data became available, my ability to compensate for some of the more obvious inequities in the sample was hindered. As a result, although general representation by region was good, Sikhs and other Punjabis were under-represented in my sample. The Sikh community(ies) was (were) the group that took me the longest to access. As very few of my first 25 informants were Sikh, it was not possible to compensate completely for their lack of representation within the 50 interviews allotted for the study (a self-imposed limit resulting from time and financial constraints). Additionally, Christians were not represented in my sample, although in retrospect I can see the value of including them in such a study.

The immigration pattern of informants corresponded very closely to that of the South Asian population in general, strengthening any

Table 6 Religious Distribution of Winnipeg

		Winnipeg *	%	South Asians **	%
Total Pop'n		652354		9870	
Religion	Catholic	218025	33.42%	850	8.61%
	Protestant	279635	42.87%	1020	10.33%
	Islam	n/a		1400	14.18%
	Buddhist	n/a		70	0.71%
	Hindu	n/a		2625	26.60%
	Sikh	n/a		3215	32.57%
	Other	43445	6.66%	100	1.01%
	No relig. affil.	104505	16.02%	100	1.01%

* Source: Statistics Canada, 1992(A):10-14, (B):10-18

** Source: Statistics Canada, 1994

conclusions that might be drawn regarding the association between time in Canada and *Surma/Kajal* use. But, it is apparent that professional sources were over-represented and clerical/sales were under-represented in my sample. This is the inevitable result of the 'academic' nature of my research. Many initial informants were referred through academic contacts. These sources further referred me to those in their community who were considered to be the most knowledgeable and to be the most comfortable talking to outsiders. Therefore an over-representation of well-educated individuals was inevitable. As the number of such community leaders is limited, a larger sample size in future projects should result in an economically more representative sample.

I am making no claims about this being a representative sample. It was not collected in a random fashion and the quantification of the characteristics or behaviors of its members cannot be extrapolated to the South Asian population as a whole. I do feel, however, that it is a broadly drawn profile that includes sufficient members of all important groups to serve as an indicator of trends and behaviors among South Asians in Winnipeg. Because the data collected from this sample are combined with my own observations of behavior during interviews and at attendance at cultural events, I am confidant that my observations and conclusions have not misrepresented the South Asian population of Winnipeg as a whole.

South Asians and Acculturation

Within a primarily Anglo-European framework (the province of Quebec excepted), immigrants are faced with the challenge of adapting and adjusting to the larger society, in particular with achieving economic

success, while attempting to maintain some degree of cultural identity. This necessitates walking the fine line between social systems comprised on occasion of widely differing or even opposing values. Necessarily, individuals and many types of groups find themselves in the position where they are forced to make choices, whether deliberately or subconsciously, regarding which of their cultural traditions can be maintained without jeopardizing successful and harmonious existence within mainstream Canadian society and which traditions must be abandoned or modified.

How culture change is categorized (assimilation, acculturation, integration etc.) is the subject of much discussion in the social sciences. Various models that have been proposed as predictors of or models for culture contact and interaction ('melting pot', and 'cultural mosaic') (Satewich, 1992:12-15, Fleras and Elliot,1992:59-64) are all problematic in both theoretical and practical terms. Multiculturalism in Canada, for example has been criticized for being too pluralistic, focusing too much attention on our differences, increasing cultural isolation and undermining the development of a distinct Canadian cultural identity. Conversely, it has been faulted for not promoting enough pluralism; promoting only those aspects of non-anglo culture that do not threaten the status quo, and for not doing enough to eradicate racism (Satewich, 1992:14-15).

Within this context of multiculturalism, as one observes how and why certain cultural traits are maintained or abandoned the analysis reveals the importance of certain demographic/socioeconomic variables (i.e.. economic status, religion, age, or length of exposure to dominant culture). Identifying these variables can help to determine how cultural identity is defined and maintained. The use of the traditional eye cosmetics *Surma*

and *Kajal* in the South Asian population of Winnipeg is an example of a cultural tradition that is being affected by the forces of acculturation.

South Asians are most commonly first and second generation Canadians and have very personal experience of living as ethnic minorities in a culturally pluralistic but dominantly Anglo-European environment. South Asians appear to have been relatively successful in their adaptation to Canadian life while maintaining cultural integrity through a variety of local ethnic, cultural and religious organizations. Among visible symbols of cultural identity such as dietary practice, religious symbols, and clothing are traditional cosmetics such as *bindi* (dot on forehead), *sindhu* (red powder in part of hair) and *Surma* and *Kajal* (eyeliner). These cosmetics are all characterized by having symbolic value beyond simple beautification and are visible markers of cultural/ethnic identity.

The time spent doing fieldwork has allowed me to observe some of the more general characteristics of the South Asian population. This group has assimilated to Canadian society in many ways. They are economically quite successful. The majority of individuals I met were either professional or training for professional careers (physicians, teachers, professors, engineers, etc.). Saran found that 84% of Asian Indians in New York City had a college degree of some kind, and maintained financial savings at two to three times the national average (Saran, 1985:47). This success could be attributed to a variety of factors including their professional backgrounds, caste origins, the pluralistic nature of their home countries, and the prevalence of English spoken there.

The Sikhs I interviewed present a somewhat different economic profile. Although most individuals I met were relatively economically successful, there is a tendency for this group to be more blue collar and to

identify itself as such. Johnson's 1988 study of 602 randomly selected Vancouver Sikh households found that 65% of the heads of households and nearly 80% of their wives had no education in India beyond the secondary level. Sixty to seventy percent of the Sikh men in his study were doing unskilled factory work, while other Indo-Canadian communities contained higher percentages of professionally or technically qualified people (Johnson, 1988). In Winnipeg, taxi drivers and shopkeepers are often Sikh. One orthodox Sikh gentleman told me that Sikhs preferred to be their own boss. Sikh immigrants are more likely to have rural origins and agricultural backgrounds than other South Asians. Ames and Inglis (1973-74) found that most British Columbia Sikhs were Jats and Rajputs, traditional land-owning castes. Sikhs in Winnipeg appear to more actively sponsor additional family members to Canada than do Hindus or Muslims. Small extended families sharing a single household were most common among Sikh informants. Johnson also found that Punjabis in Vancouver sponsored more family members at a higher rate than other South Asians (Johnson, 1988). Locally, this profile is slowly changing as second generation Sikhs are being encouraged to pursue professional careers. Parents of teenage children often asked me questions about University and career opportunities.

Homes were essentially contemporary Western in both organization and decor. Sikh households usually contained no visible cultural referents. Muslim households sometimes contained a small prayer or message in Arabic on a plaque or an Arabic-style pillow or rug. Hindu homes often had artwork portraying Hindu deities prominently displayed. Some Hindu homes contained a "Gods' room" a bedroom, den or basement area devoted to gathering and worship. If the home was large enough to have both a

living room and family room, I was usually shown into the living room. Although this is not an arrangement that differs from many Canadian homes, I sensed an additional degree of utility in this organization in South Asian homes. In particular, homes of conservative Muslims seemed well suited to this arrangement. Family members, especially women, can relax in privacy in the family room while visitors are formally entertained in the living room. Propriety is therefore comfortably maintained. Living rooms, while relatively formal in their decor, did appear to be well used, unlike the living rooms of many other Canadian homes.

Traditional dress is another practice that is being maintained, albeit somewhat irregularly. Much attention has been focused in the public press in recent years about Sikh turbans and Islamic *hijabs* (headscarves). My observations lead me to conclude that turbans are worn by a majority of Sikh men in their forties and older, but younger men do not commonly let their hair grow or wear a turban. This appears to be the cause of some consternation for the older members of the Sikh communities, although the social pressures on children and teenagers to conform to the larger society are well understood. Men of all religions dress in western clothing, with the exception of some Priests and particularly devout laymen, who may wear more traditional clothing while at home or attending religious services.

Women rarely wear traditional dress outside the home if they are students or second generation Canadians, although their mothers often do. Younger women may wear casual, two piece *kurta* 'suits' in traditional style when at home and always wear highly decorative traditional clothing (*kurtas* and *sarees*) when attending religious or cultural events. Muslim women's clothing is usually Western in origin, but may vary from T-shirt

and blue jeans to very conservative clothing with a *hijab*. Young women from conservative Muslim families may conform to this style out of pressure from family or out of a sense of religious identity and pride. One female informant relayed the surprise and pleasure she felt when her young daughter, who wasn't expected to take up the *hijab* until she turned 14, asked to start wearing it when she was still in elementary school. A revitalization of sorts may be occurring among segments of this group.

It was obvious that while some elements of traditional culture are being maintained, others are undergoing fundamental changes. In particular younger people, not only second generation Canadians, but also University students who have arrived only recently from South Asian countries are more Westernized than their parents were. More Western foods, products and influences are present in India than is commonly thought. Young people are bringing this modern Asian culture with them to Canada; they are further influenced by their new cultural surroundings once they arrive. Vegetarianism among this younger group is rare, and I was served beef in the home of one Hindu student. Food taboos are rapidly breaking down, as one might expect in a society where many meals are caught 'on the run'. Alcohol consumption appears modest by most Canadian standards (as a result of religious and cultural prohibitions), but is certainly engaged in by young South Asian Canadians.

Core cultural activities remain strongly supported by all groups. Traditional festivals and holidays are well attended. Sikh and Hindu festivals in particular may be attended by small numbers of individuals from religions other than that of the hosting group. Indian dance is strongly supported by the South Asian population, and young girls from all religious groups (but most commonly Hindu) may and frequently do take lessons and

perform locally and sometimes internationally. Folklorama's (a local multicultural festival) pavilion for India is also strongly supported.

Such aspects of material culture are relatively easy to observe. Cultural traits associated with beliefs, social interaction and self-perception are much more difficult to examine, and I certainly don't intend to put forth a detailed consideration of them at this time. Still, non-material elements of culture exhibit many of the same changes and complexities characteristic of South Asian groups in Winnipeg. Arranged marriages are still practised, but are becoming less common. Hindu parents seem less concerned about taking a role in the choice of their children's partner than do parents in the Muslim and Sikh groups. Younger, professional parents of all religions consider it acceptable for their children to choose their own partners. Hindus also have more open views on the subject of interracial marriages, perhaps because they feel their religion allows for more flexibility than do Sikhism and Islam. Conservative South Asians, Sikhs and Muslims in particular, disapprove of dating, and are more likely to encourage group activities for their teenagers to enable them to interact with members of the opposite sex in a controlled setting. This also would serve to reinforce the preference for a mate from within their group.

Care of young children still rests primarily on the shoulders of their mother. However, many fathers take an active role in the care of their children, in particular in cases where the mother also works or attends school. This is especially important in households where no extended family is available to provide assistance in child care. Mothers have little time to spend on traditional activities with their children, such as infant massage. Nonetheless, in homes I visited with small children, mothers were extremely gentle and calm, and the children were generally quite well

behaved. Boys and girls seemed to be given equal amounts of attention, and although grandparents seemed to hope to have a grandson at some point, male children were not overtly favored, at least in my presence.

Older children and teenagers, particularly females, were outgoing and friendly, often more so than their parents. Most young adults were actively pursuing professional careers. A great deal of prestige was associated with the medical profession in particular, and many families had one or more individuals engaged in this pursuit.

Informants invariably treated me with a great deal of hospitality. Drinks, snacks and even meals were often served. I found that an interview scheduled for around 1 p.m. usually resulted in lunch being served while I was present and I soon learned to anticipate those words "Do you like Indian food?". I generally did not feel any more out of place than I would in any stranger's home, but occasionally my awareness of my status as an outsider was reinforced. Occasionally, the fact that I was "white" or even "Canadian" was referred to and surprise at my interest in the research being conducted was expressed. While family and friends frequently stopped in for visits during interviews, I never saw another white person present during any visit. When groups of people congregated, they invariably switched from English to their native language, forcing me to be aggressive to keep up with the conversation. A few individuals, including two Pakistani informants, expressed poorly concealed suspicion of my motives. One Sikh lady whom I met at a local temple (*Gurdwara*) quickly shuffled me into a back room and locked the door, revealing her concern that some older members of the congregation might worry about what I was doing there. This was completely contrary to every other experience I had at that

and two other Sikh temples where I was treated with great kindness and given a tour of the premises.

It became increasingly obvious to me that measuring culture change in any general way would be well near impossible. People who looked traditional often didn't act traditional and vice versa. South Asians were obviously responding to the pressures of acculturation and adjusting accordingly. Some traditions seemed to have been maintained because of their symbolic value, others because they were relatively convenient. Households and individuals defined their ethnic and cultural identity in a variety of ways. *Surma* and *Kajal* use may be one of many practices that maintain and strengthen ethnic identity. Before I explore this and any other roles their use might fill, I will outline the characteristics and uses of these cosmetics.

THE PRODUCTS

CHAPTER 3

THE PRODUCTS

Introduction to *Surma, Kajal* and Related Products

At this point, it is appropriate to introduce certain terminology that appears frequently in the text. With one exception, these are not dictionary definitions. Rather they are basic physical descriptions of the items concerned and their uses; composites based on both my personal observations and a thorough examination of the appropriate literature.

Surma: A dry, powdery substance ranging in color from bone white to pitch black, but most commonly dark grey and having a slightly glittery appearance. *Surma* is kept in a glass or decorative metal container (see Illustrations 1 & 2) and is applied by the insertion of a thin glass, plastic or metal rod through the neck of the container. The rod is either placed directly into the *Surma* or the bottle is shaken with the rod inside. Some *Surma* will adhere to the rod as it is removed from the bottle. The rod is placed along the lower conjunctiva of the inner margin of the eye and drawn outwards. The eye may be partially closed and the rod twisted as the *Surma* is applied. This will result in more even application and the upper conjunctiva of the eye being tinted as well (see Illustration 3).

Some *Surmas* will initially cause the eyes to water following application. In my personal experience it is those *Surmas* that smell noticeably of camphor that result in lacrimation. After the initial stinging

Illustration 1 Commercially Available *Surmas* Including Unground *Surma* 'Stone' and White *Surma* (second from right)

Illustration 2 Decorative *Surma* Containers (*Surmadanis*)

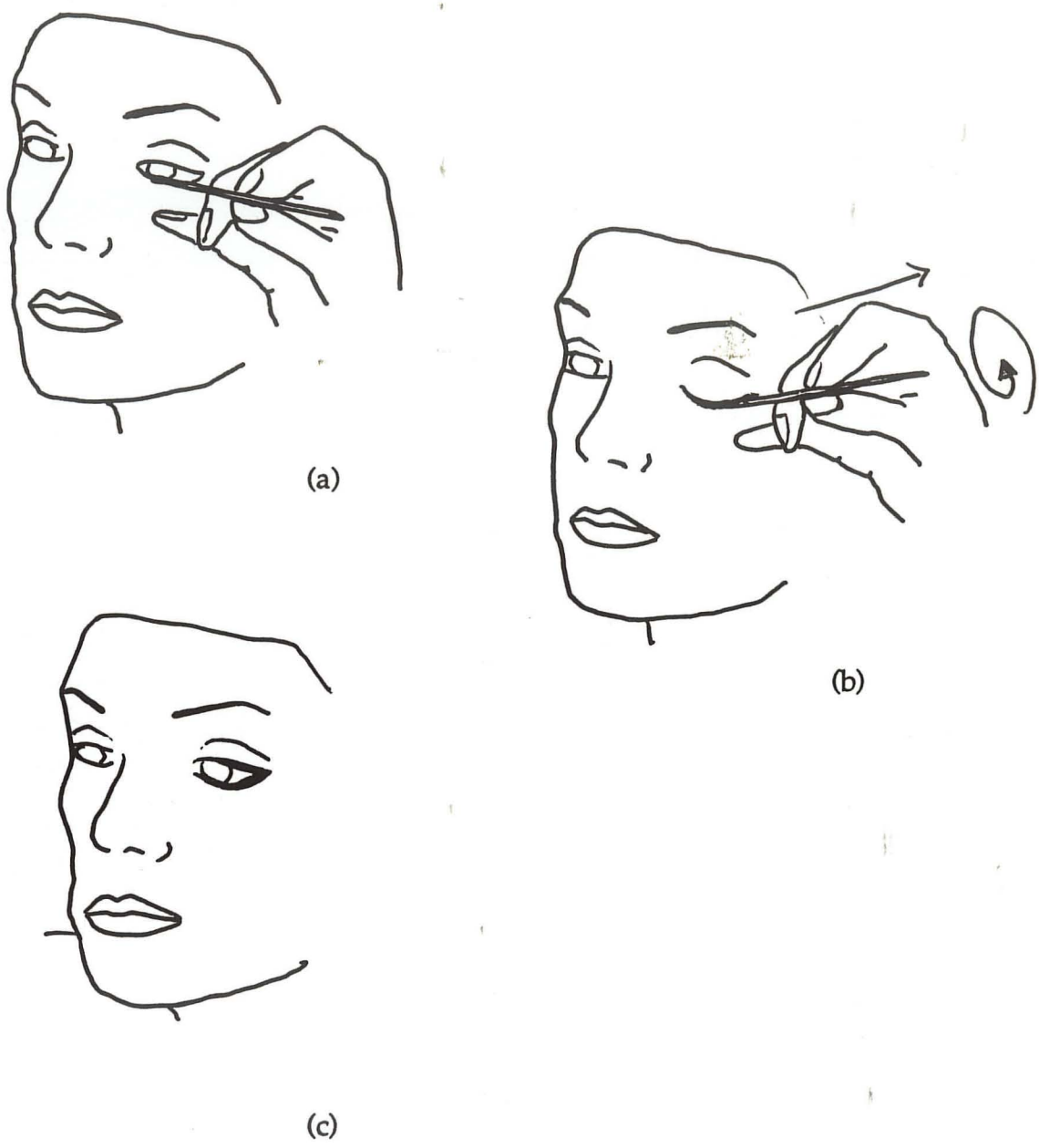


Illustration 3 Application of *Surma*: (a) the *Surma* applicator is placed along the lower conjuctiva at the inner margin of the eye (b) the applicator is moved in a twisting motion along the conjuctivae towards the outer margin of the eye (c) *Surma* applied to both the conjunctivae

sensation, a cool feeling remains that may last for as much as two or three hours. *Surma* is a term that is used throughout South Asia in reference to this substance.

Kohl: *Kohl* is synonymous with *Surma*, although it is a term rarely used by people of South Asian origin. It is considered an Arabic, Persian or Middle Eastern word. Although the containers of some informants were labelled '*Kohl*' or '*cohol*' the name invariably used by those same informants was *Surma*.

Al-Kohl: Same as *Kohl*.

Kajal: A black, pastey substance having a consistency ranging from that of a thick lotion to shoe polish. *Kajal* is traditionally packaged or stored in a small round metal tin, but may be also manufactured in the form of a pencil or stick (see Illustrations 4 & 5). *Kajal* is applied to the conjunctivae of the eye with the tip of a finger (see Illustration 6), although a small minority use a thin rod for application in the manner of *Surma*. It may also be applied around the outer edge of the eyelid in the manner of modern cosmetic eyeliner. Occasionally *Kajal* has a mild camphor smell, but this seems to cause only the slightest amount of lacrimation, if any.

Lo: *Kajal*. A term used by a minority of Punjabi Sikh families.

Anjana: A word (Sanskrit) referring either to *Kajal* or *Surma*, depending on the source. It might be best considered a synonym for 'collyrium'.

Illustration 4 Commercially Available *Kajals*

Illustration 5 Decorative *Kajal* Containers Including *Kajalata* (top) and Nepali *Kajal* Container

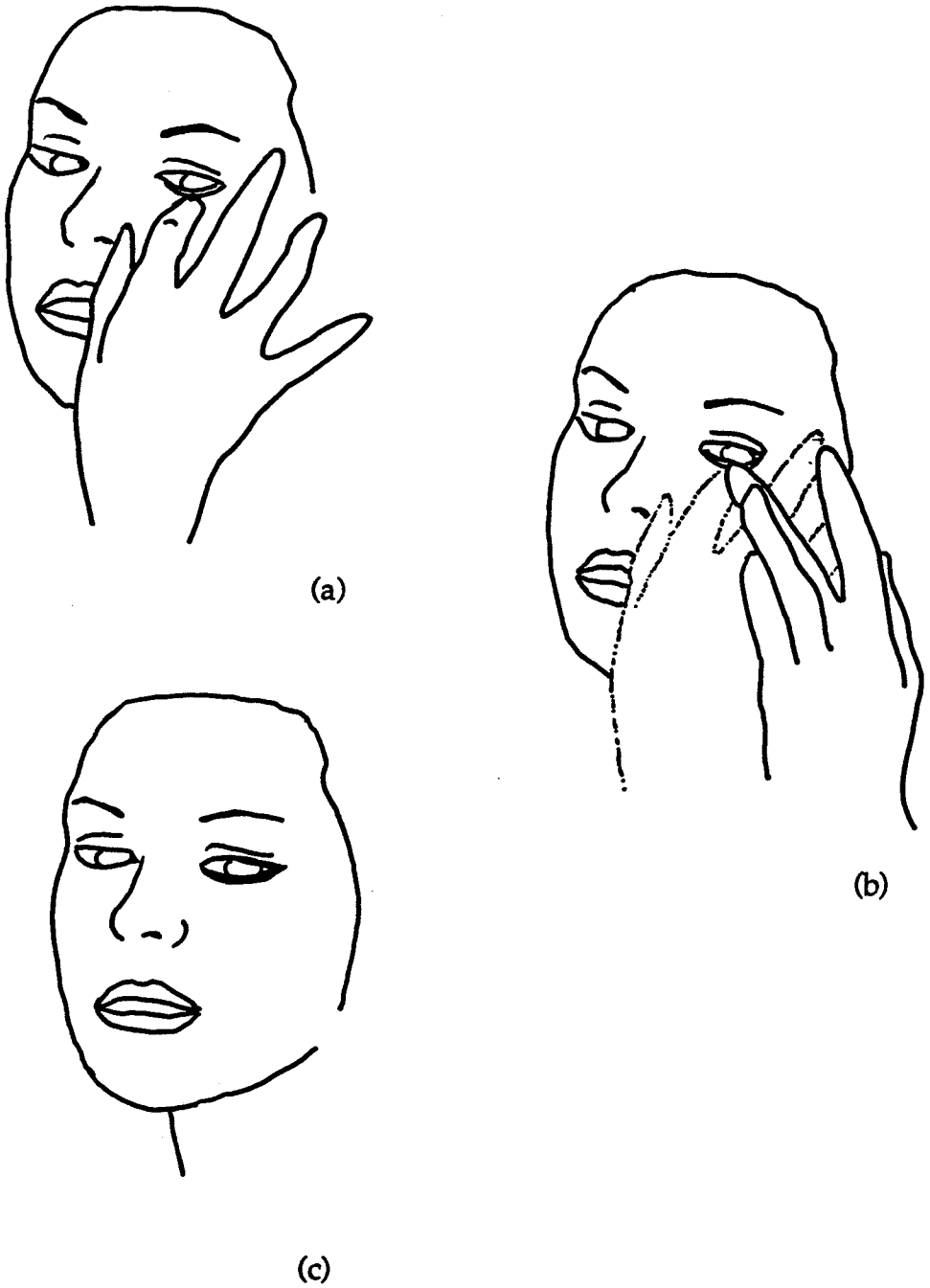


Illustration 6 Application of *Kajal* : (a) the lower eyelid is drawn away to partially expose the conjuctiva (b) *Kajal* is applied to the lower conjunctiva with a finger, moving from the inner to the outer margin of the eye (c) after application, some *Kajal* will adhere to the upper as well as lower conjunctivae.

Collyrium: " 1) A topical remedy for disorders of the eyes: an eye salve or eyewash...3) *loosely* any application for the eyes, as the koh'l used by eastern women" (The Oxford English Dictionary, 1989 (3): 492).

Surmadani Traditional decorative container for *Surma.*

Ingredients/Preparation of *Surma* and *Kajal*

Kajal

Kajal is made from lamp black; the soot from an oil lamp. The most common method of *Kajal* preparation is as follows: fill an oil lamp with mustard oil and roll a cotton wick to place in the lamp. Light the wick and hold a plate, bowl or *Kajalata* (a special spoon-type container, see Illustration 5) over (not within) the flame. When the soot has collected along the bottom of the plate, mix it with *ghee* (clarified butter) or oil and store for use. Castor oil, almond oil, peanut oil, olive oil or other vegetable oils may be substituted for the mustard oil, although the medicinal quality of the *Kajal* may be considered to be dependant on the type of oil used. Vegetable matter such as '*neem*', Azadirachta indica (Kapoor, 1990:59), camphor, peppermint, or flower petals may be added by drying them and rolling them in the cotton wick, extracting their juices and soaking the wick in them, by dropping directly on the flame, or adding after the rest of the preparation is complete.

Alternatively and less commonly, *Kajal* may be prepared by crushing burnt cumin seed, almond shell or rice and mixing with oil. Plant material

may be held over the flame as an alternative. A mango leaf or the thorny leaf of a seaside plant (Sri Lanka) will be spread with ghee or oil and held over a flame. The sticky paste that forms on the underside of the leaf is *Kajal*. *Kajal* may also be bought in the stores and is generally of a thicker and dryer consistency than the homemade variety.

Surma

Surma is generally identified as something that is found, not made. Rocks/stones crystals are ground to produce *Surma*. Five respondents identified the 'stone' as antimony. Oxide, Zinc Oxide (ZnO), Lead, Lead oxide (PbO), granite and non-graphite stone were suggested as other potential components. Antimony is the ingredient identified most often by professional and semi-professional sources (see Appendix 1). Camphor, *neem* leaves, milk and rosewater may also be added. The *Surma* stone in one Sikh lady's tradition was kept buried under the leaves of a *neem* tree and dug up once a year to undergo an elaborate ritual of preparation. The stone was ground and mixed with liquid and left to dry overnight. Every day grinding and soaking took place, often with the addition of herbal ingredients. This process would continue for over a month, producing a very potent and very expensive medicinal *Surma*.

Another potent *Surma* is produced when the *Surma* stone is placed in the mouth of a dead cobra and the snake is burned/buried. The *Surma* is said to become infused with the venom of the snake and is particularly powerful. *Surma* can also be purchased ready-made, and usually is, but a few Sikh informants related family experiences where *Surma* rocks were purchased and then ground in the home. *Surma* may have carbon (*Kajal*) added to it to make it blacker in color.

Antiquity of Use of *Surma* and *Kajal*

As demonstrated by the antiquity of much of the traditional literature of South Asia and the Middle East that refer to collyrium, *Kohl*, *Surma* etc., it is apparent that the use of such products is of considerable antiquity as well. The question of where in the ancient world *Surma* originated appears well nigh impossible to answer, as it appears in some form in various regions through many thousands of years of history, and likely predates written history in more than one region. Richard Corson, in his book Fashions in Makeup: from Ancient to Modern Times (1972) describes the use of decorative cosmetics in much of the ancient world. Egyptian men and women at least as early as the 16th century B.C. used *Kohl* , a "black, grey, or colored powder made variously of powdered antimony, black manganese oxide, burnt almonds, lead, black oxide of copper, carbon..." (Corson, 1972:9-10). *Kohl* may have had some medicinal properties to the Egyptians. Corson (1972:11) considers protection against the glare of the sun and the dust and sand of the desert its most likely purpose. *Kohl* jars have been found dating to 1900 B.C. (Corson, 1972:15&17). In ancient Sumer, antimony was used for staining the eyelids (Chandra, 1973:181). Additionally, the ancient Assyrians were known to blacken their brows and lashes and line their eyes with powdered antimony (Corson, 1972:25-6), the ancient Greeks were known to use Egyptian *Kohl* or lamp black in eye make-up (Corson, 1972:40), and the ancient Romans blackened their eyebrows with antimony, lead, or soot (Corson, 1972:56).

Collyrium, in the form of antimony sulphide (Sb_3S_2) was known to classical Greek physicians. In The Greek Herbal of Dioscorides (First Century

A.D.), antimony sulphide is said to "...hath a faculty...of cleansing eye filth and ulcers which are in ye eyes". In the description of the uses of galena (PbS) in the same work, no mention is made of an application for the eye. (Gunther, 1968:154, 633).

On the Indian sub-continent, the use of *Kohl* can be traced back to 2500-3000 B.C. as *Kohl* sticks and pots found at Mohenjo-Daro (Chandra, 1973:182-183). The people of the ancient Indus Valley civilization apparently used their *Kohl* in the form of galena and lamp black mixed with fat (Corson, 1972:32). Collyrium (eye-wash or ointment, sometimes used synonymously with antimony) was used to "beautify the eyes, stop itching and burning, clean the eyes, and improve vision" (Corson, 1972:46). It was applied with a finger or stick. In Excavations at Harappa, archaeologists found a "faience vessel" with traces of black color inside appears to have held collyrium or eyepaint and dates to 3050-3500 B.C. (Vats, 1974:312). *Kohl* sticks are also found dating to the same period (Vats, 1974:460). Kohl pots and sticks of similar antiquity are also described in Further Excavations at Mohenjo-Daro (Mackay and Litt, 1976: 228, 322, 450. 475).

Chandra, in Costumes Textiles Cosmetics and Coiffure in Ancient and Mediaeval India (1973:181-2) suggests that *Kohl* was also used in the Indus River Valley for medicinal purposes; to protect the eyes from the glare of the sun and from insects. He also states that colors indicate a particular state of the body. Evil passion is associated with the color black, which is imbued with strength enough to drive away evil spirits, and is therefore used to guard against the evil eye at marriages and deaths.

Chandra also reports the use of collyrium in the Indus Valley Civilization (1973:182-3), by the Indo-Aryans (beginning about 1500 B.C. and by successive reigns in India up to the 7th century A.D. (Chandra, 1973:191,

200, 204, 208) for alleviating burning sensation, removing local pain, increasing the range of vision, and cleansing the eyes. Chandra's suggestion that lamp black was likely used by the common people but that antimony was considered the purest form of collyrium (1973:208) supports the interchangeability of ingredients. The claim of Ali *et al.* (1978) that the main component of *Surma* was originally antimony and not lead should be considered within this context. Antimony was possibly that preferred component, not necessarily the original one. Perry and Eaton, however, claim that ancient cosmetics unearthed in the Middle East and Africa were primarily ground antimony, that Pharonic Egyptians used both antimony and galena (PbS), and that the current popularity of lead sulphide reflects a product substitution in favor of a cheaper, more easily available ingredient over time (Perry and Eaton, 1991). To further complicate matters, Lucas, in Ancient Egyptian Materials and Industries (1948:222-8), denies that antimony was ever likely to have been a component of *Kohl* in Egypt.

Some authors have suggested that *Surma* originated in Egypt and that its use was adopted in India with the spread of Islam (Healy *et al.*, 1984). India's relationship with Islam is generally considered to have started in 1001 A.D. with the beginning of a series of invasions (MacNicol, 1964:135). However, the *Surma* containers found at Harappa and Mohenjo-Daro considerably predate this invasion. Nonetheless, the introduction of Islam to India would have not served to discourage this tradition, as the use of *Kohl* is apparently associated with Islam (see Chapter 4). Specifically, my research has revealed references to *Kohl* in two collections of Hadith (traditions) (see Khan, 1981 and Muslim, 1987).

From this short review of available literature, we might conclude that the use of *Surma* and *Kohl* is a tradition of great antiquity in South

Asia, the Middle East and even the Mediterranean. I shall now review some traditional texts from India which shed some light on the cultural context of the use of *Surma* and *Kajal*.

THE TRADITIONAL LITERATURE

CHAPTER 4

THE TRADITIONAL LITERATURE

Surma and *Kajal* in South Asian and Traditional Literature

References to "*Kohl*" "*Surma*" and "collyrium" frequently occur in dictionaries and reference texts involving a number of Indian languages and traditions. To demonstrate the frequency and the variability with which such references occur, I have reproduced several of them as follows:

Wehr (1971:816-817) in A Dictionary of Modern Written Arabic lists the following definitions:

kihal "antimony powder, eye powder"

mikhal "*Kohl* stick, pencil for darkening the eyelids"

mukhula "*Kohl* container, *Kohl* jar"

takhil "treatment of the eyes with *Kohl*"

kahala "to rub, paint, or smear (with *Kohl*)(The eyes)"..."to color (the edges of) the eyelids with *Kohl*"

kuhl "antimony; *Kohl*, a preparation of pulverized antimony used for darkening (the edges of) the eyelids; any preparation for coloring the eyelids"

kahal "black coloring (of the edges) of the eyelids"

kahil "darkened with *Kohl*, dyed black (eyelids)"

Chaturdevi and Tiwari (1984:823) include the following Hindi translations in A Practical Hindi-English Dictionary:

Surmai "dark grey, of the color of (Hindi script for *Surma*)"

Surma "collyrium, antimony ground into fine powder"

followed by Hindi compound words containing the word *Surma* meaning 1) "collyrium phial or receptacle" and 2) "to grind into fine powder"

In Bhargava's Standard Illustrated Dictionary of the Hindi Language (Pathak, 1961:1103) is found:

surama "antimony ground into fine powder, collyrium"

suramadani "a small vial to hold collyrium"

The Dictionary of the Punjabi Language published by the Patiala, Punjab Language Department (1961, 64:816-817) lists the following translations:

Surma,i "of the color of *Surma*"

Surma "antimony; (used chiefly to blacken and beautify the eyes.)"

The Panjabi Dictionary (B.M. Singh, 1961:1083-1084) also lists these Punjabi definitions;

Surma "Black ter sulphide of antimony, used to beautify the eyes, supposed to strengthen the nerves of the eye and preserve sight. It is often confounded with Sulphide of Lead. It occurs abundantly in India, but most of that used is imported from Kabul and Bukhara. Some comes from Beyla in Lus. Moslems think the best comes from Mount Sinai".

Surma Isfahani "an oxide of iron forming glistening Hematite ore"

Surma Kandhari "Sulphide of Lead"

Surma pahari "Antimony from the hills in the Punjab"

Surma sufaid "Iceland Spar, a carbonate of Lime. It is also used for the eyes"
Surmachu "a long thin metal bodkin by which antimony is applied to the eyes"
Surmai "of the color of *Surma*, deep blue black indigo colour"
surmi "an inferior ore of antimony, also zinc sulphide"

Only one Sanskrit dictionary lists any of the familiar "*Kohl*" or "*Surma* " variants. The Student's Sanskrit Dictionary (Shivram Apte, 1986:611) includes:
surmi "an iron or metallic image; metallic radiance or lustre"

Anjana variants are more common in Sanskrit dictionaries as in A Sanskrit-English Dictionary (Monier-Williams 1960:1274):
strotoja "stream-produced antimony"
stotonjana "stream-collyrium, antimony (esp. as a collyrium for the eyes, said to be produced in the river Yamuna)"

Additionally, MacDonnell, in A Practical Sanskrit Dictionary (MacDonell, 1929:38) lists;
angana "ointment, eye-salve"

In A Dictionary of the Economic Products of India, Watt (1972) refers to the use of both antimony and lead in the recipe for *Surma*. Of antimony, he states that a "black tersulphide of antimony" (stibnite, Sb_2S_3) found in northern India (especially the Punjab and Himalayan region) is used on the eye for cosmetic purposes. In India it is believed to act as a tonic for the nerves of the eye, to strengthen the eyesight, and to protect them from the glare of the sun. Most of the antimony sold by druggists is actually galena

(PbS) imported from Kabul and Bokhara, and antimony is known as *Surmai Ispahani* in Bombay to distinguish it from galena. (Watt, 1972, Vol 1:270).

Although lead ores including galena are found in India, at the time of the publication of the Watt's Dictionary the mining of such ores did not occur to any significant degree. The Sanskrit name for galena, *anjana,* means "*the* collyrium" and was considered to be the best medicine for the eyes. In India it is used to strengthen eyesight, improve appearance, and prevent disease. (Watt, 1972, Vol 4: 153-155).

Surma and *Kajal* in South Asian Folklore

References to *Surma* and to the beauty of the eye are a common theme in South Asian poetry, folklore and literature. In An Anthology of Sanskrit Court Poetry (Ingalls, 1965) AKA Vidyakara's "Subhasitaratnakosa" (originally printed about 1100 A.D.) a compilation of poetry dating from between approximately 400-1100 A.D. make such references.

The evidence of a successful marital consummation is:

> Upon the morrow noticing
> that the son-in-law bears *Kohl* upon his lip
> and the bride's young breasts are sealed with ash
> [referring to scratches that have been tended]
> the women smile with rising joy (Ingalls, 1965:88)

In a collection of poems referring to women who have been parted from their lovers the following descriptions are used:

> A tear stands in your eye in place of *Kohl* (Ingalls, 1965:235)
>
> Why has the bright collyrium faded from your eye? (235)

Why is your braid so disarrayed,
your eyes without their *Kohl*? (237)

Why, slender maid, are these drops of tears,
black from collyrium they have washed,
scattered in atoms on your breast
that surges with your sighs? (238)

Who spoiled the painting on your breast
and the collyrium of your eye? (255)

Many similar references are also found.

Additionally, there are many Rajasthani folksongs that illustrate the theme that a woman should not decorate herself when she is away from her husband, including wearing perfumes, flowers, gold and silver jewelry or collyrium (Bhatnager, 1969:69).

The Gods may be referred to by comparison to *Surma* as in the following excerpt from a poem:

May you be united by that united body,
like the sky half covered by white autumn cloud,
of Visnu of all forms and Siva, lord of all,
two mountains, of collyrium and ice. (Ingalls, 1965:429)

A long, dark eye, such as one painted with *Kohl*, is frequently used as a symbol of beauty as in the following:

the face of my long-eyed beauty (Ingalls, 1965:167)

her eye surpassed the waterlily
with its iridescent darkness (171)

That it cannot reproduce
my long-eyed darling's face
is why the cold moon ever reforms its orb
only to break it. (177)

The glances of your eye,
which stretches to your ear, longer than waterlily,
were enough to steal a heart. (179)

until they are bitten by the crooked, coal-black snake,
the eye of a gazelle-eyed girl (185)

Her sidelong glances,
ever flashing like little minnows
along the long trench of the angle of her lids,
emitting for me love's total wealth, my friend,
create a new perfection of the eye. (188)

In the Notes of this volume, the author states the following: "the angle of the eye, which was exaggerated by painting it with collyrium in a line stretching toward the ear, is likened to a canal or trench" (Ingalls, 1965:506).

References to *Surma* are common in folk songs from various areas. The following was sung to me in Punjabi and translated with the following commentary:

"This is a folk song being sung by a daughter-in-law about her mother-in-law. The song depicts the relationship between the two and the metaphor is *Surma*."

The vendor has come to the village.
He is selling articles including *Surma, dandasa* (tree-skin for teeth cleaning) and glass bangles, etc.
The daughter-in-law sings to say:

Surma is on sale. I am having a look at the handful of it.
Others have bought pennies worth only,
but my mother-in-law has tendered a bill for a big amount because she wants to have it in large quantity.

She further sings to say:

Other people have ground their *Surma*
in their small grinding stones, but
her mother-in-law has ground hers
in her large grinding stone.

Other women have used *Surma* by using only

a couple of small sticks in the eyes,
but her mother-in-law
has put lots of *Surma* in her eyes.

While other women have examined
their appearance/application of *Surma* in the mirror
her mother-in-law
has got it seen from her husband (the singer's father-in-law).

(Sung in a satiric, humorous fashion).

In the Orissa folk tale, The Village Rogue, the City Rogue and the King of Rogues one rogue brags to another "We know how to steal even the sandalwood paste from the Brahmin's forehead and the *Kohl* from the eyes of pretty women" (Ramunajan, 1991:267). In the Kannada folk tale Adventures of a Disobedient Son, beautiful celestial women are described as having "*Kohl*-streaked eyes, faces like the moon, cascades of black hair falling down to their buttocks, round breasts like perfect melons, and all of them young, virginal" Ramunajan, 1991: 277).

In Gujrati tradition, the eyes of both bride and groom are smeared with lamp black during marriage rites (Majmudar, 1969:152). In west Bengal, men are said to go mad at the sight of women wearing *Kajal* prepared during the month of *Asvin* during the Grand *Puja* (Kayal, 1969:181). In parts of Bengal (Bangladesh and India), when a Muslim woman is well advanced in her pregnancy, she receives gifts from her father's house including two suits of clothes, one pair of shoes, tooth powder, oil and *Surma* (Kabiraj, 1969:266). In parts of West Bengal, a symbolic welcoming basket, *barankula*, is prepared the day before a marriage. In the basket are placed mud from the Ganges, a small stone, a conch shell, collyrium, a mirror, comb and various other articles. When the bridegroom has taken his bath, the basket is raised

to him and every object in it is touched to his forehead (Ghosal, 1969:307-308).

References to *Kajal* and *Surma* appear in the Scripture of the Sikh religion, the Guru Granth Sahib. These references are illustrations of the futility of trying to use physical attributes to acquire the notice and approval of God. One such reference relates the activities of a woman as she adorns herself with *Kajal*, flour, betel and other articles of decoration. After all her efforts her husband did not appear in her bed, so all her efforts were for naught. In another section a woman laments "Oh my friend, I have put *Surma* on my eyes, I have decorated myself with necklaces, my lips with betel and decorated myself with all the sixteen decorations. But it is all fruitless when my beloved does not come to my home". These references were read to me from a Punjabi version of the text, but I was unable to find their translations in the published English language versions available.

Additional references can be found and more appropriately documented in the Guru Granth Sahib. The appearance of a beautiful girl whose eyes were so delicate they could not even bear the line of *Kajal* is described. The speaker later sees the skeleton of the same girl within which birds are nesting and caring for their young (G. Singh, 1978(4):1310). This passage may be an illustration of the impermanence of the physical world. Collyrium is used as a metaphor for clarity of spiritual knowledge in the following passages: "and with the collyrium of wisdom (in the mind's eye) to me is revealed the Guru's word" (G. Singh, 1978(1):212) and "He loses his worrying and sees he the one alone, who applies the collyrium of wisdom to his eyes (G. Singh, 1978(1):244).

One of my informants quoted the 20th century writer Mohan Singh. In his poem Mango Tree, Singh writes of the reminiscences of a woman

thinking of her love. "What a beautiful day it was when my husband was in my home. I took my shower, washed my hair, took *Kajal* in my eye, then I also took the adornments".

The frequent occurrence of references to *Surma* and *Kajal* in South Asian traditional literature illustrates the importance of their uses in ritual and everyday life. *Surma* and *Kajal* clearly have symbolic value. As well, the variety of texts in which they are mentioned is indicative of their ongoing importance as a popular cosmetic and medication in a variety of South Asian cultures.

Surma and *Kajal* in South Asian Medical Literature

Texts and writings focusing on traditional Indian medicine almost universally include *Surma* and its counterparts in their lists of preparations and treatments. Chopra *et al.* (1958) lists both:
"Antimony Sulphidum-Kermes mineral (Sanskrit-*Srotonjana,* Hindi-*Anjan);* used for eye diseases" (Chopra *et al.,* 1958:531) and
Plumbi sulphuratum-galena- (Sanskrit-*Anjana,* Hindi-*Surma*) cosmetics for the eyes. Dutt, in Materia Medica of the Hindus, (1980:73-74) defines *anjana* or *sauviranjana* as as collyrium for the eyes, synonymous with galena

Savnur (1988:268-9) states that "applications to the eye may be in the form of a paste applied to the eyelids or medicines applied to the lids of the conjunctiva either with a probe or a finger". K.R.L. Gupta (1986:69-70) in his popular interpretation of classical Ayurveda states that medicines such as myrobalan, tumeric, *anjana* and antimony may be moistened and applied to the eyelid. Additionally, "*rasanjana*" (sulphide of antimony) may be mixed with red sulphur of arsenic, black pepper, burnt conch, rock salt "*jagry*" and

honey and applied to the eye with a probe to purify the humors and improve the health of mother and child. S. Kakar, a psychoanalyst who has researched Indian medicine, interviewed a *Hakim* in Delhi who said about *Surma*: "I know of many incidents where people have used urine to make the *Surma*. Because of the urine the eyes will certainly show an improvement but I don't want my eyes to become impure" (Kakar, 1991:18). The type of urine was not specified.

Jaggi, in Folk Medicine (1973a:126, 185) observes that lamp black is almost universally spread on the eyelids of women and children because spirits hate the black color and it helps disguise an individual against the evil eye. Lamp black is produced when a small pot is filled with till oil and the soot is collected on a brass plate as this "lamp's" cotton wick burns. This soot is then applied to the eye with a finger and will help protect the child from the effects of the 'evil eye', which include crying, fever, and diarrhea. Jains believe that black counteracts the evil eye, thus when a beautiful child is taken out, its cheek is marked with black. (Mahapatra, 1969:39)

Other authors refer explicitly or indirectly to classical Indian works in their materia medica. The Ayurveda Saukhyain of Tolurananda (16th century A.D.) is the basis of Dash and Kashyap's Basic Principles of Ayurveda work where 'external cleansing' is defined as "Massage, sprinkling of medicated liquids, ointments and *anjana* (collyrium)...and cutting on the nails" (Dash and Kashap, 1980a:165). The authors refer to the same work in Material Medica of Ayurveda where they list *Nilanjana* (Lead Sulphide) as a cure for eye diseases (Dash and Kashap, 1980b:88). Jaggi (1979:177) appears to be referring to the Rasa-Ratna-Samuchaya by Vagbhata (13th century A.D.) as he defines the following:

"*Anjanas* (collyriums)-compounds of antimony used as cosmetics for the eyes". The different types are: "*Sauviranjana*- mostly galena and lead sulphide", "*Srotanjana* and *Nilanjana*"-sulphides of antimony, "*Rasanjans*"-extract of the wood of Barberis Asiatic

However the introduction of Vagbhata's Astangahrdayasamhita claims the author lived during the mid seventh century A.D. (Vagbhata, 1965). In this work, Vagbhata specifically recommends galena as a collyrium to treat a variety of symptoms, including indigestion, nausea and thirst (Vagbhata, 1965: 84-85).

The History of Chemistry in Ancient and Medieval India contains references from The Rasahridava of Bhikshu Govinda (ca. 700-1300 A.D.) including "*anjana*- sulphide of lead and antimony (Rav, 1956:148). References to *sauviranjana, strotanjana* and *nilanjana* similar to those attributed to Vagbhata are found in the Rasaratnasamuchchya (ca. 1300-1550 A.D., Rav, 1956:175).

The Ganj-e-Badaward, an encyclopedic pharmacopeia compiled by Hakim Amanullah Khan in A.D. 1638, contains both Unani and Ayurvedic preparations, among which collyriums are recommended as one of several types of medicines for the eye (Jaggi, 1977:186). Jaggi also appears to be quoting Sushruta (Jaggi, 1973b:75) in recommending the daily use of collyrium to strengthen the eyesight. According to Mitra (1979:154) both Caraka and Sushruta have advocated the antimony collyrium *Sauviranjana* be used daily for the benefit of the eyes. Sushruta is also said to have recommended *Sroto'njana* as the best of all collyriums as it "alleviates the burning and itching sensation in the eyes, removes all local pains, secretions and impurities, increases the range of vision, enables the eyes to

bear the blasts of wind and the glare of the sun and guards against inroads of ocular infection" (Mitra, 1979:154).

Most of these classical texts are not easily found in full English translation. However, one of the most important Ayurvedic texts, The Caraka Samhita (dating between 2 B.C. to 2 A.D.) is available (Caraka, 1949), and recommends the use of collyriums in a variety of contexts. Antimony collyrium was prescribed for everyday use, although to be used only for "draining the eye at night" as use during the day weakens eyesight on exposure to sunlight (Caraka, 1949:(5):28). Collyriums containing antimony sulphide were further recommended as a treatment for itchy eyes, cataracts, and dimness of vision. This *Surma* was prepared as follows: "the wise physician should place antimony sulphide in the mouth of a dead black cobra for a month and taking it out, triturate it adding half that quantity of dried jasmine-buds and rock salt. Made into a collyrium this is the best remedy for dimness of vision"(Caraka, 1949(5):856).

Caraka prescribed collyriums in general to cleanse the eye, comparing the action of an eye salve to the removal of tarnish from gold ornaments.(Caraka, 1949(5):28). Collyriums of various other compositions (not necessarily containing antimony) were recommended for treatment of relapsed fever, epilepsy, insanity, spirit possession, fevers, (Caraka, 1949, (5):544), snake bite, chronic poisoning, acute poisoning, drowning, leprosy (Caraka, 1949(5):621), vision impairment, acute intestinal irritation, fainting and alcoholism among others. These medicinal collyriums were composed of various biles, urines, rock salt, botanicals, etc. (Caraka, 1949(5):791).

In his comprehensive book The Wonder that was India (1967:207), Basham reports that in the early Christian era, the Kama Sutra detailed the daily toilet of the men of the time. In the morning a man would wash, clean

his teeth, anoint his body with ointments and perfume, put collyrium on his eyes and dye his teeth with red lac. Additionally, Basham claims that around 500-1000A.D (his dating is unclear) collyrium or eye-salve (usually powdered antimony) was popular among both sexes both as a cosmetic and for the prevention of ophthalmia (Basham, 1967:212).

Surma, usually but not exclusively in the form of antimony sulphide, appears in a variety of South Asian medical texts. These works demonstrate the consistency of its presence through time, supporting the contention that *Surma* use in South Asia today is part of an ongoing tradition spanning hundreds, even thousands of years. *Kajal* was not found to be recommended as a medication in any of the publications studied.

Surma in Islamic Literature

Although there is an oral Muslim tradition wherein the Prophet Mohammad wore *Kohl* or *Surma* during his lifetime, I was not able to locate written references that codify that usage. The closest I was able to come was a passage in Muhammad the Prophet that describes Mohammad as a child:

> ...also found that the lad was neat and well-behaved. While the other children were untidy having their hair straw-like and uncombed and eyes uncleaned and watery he would always have his hair well kept and his eyes well treated with eye salve (Abduraheem, 1971:67).

This reference to eye salve could very well mean *Surma*, the term having been generalized in the translation. However, since the author does not mention the original source for this passage, it was not possible to track

down either an alternate translation of the work or an original Arabic version. The question of whether Mohammad's use of *Surma* is a written as well as an oral tradition therefore remains unconfirmed.

Surma or *Kohl* is mentioned occasionally in Islamic literature, usually to indicate adornment, or the lack of it to symbolize mourning. For example, in Muhammad the Prophet (Abduraheen, 1971:790), during a pilgrimage:

> Meanwhile, Ali also had joined the party from Yemen. As he met his beloved wife Fatima dressed in her best with collyrium around her hazel eyes, he was a little bewildered by her appearance

According to Glubb (1970) and several informants, the two most reliable and respected works of Hadith are by Bukhari and Muslim. The Prophet Muhammad himself gives directions for widows in mourning not to wear *Kohl* in The Translation of the Meanings of Sahib Al-Bukhari (also known as the True Traditions, originally written 9th century A.D.)(Khan, 1981). A woman came to the Prophet and asked him if her daughter, who had just lost her husband, could use *Kohl* to treat an eye disease from which she suffered. The prophet replied "no", two or three times (Khan, 1981:191). There are several additional references in this work which stress the inappropriateness of a woman wearing *Kohl* while in mourning (Khan, 1981:192, 193, 194, 198). Muslim (1987:595) refers to *Kohl* in a medicinal context when one man forbade another to use antimony on his swollen and sore eyes when he learned that the Prophet had used aloes on his own eyes instead. Rahman does not refer to *Kohl* in Health and Medicine in the Islamic Tradition (Rahman, 1987).

In The Life of Muhammad, a translation of Ishaq's Sirat Rasul Allah originally written 752 A.D. (Ibn Hisham, 1968: 641), when eighty riders came

to the Apostle to announce they had accepted Islam, they came with eyes blackened with *Kohl* and wore striped robes bordered with silk. They then tore off the silk when asked by the Prophet why they had silk robes around their necks. In the same work (Ibn Hisham, 1968: 644) a Muslim who had been imprisoned tells his wife to "Paint not thine eyes with *Kohl*, Salma, after I am dead".

Kohl is again referred to The Life of Muhammad (Ibn Hisham, 1968:795), where in mourning the apostle, Hassan b. Thabit said "What ails thine eye that it cannot sleep. As though its ducts were painted with the *Kohl* of one suffering from ophthalmia. In grief for the guided one who lies dead?" These references suggest that in Islamic culture, the use of *Kohl* may be approved of for cosmetic and medicinal purposes, but it is not considered appropriate for solemn occasions such as mourning.

Ayurvedic and Islamic Medicine: Relationships To *Surma* and *Kohl*

The Ayurvedic tradition of which *Surma* and *Kajal* are a part is a textually based, classical medical system found throughout South Asia (Lambert, 1992). In reality, rather than existing in the pure, traditional form, it blends so thoroughly with other local medical traditions (Islamic or Unani in the North, Buddhist on Sri Lanka and allopathic medicine and local folk traditions everywhere) that some authors have argued that true, classical Ayurvedic medicine is rarely found in practice (Nordstrom, 1988, Nordstrom, 1989, Waxler-Morrison, 1988). Nonetheless, because of Ayurveda's pervasiveness in India, it is important to have at least a passing familiarity with some of the tenets and activities associated with this tradition.

"Ayurveda" translates roughly as "knowledge of life". (Goldman, 1991). Ayurvedic practitioners, or "*Vaidyas*" (Lambert, 1992) counsel patients to improve their health by harmonizing the mind and the body. This can be accomplished through herbal remedies, massage, yoga and pulse diagnosis (Goldman, 1991). Herbal preparations are classified into three categories; vegetable products, animal products, and metals and minerals. Vegetable products are the most common and metals and minerals the least frequently used in general, but lead and mercury in particular are very important medicines in Ayurveda (Smitherman and Harber, 1991). *Silajeet*, a "kind of gelatinous substance secreted from the sides of the mountains when they become heated by the rays of the sun in the months of June and July" (Jaggi, 1973b:142) is said to contain lead, copper, tin, gold and iron. It is considered within this tradition to be heat-producing and body-purifying. When it is taken appropriately, *silajeet* is credited with the successful treatment of diabetes, leprosy, epilepsy, insanity, elephantiasis, consumption, oedema, haemorrhoids, internal tumors, jaundice, and chronic fever. "Indeed, there is no such bodily distemper which does not yield to its curative virtues" (Jaggi, 1973b:142).

Ayurveda is also a humoral system. Often characterized by a hot/cold dichotomy, substances, illness and treatments actually reflect a complex set of relationships between the three humors (wind, bile, and phlegm), six savors (sweet, acid, salty, acrid, bitter and astringent) and ten pairs of contradictory qualities (heavy/light, cold/hot, victuous/dry, sluggish/lively, solid/liquid, tender/hard, desiccant/lubrifying, smooth/rough, subtle/crude, and viscous/fluid) (Zimmerman, 1988). Diseases are classified differently by various authors, but may be considered to arise from conditions such as defects of semen and blood, improper conduct, improper

diet, wounds, fear, anger, excesses of cold or heat, lack of hygiene, transgressions against gods and elders, and black magic and sorcery, among others (Jaggi, 1973b:123).

The place of substances such as *Surma* and *Kajal* in this scheme appears to be that of cooling agents. Many afflictions that *Surma* and *Kajal* are supposed to prevent/cure are associated with the hot sun and wind of the Indian sub-continent. Informants indicate that both *Vaiydas* (Hindu) and *Hakims* (Unani, Muslim) prescribe *Surma* in the same fashion for similar purposes. Islamic medicine is also based on a set of humoral balances, but it evolved separately from Ayurveda, is based on classical Greek medicine, and developed in Persia (Bhopal, 1986b). While some substances may be expected to differ in categorization between the two system, the properties of *Surma* appear to correspond. An interesting observation is that while application of *Surma* containing camphor initially stung and then cooled my eyes, *Surma* with no noticeable camphor lacked apparent effect. Yet all *Surmas* are considered cooling, regardless of herbal ingredients. Therefore simple physical sensation may not be the exclusive reason for this classification.

In conclusion, this chapter illustrated the variety of aesthetic, religious and medical virtues attributed to these compounds in the different cultures of the Indian subcontinent.

ETHNOGRAPHIC METHODS

CHAPTER 5

ETHNOGRAPHIC METHODS

Research Objectives

As the South Asian population in Winnipeg is of substantial size (approaching 10,000 people), and no immigrant group in North America had been sampled regarding its use of these products, I set out to determine the frequency and the context of the use of *Surma* and *Kajal*, as well as to collect samples for chemical analysis and microbial analysis (testing for bacterial contamination). As initial investigations suggested that complex and ancient beliefs were associated with these practices, interviews rather than questionnaires were conducted to gain as much contextual information as possible. I designed my research plan to;

1: Determine the frequency of *Surma/Kajal* use locally

2: Catalogue the motivations/characteristics of individual users of *Surma* and *Kajal*

3: Collect information regarding the historical, religious, medical, aesthetic and symbolic associations of *Surma* and *Kajal*

4: Consider the use of *Surma* and *Kajal* in the context of immigration and acculturation

5: Collect samples of *Surma* and *Kajal* from informants

6: Determine their potential risk to health through laboratory testing and review of appropriate medical literature/knowledge

7: Use ethnographic data, if such risks exist, to find the most culturally appropriate, and the most effective methods of informing the South Asian population and discouraging the use of such preparations.

8: Inform local/national medical community of potential risks within their patient populations.

9: Encourage further research where appropriate

To the best of my knowledge, this is the only study of the use of *Surma* and *Kajal* to be conducted in North America and the only one to combine ethnography with chemical and microbial analysis. It should thereby provide the most complete picture of the use of such traditional preparations within any community yet studied and be of value to researchers concerned with health issues of immigrant groups in other parts of the world.

Access to the Field:

Access to the South Asian community was gained through a variety of pathways. Referrals from Dr. Terence Day and referrals from friends and colleagues served to help make important initial contacts. The leaders of student, community and religious groups were contacted, in most cases interviewed, and used to identify a variety of additional individuals from India, Bangladesh, Pakistan, and Sri Lanka. Requests for interviews were usually made over the phone. Response was largely positive, if somewhat puzzled on occasion and only twice was my request for an interview turned down. Additionally, two of these potential informants requested the interview be held over the phone. These communications were not

particularly successful: telephone conversations were usually brief and formal in structure in comparison to personal interviews. People rarely wished to talk for more than 20 minutes over the phone and seemed less likely to volunteer information about critical variables such as age and socio-economic standing. In all other cases the appearance and value of the home, with the occupation(s) of its inhabitants was used to determine socio-economic status. When pictures of family members were prominently displayed, it was a simple matter to initiate conversations about family structure and values.

Additionally, I attended community events such as religious celebrations to observe behavior and appearance, make contacts, and establish a presence in the community (i.e. to show that I was seriously interested in the people and their culture).

The Sample

The sample used in this study was not randomly chosen, but rather a form of "snowball sampling". In this form of sampling, each individual contacted is asked to provide the names of others in their community that may be contacted for a future interview (Bernard, 1988:98). I also encorporated "judgement sampling" where the ethnographer uses his or her own knowledge of the population to select representatives with certain characteristics (Honingman, 1970:268-270) to ensure that people of various ages, backgrounds and religions were included in the sample. These forms of sampling cannot be said to be representative.

Fifty (50) interviews with members of Winnipeg's South Asian population were completed. I had some control over the representation of

members of the three main religious groups in the South Asian population (Sikh, Hindu and Muslim) because the three groups represented essentially autonomous communities with limited interaction between them. For instance, if a Hindu were to refer me to a Muslim it was usually because they had a neighbor or a colleague of that religion, not a close personal friend, and vice versa. No one outside the Sikh population could or would refer me to Sikh individuals, although I frequently requested such a referral. Through persistence I was able to ensure that members of all three religious groups had reasonable representation in my sample.

I tried systematically to avoid any bias in my sample. However, because I was relying on the judgement and kindness of others to provide me with contacts, certain types of people were referred to me more frequently than others. Many of those I interviewed were community leaders, had relatively outgoing personalities, and had either academic or professional backgrounds. These individuals were seen by their peers as more sympathetic towards students and/or comfortable and familiar dealing with outsiders. They were also very fluent in English. Additionally I was referred to people who were considered "close to my (traditional) culture" more so than average.

As such, it was difficult to convince people that I was also interested in speaking to young, less educated, poorer or less traditional people. Naturally, informants wanted to refer me to those whom they felt would help me the most; those who would know the most about *Surma/Kajal* and who would be the most comfortable talking to me about it. I suspect as a result, middle aged professionals may be overrepresented in my sample.

Interview Structure and Dynamics

Interview structure was informal. Agar (1980:90) defines the informal ethnographic interview as "a repertoire of question asking strategies from which you draw as the moment seems appropriate". Apart from two telephone conversations, all interviews were conducted in person; usually in the informants home, but occasionally at their place of business or worship and on one occasion in my home. My original intention was to tape record the interviews but I soon found that people were much more comfortable having an informal "chat" so I abandoned the notion of taping the interviews. I always had the recorder available in case I was unable to accurately record conversation in my notes. I always presented myself in a modest and appreciative manner, and particularly so when I was visiting elderly or conservative individuals.

My interviews were usually scheduled with a female adult member of the home, but often her husband would join us if he were home. Sometimes other family members would join as well. In one home I had three generations of women present simultaneously. Fortunately the senior female was generally deferred to in a group conversation else chaos would have reigned. Six interviews were with an adult male person. These were usually community leaders and interviews were held at their place of business. I found that the women interviewed were generally more knowledgeable about the traditions surrounding the preparations in question, but on occasion men possessed additional technical, historical or religious information that made their participation invaluable.

As a student, I found that people were usually very friendly and sympathetic and probably more willing to help than they would have been

to someone who approached them under the mantle of a "professional anthropologist". As many had children at or near University age, they were inclined to be patient. Many were genuinely pleased at my interest in their culture and stated my inquiries had stimulated their interest in the subject as well. *Surma*, they would say, was just something that was there. They didn't think about how it might work or what might be in it. As a result, all were quite willing to donate a sample of their cosmetic for testing if they had it and others offered to obtain some from India/Pakistan etc. for me. Two samples and two traditional containers were eventually provided in this manner.

As I am a white female, and as I indicated, *Surma/Kajal* are not often thought consciously about, informants were often puzzled by my interest in these preparations. While many eventually started to consider the project interesting in its own right, a minority continued to think I was barking up a rather dull tree, but fortunately bore my questioning with good humor and hospitality. As a female, I found that in general my conversations with female informants were of a less formal and more personal nature than interactions with male informants. Although men were all friendly and helpful, they were less likely to divulge personal, anecdotal information. While questioning male respondents, I often found it necessary to ask more direct questions than I would of female subjects. During the interview that took place in my home, the informant, a middle aged male Sikh, spent the evening politely answering my questions and musing about his traditions while looking almost exclusively at my husband. I also learned to bring my husband along when I had business to attend to with priests at Sikh *Gurdwaras* (temples) as the presence of a chaperone made the subjects more

comfortable. In one case I was specifically requested to bring along a companion.

Although most interviews were conducted in English, four were conducted with the aid of an interpreter, either a family member or close friend graciously lending their time for the purpose. As with any interpreter, the possibility of information being added, dropped or modified existed. It was not uncommon, for example for a rather lengthy description being abbreviated to a few short sentences upon its "translation". Also, disagreement in what the 'correct' answer was occurred on occasion between informant and translator. Although I did my best to clarify these contradictions, it was not always possible. If the interpreter was unrelated, the suggestion that different families had different traditions was usually sufficient to clear things up. If members of the same family, however, were in disagreement, they were often extremely reluctant to even share the nature of the disagreement with me. In particular in more traditional groups, the women would defer to the eldest lady, or the wife to her husband. Similar difficulties occurred occasionally in English language interviews, where informants would lapse into their native language to disagree or clarify information before presenting it to me in English.

Language barriers also became a problem when interviewing individuals of indeterminate fluency in English. Learned individuals who did not speak English when within their community tended to cope reasonably well with formal, structured English, but idiomatic language was incomprehensible to them at times. Additionally there were occasions when I asked a question and was answered as if I had asked a different question or had the subject changed on me altogether. This would beg the question of whether the informant misunderstood or were using their lack

of fluency as an excuse to avoid discussion of uncomfortable topics. Rephrasing and repeating the question could be considered rude in such cases, so occasionally I had to allow the subject to be changed.

Information was gathered to determine the frequency of *Surma/Kajal* use, the reasons for its use/disuse, and the demographic and socioeconomic characteristics of its users. Interviews usually took the following format: I introduced myself, stated the goals of my research and discussed some of the progress of my research (when appropriate). I would then usually ask what the subject could tell me about *Surma* and *Kajal*, specifically what the substances were, and how and why they were made if that information wasn't automatically volunteered, which it frequently was.

During the course of the interview, I would use appropriate moments to elicit information about family and household, family history, and personal and demographic information. When necessary, I would ask explicit questions to obtain such information. Questions about *Surma* and *Kajal* use within the household were usually asked directly, as that information was too important to risk a casual generalization. The religion of the informant was usually known to me prior to the interview (due to conversation with whoever gave me the referral), but the decor of the household and dress of its inhabitants, and the content of the interview itself confirmed this. Finally, informed consent (verbal) was obtained and further referrals were requested.

OBSERVATIONS

CHAPTER 6

OBSERVATIONS

Interviews were informal. I avoided asking direct questions whenever possible, and conducted the interview with the intent of gathering information on the following topics:

Age/Gender of subject
Household composition
Contact with Mother/Father, In-Laws if not part of household
Time of immigration to Canada
Birth Country/language
Religious affiliation
Occupation
Occupation of spouse
Socio-economic status
Surma or *Kajal* use in household, who uses it, how frequently
Use of other topical preparations
Past use
Reasons for use
Reasons for disuse
Influence of religion on use
Possible medicinal qualities
Warding off evil eye and its physical manifestations
Influence of extended family on use
Paths of acquisition
Preparation in the home
Components of preparation
Knowledge of lead content
Change in use pattern since move to Canada
Referrals to other knowledgeable persons

Frequency of Use of *Kajal* and *Surma*

The primary purpose of conducting ethnographic interviews within the South Asian population was to determine the frequency of local use of *Surma* and *Kajal*. The following figures reflect the number and percentage of households where one or more individuals admitted to currently use *Surma* or *Kajal* on at least an occasional basis. Many interviews resulted in the gathering of data in a multi-generational context. Since a preparation in use by one member of a household may be opportunistically used by other inhabitants, I chose to analyze the data on the level of the household as a unit.

Kajal was found to be used by 12/50 (24%) of households, while *Surma* was used by 9/50 (18%) of households sampled. As the figures show, *Surma* and/or *Kajal* is presently in use in a substantial number of households. This use can be examined further by studying specific variables potentially associated with use and looking for potential associations and explanations for those associations when apparent. The following are the variables that have been considered at this time:

Age If the age of the principal informant was an important factor i.e. if the use of *Surma/Kajal* was declining over time, a corresponding pattern should be present between age cohorts. Please note that "age" refers to the age of the principal informant, while use is recorded by household. Therefore, while the great majority of principal informants (or their spouse who is of a similar age) were also the users of these products, in a few cases,

the user was a member of a different generation within the family (mother, daughter, etc.).

(See Table 7) Both *Surma* and *Kajal* use were found to increase with a corresponding age in the informant. Use was lowest in the 25-35 year age group and increased thereafter. The use of *Kajal* was maintained in a somewhat younger age group (36-50 years) in a greater percentage than *Surma*. This is not surprising considering the greater availability of *Kajal* for purchase locally and the ability to purchase *Kajal* in pencil form, more convenient and 'modern' than the powder and stick form of *Surma* (which is not readily available in local stores).

Socio-economic Status (Table 8) Socio-economic status was estimated by a combination of occupation of informant and type and value of residential property. Questions about household income were not asked in the interviews and the scale used is therefore not necessarily comparable to similar scales in other studies. The categories assessed and assigned were as follows:

Student: University Student maintaining their own household.
Lower: Employed, living in apartment
Middle: Employed, homeowner with property valued <80,000
Upper: Employed, homeowner with property valued 80,000-120,000
Professional: Employed, homeowner with property valued 120,000+ and/or Professional occupation i.e.) Physician, University Professor, etc.

Use of both *Surma* and *Kajal* is found in almost every socio-economic category. It is significant to note that the use of these products

Table 7 *Surma* and *Kajal* Use by Age of Informant

Age	Total Responses	*Kajal* Users	%	*Surma* Users	%	Either	%
25-35 yrs	16	1	6.25%	2	12.50%	2	12.50%
36-50 yrs	21	7	33.33%	3	14.29%	9	42.86%
51+ yrs	13	4	30.77%	4	30.77%	6	46.15%

Table 8 *Surma* and *Kajal* Use by Socio-Economic Status

Rating	Total Responses	*Kajal* Users	%	*Surma* Users	%	Either	%
Student (Avg. age 31 yrs)	10	2	20.00%	0	0.00%	2	20.00%
Lower (Avg. age 31.25 yrs)	4	1	25.00%	1	25.00%	1	25.00%
Middle (Avg. age 49.1 yrs)	15	1	6.67%	5	33.33%	4	26.67%
Upper (Avg. age 46.1 yrs)	7	4	57.14%	1	14.29%	5	71.43%
Professional (Avg. age 52.1 yrs)	14	4	28.57%	2	14.29%	5	35.71%

does not seem to have been abandoned completely by any segment of South Asian society. The use of the two cosmetics does, however, appear to be most prevalent in slightly different socio-economic levels. The use of *Kajal* is concentrated in the upper and professional classes, while *Surma* is mostly used by the lower and middle classes.

Urban/Rural Origin (Table 9) Both *Surma* and *Kajal* are seen to be used in Households originating from both rural and urban areas. *Kajal* use was predominant among urban residents, while *Surma* was used primarily by those with rural origins. This is surprising, as *Kajal* is prepared from materials already found in the home, and is extremely easy to prepare, and therefore would be thought to be popular among rural residents, while *Surma* or the rock it is ground from must be purchased. This may be partially the result of a tendency for city dwelling women to be exposed to Western influences, as a *Kajal* pencil is similar to a Western eye-liner. Additionally, it is arguably more portable than *Surma* and easier to apply, and would again appeal more to urban dwellers. Some informants reported that *Kajal* manufacturers began marketing their product aggressively in the 1960s and continue to do so. Such campaigns are more likely to reach urban residents.

Mother Tongue (Table 10, Illustration 7) When use of *Surma/Kajal* is examined according to the mother tongue of the informant, and that distribution is compared to a simplified Language map of South Asia, the overlapping spatial distribution of these preparations (as represented by the sample) can be observed. The use of *Surma* is restricted to Pakistan, Bangladesh, and North India, while *Kajal* appears to be used throughout the

Table 9 *Surma* and *Kajal* Use by Urban/Rural Origin

Origin	Total Responses	*Kajal* Users	%	*Surma* Users	%	Either	%
Urban	34	10	29.41%	4	11.76%	13	38.24%
Rural	8	1	12.50%	3	37.50%	3	37.50%

Table 10 Use of *Surma* and *Kajal* by Mother Tongue of Informant

Language	Total Responses	*Kajal* Users	%	*Surma* Users	%	Either	%
Urdu (N.W.C.) (Pakistan, U.P.)	6	2	33.33%	4	66.67%	4	66.67%
Punjabi (N.W.C.) (Punjab)	14	1	7.14%	2	14.29%	1	7.14%
Hindi (N.C.) (U.P.)	5	3	60.00%	0	0.00%	3	60.00%
Bengali (N.E.) (Bengal, Bangladesh)	11	1	9.09%	2	18.18%	3	27.27%
Gugrati (W.C.) (Gugrat, Bombay)	2	2	100.00%	0	0.00%	2	100.00%
Tamil (S.) (South India, Sri Lanka)	5	2	40.00%	0	0.00%	2	40.00%
Singhalese (Sri Lanka)	1	0	0.00%	0	0.00%	0	0.00%

Illustration 7 Simplified Language Distribution Map of South Asia

(After Schwartzberg, 1992:100)

region but most frequently in the central and southern regions of India. This may be seen as support for the hypothesis that *Kajal* is an indigenous product, originating in South Asia, while *Surma* is an import with origins in the Middle East.

Number of Years in Canada (Table 11) The use of *Kajal* is the highest in that group of individuals that has been in Canada the longest time; (20+) years. This difference may reflect the fact that (as reported by several informants) use of traditional products is decreasing in South Asia. Young women there are more likely to use commercial eye-liner and therefore more recent arrivals to Canada are also more likely to use it. Individuals whose period of residence has been longest are more likely to reflect the popular customs of their youth in their homeland. The same pattern is not seen in the use of *Surma* where the intermediate group (6-20 yrs) has the highest frequency of use, and the overall differences in the frequencies between groups are much smaller. This suggests that *Surma* use is not declining at the same rate as *Kajal* use in South Asia or that the motivations of *Surma* users differ in some way from that of *Kajal* users. Specifically the medicinal and religious values attributed to *Surma* may have remained more constant over time.

Religion (Table 12) All informants belonged to one of four religious groups; Hindu, Muslim, Sikh or Buddhist. Because there was only one Buddhist respondent, this category was not included in the analysis. Use of *Kajal* among the Hindu group and *Surma* among the Muslim group were quite high, while any other use of either substance by any of the groups was considerably lower (but still significant at 7.69 to 15.38 percent). This reflects a reality frequently reported by informants in interviews; that use of *Surma*

Table 11 *Surma* and *Kajal* Users by Number of Years in Canada

Years in Canada	Total Responses	*Kajal* Users	%	*Surma* Users	%	Either	%
1-5 yrs (Mean age 38.8)	15	3	20.00%	2	13.33%	4	26.67%
6-20 yrs (Mean age 44.5)	17	3	17.65%	4	23.53%	5	29.41%
20+ yrs (Mean age 49.17)	9	4	44.44%	1	11.11%	5	55.56%

Table 12 Use of *Surma* and *Kajal* by Religion of Informant

Religion	Total Responses	Kajal Users	%	Surma Users	%	Either	%
Hindu	23	10	43.48%	2	8.70%	11	47.83%
Sikh	13	1	7.69%	2	15.38%	1	7.69%
Muslim	13	1	7.69%	5	38.46%	5	38.46%

is more common among Muslims. This is likely a reflection of its ties to the Middle East and symbolic value within Islam. Some Muslim informants related the story of Moses on the Mount as further indication of the ties between *Surma* and Islam. The story is told as follows (from a variety of oral recitations):

> The prophet Moses wanted to know what the appearance of God was. God refused, saying that Moses could not bear to witness his illumination. Moses persisted (Moses was a particularly "pushy" prophet) and finally God relented, lifting one of the many veils he wore (or exposed the tip of his little finger, or allowed one shaft of his illumination to fall). The light from this exposure (suggested by one to be the burning bush) instantly caused the rock next to Moses (or the mountain, Mt. Sinai) to combust and turn to ash. That mountain is where *Surma* comes from (or originally came from).

The frequency of the use of *Kajal* among the Hindu group is a reflection not only of its long use among the people of the Indian sub-continent, but also its use in traditional dance. Cosmetics and ornamentation in general seem to be emphasized among the Hindus more so than among either of the two other groups. In traditional professional Indian dance, *Kajal* is worn with other decorations not only to make the eyes appear larger and more beautiful, but also to exaggerate it and increase their visibility. A dark elongated line of *Kajal* drawn all around the eye allows dramatic eye movements and facial expressions to be more apparent to the audience. As demonstrated to in an instructional video prepared locally, this application (whether *Kajal* or any other eyeliner) is extremely effective. Although formal dance is not barred to non-Hindus, it is traditionally associated with Hindu (Shivite) temples and is essentially a Hindu tradition in South Asia. This appreciation for dance and its

ornaments may be one reason the use of *Kajal* has persisted into modern times. Certainly I have been told that local amateur and professional dancers of the several Indian dance troupes and schools in Winnipeg wear *Kajal* as a part of their accoutrement, although some do prefer liquid eye-liner.

The Sikhs share cultural and religious values with both the Hindus and the Muslims. The use of *Surma* among the Sikhs is intermediate between Hindu and Muslim use. Sikhs who were interviewed demonstrated greater general knowledge than Hindus of the uses of and preparation of *Surma*. Their familiarity with the material matched that of the Muslims. If asked whether *Surma* or *Kajal* was more commonly used in their region of origin, a Sikh informant would be just as likely to answer *'Kajal'* as *'Surma'*.

Risk of future *Surma* and *Kajal* Use(Grouped by Religion) (Table 13)

Besides recording the frequency of the use of *Kajal/Surma,* I also endeavored to identify which households had characteristics that could lead to future *Surma* or *Kajal* use. A household was considered at risk for future use if: *Surma* and/or *Kajal* were presently in use, they had recently been used, there was *Surma* or *Kajal* in the house, though not presently in use, members of the household had put *Surma* or *Kajal* on their children in the past (future children or grandchildren may be affected), or if a non-resident family member had applied the substance(s) to a household member in the past.

The biggest difference in the distribution between this and the previous category was the increased likelihood of the use of *Surma,* and to a lesser extent *Kajal* among the Sikh population. This is directly related to the

Table 13 Risk of Future *Surma* and *Kajal* Use by Religion of Informants

Religion	Total Responses	*Kajal*	%	*Surma*	%	Either	%
Hindu	23	14	60.87%	4	17.39%	15	65.22%
Sikh	13	3	23.08%	6	46.15%	6	46.15%
Muslim	13	5	38.46%	6	46.15%	7	53.85%

fact that Sikh households in Winnipeg are more likely to be multi-generational than households in the Hindu or Muslim categories. Thus, if parents are too busy or too 'modern' to bother with traditional practices, grandparents, who share in child care, may be available to continue such traditions. I suspect that in a broader sampling of Sikh families, or if these households were monitored over time, a larger percentage of households may be found to employ *Surma* and/or *Kajal*.

Reasons for the Use of *Surma* and *Kajal*

Explanations given for *Surma* and *Kajal* use were varied and correspond with many of the literary sources already discussed in this text. The following are those reasons given, not necessarily in the order of their importance. Religious and regional associations are discussed where appropriate.

Surma

Cosmetic *Surma*, like *Kajal*, is considered an important cosmetic. Hindu, and to a lesser degree Sikh women have an entire arsenal of traditional and modern cosmetics at their disposal. Muslim women, however, are often discouraged from wearing any cosmetics other than *Surma*, so it is particularly important to them in this capacity. *Surma* is considered to be more subtle in appearance than *Kajal*, especially if applied the day before, and is preferred by some for that reason. *Surma*, as a cosmetic, is worn by women and children, and although *Surma* is said to have once been worn by men for cosmetic purposes, this is a practice that is currently rare in India, and unknown in Canada among the informants.

Medicinal *Surma's* value as a medicine takes primacy over its use as a cosmetic. White *Surma* is used exclusively for the treatment and prevention of ocular disorders, while black *Surma* serves both medicinal and cosmetic functions. When used for medicinal purposes, *Surma* is applied at night, in this way even men may use it as its appearance is considerably faded by morning. A variety of *Surma* preparations are available for various purposes, and they are employed as much for their curative properties as for their preventative properties. Like *Kajal, Surma* is considered to strengthen and cleanse the eye and to prevent the need for eyeglasses, although *Surma* is usually considered to be the more powerful medication in areas where both *Surma* and *Kajal* are common. Among most Hindu and Muslim subjects, *Surma* was considered too strong a medication for infants and too difficult to apply to them (with a rod rather than with the finger). The use of *Surma* was therefore reserved for adults only, or for older children. However, among many Sikh respondents, *Surma* was considered to be an appropriate and preferred product for use on infants. Some women claimed that if they didn't apply *Surma* every day their eyes immediately became irritated. *Surma* was seen by some to be pure and harmless, and as a natural substance to be hypo-allergenic.

Warding Off the Evil Eye *Surma* is also used, in the form of a dot on the face, ear, etc. of a child among groups that employ *Surma* for other reasons. The majority of informants, however, considered *Surma* inferior to *Kajal* for this purpose because as a powder, it does not adhere to the skin as effectively as *Kajal.*

Religion (Muslim) Because *Surma* is said to have been worn by the prophet Mohammed, Muslims will wear *Surma* in an exercise of veneration and admiration. As previously stated, some Muslim women feel that *Surma* is the only cosmetic they can wear and be true to their faith, and even men, particularly on Fridays or on religious holidays such as *Eid* (the festival following the month of *Ramadan*), may apply *Surma* to their eyes as a devotional exercise.

Habit No real reason to quit. A practice that had been maintained for several years and become part of a daily routine. Those who used *Surma* often could not state a specific reason for the practice. Sometimes they mentioned 'tradition', implying cultural or ethnic association, and in fact I feel that maintaining cultural identity is an important motivating factor for many such users. They, however, were more likely to see their behavior as the result of simple familiarity with the products: they had used them for so long that they didn't feel "right" when they didn't.

Younger women who wore *Surma* did so almost exclusively because of its association with Islam. Their mothers and grandmothers, while frequently mentioning Islam in their reflections, seemed equally motivated by *Surma's* tonic and curative properties. They were also likely to claim that they felt very uncomfortable when they didn't wear *Surma* after so many years of daily use.

Reasons for Not Using *Surma*

Individuals who did not wear *Surma* were likely to give one of the following reasons as to why: too old-fashioned, too messy, stings the eyes, bad for the eyes (gritty, infections), can't get it here, use eye drops instead, too difficult to apply, afraid of scratching a baby's eye, or not a tradition in my area.

Kajal

Cosmetic Kajal's primary use seems to be that of a cosmetic, especially when used by an adult. *Kajal* is worn exclusively by adult women and children of both sexes. Large, dark eyes are considered to be symbols of beauty throughout South Asia, and *Kajal* worn in (the conjunctivae of) the eye and occasionally around the eye help illuminate and decorate this beauty. *Kajal* may be used on infants from almost the time of birth onwards. *Kajal* may be used as a symbol of joy, and is frequently worn by traditional dancers.

Medicinal *Kajal's* medicinal properties may perhaps best described as similar to those of a tonic rather than a strong curative medicine; a general, all-purpose preventative and health generating preparation. *Kajal* is often thought to protect the eyes from the effects of the sun (dark color) and wind (by clearing dust out of the eye). It is thought to prevent eye diseases, particularly *Kajal* that contains camphor, mint or another medicinal herb. *Kajal* made with mustard oil is considered beneficial as mustard oil is also a medicinal product. When *Kajal* is applied to the eyes of infants it is thought

to strengthen the eye and reduce the likelihood that the child will need prescription eyewear later in life.

It should be noted that people whose origins were in the northern regions of South Asia (North Asia, Pakistan, and Bangladesh) where *Surma* is also common were less likely to extol the virtues of *Kajal* as a medicine and more likely to consider it a simple cosmetic with minor beneficial qualities. Individuals from the south of India, and to a lesser extent, Bengal, were more likely to be familiar with a variety of *Kajal* preparations which were considered proof against a variety of ophthalmic disorders.

Warding Off the Evil Eye This is a frequently referred to reason for the use of *Kajal* among children. Although a small number of informants thought that application of *Kajal* to the eye would act in this capacity, the overwhelming number felt that *Kajal* did not ward off evil when used this way. Instead, a dot of *Kajal* would be placed on the forehead, cheek, chin, neck, hairline, or behind the ear of the child, thus protecting them from the jealous, negative thoughts of others. Even well-meaning adults, including parents, can direct "*nazar*" (bad sight, evil sight) towards a child simply by focusing too much attention at them, but jealous individuals are usually considered more dangerous. The black dot is considered to act as protection in one or all of the following ways: This 'blemish' spoils the perfection of the beautiful child, making it less likely to be the object of jealousy; the dot distracts the gaze of the offender, preventing their evil gaze from focusing on the child itself; and the black color of the *Kajal* confers protection from evil forces.

Any beautiful child, adult, item of clothing, building, new car, etc.. is potentially at risk for the evil eye. A much admired *saree* may be torn, long

beautiful hair may become tangled, a car may crash, or in the case of an unprotected child, sleepless nights, excessive crying, diarrhea and illness may result. The use of *Kajal* as protection from the evil eye is familiar to individuals from all parts of South Asia, and members of all religious groups spoken to (Buddhist, Hindu, Sikh, Muslim) admit the use of *Kajal* in this context in their home communities. Most informants called this a superstition, not a real concern. Muslims in particular and Sikh priests consider this the belief of the uneducated and/or rural. But, at least one young Hindu couple continues the practice, and several Hindus and Sikhs confessed, in a somewhat sheepish manner, that they think there might "be something to it". So although this behavior may be seen as backwards to some, and not be practised universally, it is still very much a part of the consciousness of the people as a whole.

Habit As with *Surma, Kajal* use likely does relate to the maintenance of ethnic identity. Users often do not acknowledge this and insist that their use of *Kajal* is simply the maintenance of a comfortable habit.

The reasons women gave for wearing *Kajal* differed somewhat across generation. Teenagers and women in their early twenties usually wore *Kajal* as part of their Indian dance costume. Those young women who wore *Kajal* on other occasions often stated its importance in declaring or maintaining ethnic identity. They were unlikely to wear it out of mere habit or for medicinal purposes. Their mothers and grandmothers, however, were more likely to wear *Kajal* out of life-long habit or for its medicinal and tonic properties.

Reasons for not using *Kajal*

Those who didn't use *Kajal* likely gave one of the following as the reason: too old-fashioned, too dark, too greasy, too messy, don't wear make-up, don't have time (children), bad for the eyes (impurities, infections), doesn't look good on me or eyeliner is more readily available.

In summary, the typical *Kajal* user was over 35 years of age, of upper class or professional background, and had urban origins in South Asia. She was likely to have originated in central or southern regions of South Asia, to have lived twenty years or more in Canada, and to practice the Hindu religion. *Surma* users were likely to be over 51 years of age, to have middle or lower class status, and to have rural origins. They hailed from Pakistan, Bangladesh, or northern India, had lived in Canada for six to twenty years, and were Muslim or Sikh. Since approximately 47% of all South Asians in Winnipeg are Muslim or Sikh (see Table 6) and their average incomes suggest that the majority are middle class (see Table 5), *Surma* use may potentially be quite common in South Asian homes in Winnipeg. This distribution would be noteworthy if laboratory testing did indeed determine that *Surmas* used locally posed a threat to the health of its users.

Surma and *Kajal* were used for a variety of reasons. The religious and medicinal benefits of *Surma* were frequently given as reasons for its application. In comparison, the primary use of *Kajal* was that of a cosmetic. Its tonic properties were also frequently referred to, usually in the context of its application to infants and children, but it was less likely than *Surma* to be considered a curative medicine. A dot of *Kajal* on the face was commonly

mentioned as a popular folk means of protection against the evil eye, although some informants tended to minimize this function.

A sample size of 50 was chosen as a number that, hopefully, would accurately reflect trends in *Surma* and *Kajal* use in Winnipeg. Although an ideal sample would of course have been larger, time and financial constraints necessarily limited its size. I can conclude that given the consistency in the knowledge, use, and perception of *Surma* and *Kajal* observed during the gathering of ethnographic data, a larger sample size would have produced very similar results.

Surma and *Kajal* as Ethnographic Art

Throughout this text I refer to *Surma* and *Kajal* as "medicinal cosmetics" to indicate that their role is not purely decorative. In fact, *Surma* and *Kajal* fit quite comfortably into the categories of 'body ornamentation' and even 'ethnographic art'. Ethnographic art has been considered in a variety of contexts. Some of the ways its study has been approached are as follows:

It may be seen as a functional tradition; not creative or aesthetic but rather a practical instrument of communication and purpose. Structural explanations for ethnographic art exist where the psychological and logical internal processes that relate to any art form are focused on. Art may be alternatively be considered an "iconic grammar" (Faris, 1972; 7) its meaning conceivably readable (Faris, 1972;5-8). Ethnographic art may be considered as structured and systematic; it can be best understood when broken down into elements of colors, shapes, etc. (O'Hanlon, 1989;17-19). Faris (1972, 5-8) found that Nuba personal art did indeed have important aesthetic value, contrary

to what other scholars might have led him to expect. Finally, ethnographic art (and body decoration in particular) is a means to harness supernatural power: "Body decoration equips man with the armament necessary to invoke the magic powers which he believes to be inherent in the natural world" (Ebin, 1979;16). In this context it can have therapeutic powers (Gell, 1993:21).

Surma and *Kajal* could in all likelihood be studied from any or all of these perspectives. For the purposes of this thesis, I will consider which of these approaches seem most suited to the study of *Surma* and *Kajal*, given my observations in the field. However, I will not delve into the theoretical issues that could result from such a study at this time for several reasons. Apart from criticisms that have been made of these orientations, in particular the structural approaches by several authors, my research plan did not provide me with the type of detailed focus on ornamentation in general that would be necessary to competently address these issues. *Surma* and *Kajal* are part of a rich tradition in ornamentation; cosmetics, jewelry and clothing are all extremely important in personal adornment. They also vary greatly throughout the Indian sub-continent. An appropriate study of South Asian body art would most effectively involve a detailed and lengthy study in South Asia, not among an immigrant population where traditions have become diffused in a somewhat unpredictable pattern. Any conclusions from such a study in an immigrant group would be considerably weaker and in any case would involve a lengthy stretch of fieldwork focusing specifically on ornamentation. Although a fascinating study unto itself, this is beyond the scope of the present thesis. It is also not necessary in order to answer the questions I initially asked, and so I have chosen not to do so.

Nonetheless, it is apparent that *Surma* and *Kajal* do serve some functions common to other ethnographic art. They have an aesthetic appeal. Eyes adorned with *Kajal* or *Surma* appear larger and are considered to be particularly attractive. *Kajal* and *Surma* fill medical and supernatural functions. They have a communicative function. Wearing *Surma* and *Kajal* expresses joy; this is particularly apparent when a widow in mourning ceases to wear eye cosmetics. This symbolic gesture of loss may in itself cause additional grief to family members. Finally, among immigrant minority groups, *Surma* and *Kajal* use may be used as a declaration of ethnic/religious identity; a particularly powerful and complex "message".

SURMA AND *KAJAL* IN THE RECENT MEDICAL LITERATURE

CHAPTER 7

SURMA AND *KAJAL* IN THE RECENT MEDICAL LITERATURE

I initially became aware of a scientific interest in *Surma* through the discovery of several articles in various medical journals that suggested a) that *Surmas* are frequently characterized by high lead content in the form of Lead Sulphide (PbS) and b) that this lead may be ingested or absorbed in some fashion and thus present a threat to those wearing these products. I shall therefore review the current literature on *Surma* to outline what support exists for the theory that *Surma* use can cause lead poisoning. I begin with an outline of the physiological effects of lead and then look specifically at the issue of lead in *Surma*.

The Toxicity of Lead

Exposure to lead is well known to cause a variety of symptoms including abdominal pain, constipation, vomiting, irritability, drowsiness, ataxia, stupor and fatigue (Waldron and Stofen, 1974:134). As well, low levels of lead have been associated with impaired mental development, hyperactivity (Waldron and Stofen, 1974:127-8), chromosomal abnormalities, increased risk of miscarriage (National Academy of Sciences, 1980:7), neurological dysfunction, fine motor dysfunction, impaired concept formation and altered behavioral profiles (Grant and Davis,1989) and in the most extreme cases, death.

While exposure to lead is considered to be largely a problem of third world countries, industrialized nations may also be susceptible. In Canada there is ample opportunity for human contact with lead from sources such as fossil fuel combustion, waste incineration, lead production, industrial applications of lead, production of other metals, and cement manufacture among others. Lead intake is associated with living downtown or near smelters, with the ingestion of interior paint, with smoking and wine consumption and with consumption of produce from family gardens (Nriagu, 1986:61).

Lead may be breathed in, absorbed through the gastro-intestinal tract, or absorbed through the skin; only in the case of the organic compounds of lead is absorption significant, but traumatized skin absorbs three to four times as much lead as uninjured tissue. Lead is transported by the blood where most of it binds to red blood cells, is taken up by soft tissue including the liver and kidney, and is taken up by bone. Finally, lead is excreted through the gut (feces) and through the kidney (urine) (Waldron and Stofen, 1974:38-59).

The effects of lead on children are much more serious than on adults. This is in part due to the smaller body size of children, meaning higher relative concentration of lead in the body may result, but more importantly due to the devastating impact lead has on the development of the living organism. Lead intoxication commonly leads to the development of lead lines on the skeleton of the child, indications of disruption of growth. When overt symptoms of plumbism are present, diagnosis and treatment can follow with reasonable certainty. However, when there are no clinical symptoms evident, and blood lead levels are less than 60 µg/100 ml, permanent cognitive damage may still result. Faust and Brown (1987)

conducted a matched pair study of children with a past history of moderately elevated lead levels, but who had been without elevated lead levels for at least a year. The experimental group scored lower on measures of motor skill, memory, language, advanced spatial functions and concentration. It is apparent from this and other studies that even relatively low, short term exposure to lead may exert a permanent harmful impact on cognitive functions of the brain.

Lead interferes with the ongoing development of the human central nervous system. As lead is also known to cross the placenta and collect in fetal tissues, overt congenital lead poisoning in infants can occur and does, especially in infants from third world countries (Dietrich *et al.*, 1987). As the developing fetus is particularly susceptible to teratogens, both fetal growth and postnatal behavioral development can be easily impaired.

Dietrich *et al.* (1987) reviewed numerous studies that indicated prenatal exposure to lead is associated with lower birth rate, slower gestation, developmental deficits and minor congenital anomalies. In their own longitudinal study of the effects of chronic low to moderate prenatal lead exposure, the authors found that even with blood levels less than 30 μg/dl (generally considered a "safe" level), an inverse relationship existed between prenatal or neonatal lead levels and scoring on development tests. Neurobehavioral defects were present in infants at three months and at six months after birth. Although umbilical blood levels in women in this study were well within the range considered safe by the National Health and Nutrition Examination survey, levels that are safe for adults are apparently not safe for the fetus. Because of studies of this type, the Center of Disease Control in Atlanta has advocated lowering the cutoff acceptable levels from

30 µg/dl to 25 µg/dl (Guthrie, 1986:323) and Fernando *et al.* (1981) suggest 10 µg/dl is the maximum "safe" blood level for very young infants.

Finally, lead acts as an abortifactant (Dietrich *et al.*, 1987). This has been long known and is attested to by the turn of the century custom of taking Diachylon (lead compound) by British women to induce abortion (Hall and Ransom, 1906). Physicians of the time recorded numerous cases of lead poisoning and deaths in a variety of British counties.

Surma, Kajal, and Lead Content

Lead poisoning has been associated with cosmetic use historically (Hisanaga *et al.*, 1988, Nriagu, 1992:4-21). Although lead sulphide cannot be absorbed through the skin (Waldron and Stofen, 1974:38-59), alternate paths of absorption through the nasolacrimal duct and by finger sucking mean that any lead compound applied to the face is potentially dangerous. All studies that have tested *Surma* and *Kohl* samples for lead content have found alarmingly high lead concentrations. Although there was variety in the samples tested, high percentages of lead were common. Samples ranged from 0 - 91.8% lead (Fernando *et al.*, 1981), 12.8 - 81% lead (Healy *et al.*, 1984), 0 - 88.5% lead (Moghraby *et al.*, 1989) and 80 - 85% lead sulphide (Snodgrass *et al.*, 1973). Pure lead sulphide is 86.6% lead, so some samples were indeed for all practical purposes pure galena.

Ali *et al.* (1978) sorted twenty nine *Surmas* according to color. White Surmas were found to contain little or no lead, black Surmas 12 - 32% lead, and grey Surmas 14 - 80% lead. Galena in its natural form is a metallic grey. Black Surmas likely included significant additions of carbon in addition to

galena. Aslam *et al.* (1979) tested two *Kajals* and one cream "*Surma*" for lead and found only trace amounts.

The dangers of lead-based *Surmas* have been known since at least 1968 (Warley *et al.*, 1968) and concern over the use of these preparations has resulted in a fair amount of attention in Britain and Kuwait, the two countries where the most information on their use is available. It has been illegal in Britain since 1978 to sell or import *Surma* (Smart and Madan, 1990). The use of lead in *Kohl* has been banned in Kuwait (Guthrie, 1988). The Southern Derbyshire Health Authority have worked to raise awareness of health risks associated with *Surma* by running announcements on local radio and television as well as distributing leaflets and giving talks to local Asian groups (Smart and Madan, 1990). Similar measures have been undertaken in other English regions, and some airlines flying to and from the Indian sub-continent and Arab Gulf countries have agreed to carry informative pamphlets (Healy and Aslam, 1986a). Numerous physicians have issued warnings in medical journals (Fernando *et al.*, 1981, Healy and Aslam, 1986b, Guthrie, 1988, Bhopal, 1986c) and tests for lead simple enough to be used in the home by visiting community health workers have been devised and published (Healy and Aslam, 1984).

Surma and Plumbism

In 1973, Snodgrass *et al.* reported plumbism among British Indian children, in particular those of Punjabi origin. The only source of lead in their homes was lead-containing *Surma*. Since then, numerous authors have attributed elevated lead levels to the use of *Surma* (Betts *et al.*, 1973, Ghafour *et al.*, 1984, Kershner, 1985, Gupta *et al.*, 1990, Fernando *et al.*, 1981,

Shaltout *et al.*, 1981, Shaltout *et al.*, 1985). Frequently, cases of children with lead poisoning were rigorously investigated and often *Surma* use was the only possible source of lead that was identified.

These studies involved children and infants in Kuwait and England who displayed some of the more overt signs of lead poisoning, including death. The association of this poisoning with *Surma* was only surmised by the authors (Josephs, 1977, Fernando *et al.*, 1981, Shaltout *et al.*, 1981, Shaltout *et al.*, 1985). In some cases, the practice of "*Bokhoor*", inhaling lead fumes, packing *Kohl* on the umbilical stump of the newborn (Fernando *et al.*, 1981), ingestion of other lead-based remedies and pica (the natures of the inappropriate materials consumed were not revealed by the authors) (Shaltout *et al.*, 1981, Shaltout *et al.*, 1985) were suggested as possible additional sources of lead.

Other researchers have, however, more rigorously examined the apparent association between *Surma* use and elevated lead levels. Ali *et al.* (1978) took blood samples from sixty two Asian children admitted to Nottingham Children's Hospital for a variety of ailments. Parents provided information regarding *Surma* use on the children. Thirty seven children had *Surma* applied to their eyes at least occasionally. Those children who had never worn *Surma* had a mean blood lead concentration of 20.3 ± 8.7 μg/100 ml, and those who had worn it had a mean of 34.2 ± 14.1 μg/100 ml. No consideration of other factors i.e. socio-economic status, which might have affected the data were considered i.e. old house, paint chips, etc..

Gogte *et al.* (1991) looked at 253 Delhi children to test for any association with *Surma* use. Eighty two were controls with blood levels averaging 9.6 ± 6.8 μg/dl. Those exhibiting pica (mouthing and eating a variety of objects) had levels averaging 23.0 ± 13.82 μg/dl, pica and *Surma*

use 30.8 ± 18.7 μg/dl and *Surma* use alone 11.6 ± 8.4 μg/dl. Children using *Surma* alone resembled the control group, and although the overall pattern suggests that *Surma* may contribute to already elevated lead levels in children with pica, the precise nature of the relationship could not be conclusively determined.

Perhaps the most rigorous test of the frequently reported role of *Surma* in lead poisoning to date is the Nir *et al.* (1992) Israeli study. Twenty four *Kohl* using infants six to sixteen months age were compared with thirty non-*Kohl* users (had not worn *Kohl* for two months prior to the sampling). The infants were from villages where environmental exposure would have been similar for all children. The *Kohl* users had been "*Kohled*" every one to three days since birth. In the "*Kohled*" infants, the mean blood lead level was 11.2 ± 5.8 μg/dl. The mean blood lead level of the control group was 4.3 ± 2.7 μg/dl. Additionally, the control group was further broken down into two groups - no *Kohl* used in the infants surroundings = 2.8 ± 2.2 μg/dl lead and *Kohl* is used in the infants immediate surroundings (usually worn by the mother) = 5.2 ± 2.6 μg/dl lead. These are both significant associations. Additionally, infants in the study group were shorter than in the control group at three to five weeks of age.

The only study to date testing the relationship between maternal *Surma* use and neonatal exposure to lead was conducted by Moghraby *et al.* in 1989. The authors examined umbilical cord blood lead levels in Arabian mothers who used *Surma* or eye pencils (non-lead). They found no significant difference between the two groups. This is attributed at least in part to the fact that three of the four *Surmas* used by the mothers had less than 1% lead content. Their results, therefore, are inconclusive.

Other Dangers of *Surma*

Although the lead content/elevated blood issues have been explored with some diligence by the scientific community, there are other potential risks and dangers associated with its use that have only been briefly considered. Although Grant (1974:491) reports no toxic effects of *Surma* in Toxicology of the Eye, he does suggest it can produce minute conjunctival abrasions. These abrasions can be doubly harmful considering the amount of microbial contamination found by Abdelaziz and Alkofhi (1989). The authors tested 50 samples of *Al-Kohl* and found high levels of microbial and fungal contamination, sometimes alarmingly high numbers of Colliform, Bacillus, Staphylococcus and other undesirable pathogens. More than 70% of powdered samples they tested contained more than the acceptable standard 100 colony forming units (cfus) of bacteria and fungi. Twenty percent contained more than 10^4 cfu.

Contaminated eye cosmetics have been shown to lead to serious eye infections (Bloomfield *et al.*, 1988), but if conjunctival abrasions also occur in association with contamination, the associated risk of infection in those abraded areas increases. Because there are no apparent controls or regulations governing the production of *Surma* or *Kohl*, and no addition of anti-bacterial compounds, both opened and unused containers of this cosmetic are likely to continue to have unpredictable risks of infection. The degree of danger of abrasion will likely be associated with the fineness of grinding of ingredients and the type of ingredients (e.g. galena vs. carbon). One informant told me that a few years ago some companies were found to have added ground glass to their product to increase its glittery quality. The

Indian Government apparently acted to stop this practice, but any controls over production are unreliable. Additionally, as *Surma/Kohl* originates from more than one nation, as well as made in the home, product quality will likely never be standardized. Aslam *et al.*, (1979) tested *Surma* samples for iron (Fe), copper (Cu), zinc (Zn), silver (Ag), antimony (Sb) and strontium (Sr) and found only trace amounts.

Finally, Alkofahi *et al.* (1989) examined 50 samples *Al-Kohl* from Jordan for their cytotoxic (cell-destroying) and mutagenic (mutation inducing) properties. Forty percent (40%) of samples were found to have cytotoxic properties. The authors claim that there are high correlations between this type of cytotoxicity and carcinogenic activity. Among samples tested specifically for their mutagenicity, 10-20% were mildly mutagenic. The authors question whether the original stones, preparation equipment or other ingredients are responsible for these qualities. Besides lead, *Surma* and *Kajal* have also been found to contain high levels of polyclyclic aromatic hydrocarbons, which have been implicated in some cancers (Jani *et al.*, 1988). These studies clearly indicated risks to health other than those associated with lead poisoning and possibly many other potential problems that have yet to be ascertained.

Frequency of *Surma* Use in Previous Studies

Studies of *Surma* use in a variety of groups indicate varying but significant frequencies of use. Eighteen percent of South Asian subjects in a Glasgow study used *Surma* (Bhopal, 1986a). Aslam and Wilson (1990) estimated that twenty percent of Asian Indians in the United Kingdom used *Surma* regularly or occasionally. Forty five percent of pregnant women in a

Saudi Arabian study used *Surma* (Moghrabi *et al.*, 1989) and nearly fifty percent of women in two Israeli villages applied *Kohl* to their babies (Nir *et al.*, 1992). Healy and Aslam (1986b) found that women who used *Surma* invariably used it on their children also.

These figures indicate a frequent and ongoing use of traditional cosmetics in both traditionally situated peoples and immigrant groups. The use of *Surma* is a well established traditional practice from Africa to India, and may therefore be expected to be found wherever travellers from these regions have settled. Even if the percentage of people using *Surma* in these groups was as low as one percent, this percentage represents several millions worldwide and an enormously high number to be at risk.

Surma and Lead Poisoning in North America

To the best of my knowledge, as of the time of this writing, there has been only one case of elevated blood lead levels associated with the use of *Surma* in North America. In that 1991 Californian case, a seven month old child who wore *Surma* (23-26% lead) was found to have elevated blood lead levels of 39 µg/dl. Although the child was asymptomatic, the case raised concerns about the types of impairment could be caused if the practice was not discontinued (Massachusetts Medical Society, 1993 (42)27:521-524). This apparent low incidence in North America is at least partly due to the fact that unless blood lead screening is carried out, asymptomatic lead poisoning will never be detected or suspected. Until or unless a serious problem is suspected, this screening is unlikely to be done. Cases of lead poisoning due to the ingestion of Indian herbal remedies have been reported in Australia (Dunbabin *et al.*, 1992), Seattle, Washington (McElvaine *et al.*, 1990), Los

Angeles (Smitherman and Harber, 1991) and Quebec (Health and Welfare Canada, 1989). All were adults who had ingested pills or powders and subsequently exhibited symptoms of overt lead poisoning.

Dr. Milton Tennenbein [Health Sciences Center, Winnipeg] informs me that overt lead poisoning has always been rare in Winnipeg, and has become even less common with the closing of Varta Battery and improved conditions at the Winnipeg Police Department's shooting range. Lead poisoning in children is virtually unknown locally, and Dr. Tennenbein is unaware of any association between Asian Indian origin and increased blood lead levels in Winnipeg.

Shortcomings of the Literature

Research projects designed to examine the link between *Surma* use and lead toxicity seem to suffer from common shortcomings. Variables such as frequency of use are only loosely defined and environmental and socio-economic variables that may skew researchers data are rarely considered. Children from lower income families are more likely to live in older housing where lead paint may have been used. Inner city children are more likely to be in contact with lead sources due to their proximity to foundries, factories and leaded gasoline and therefore prone to elevated lead levels regardless of exposure to *Surma*. In Arab countries, inhalation of lead fumes is a traditional remedy, as is the packing of the umbilical stump with *Surma*. Other herbal remedies including lead are used in South Asia. Unless a particular research problem is clearly defined, these variables are rigorously examined, and large scale matched pair studies are conducted,

definitive, quantitative statements regarding the association between *Surma* and plumbism cannot be made.

These studies must also take into account details regarding the type of *Surma* used. High and low lead *Surmas* are rarely considered separately when associations with elevated blood lead levels are made. This likely results in the underestimation of risk associated with high lead *Surmas*. Additionally, the paths of absorption by the human body need to be better understood. How significant are congenital exposure and absorption via the nasolacrimal duct? If *Surmas* cause lachrymation and children who rub their watery eyes and suck their fingers are more likely to absorb lead, why haven't researchers considered this in their proposals? In my experience there are marked differences in the degree of lachrymation caused by *Surmas*. This is apparently dependant on their camphor content. High camphor *Surmas* might therefore present a much higher risk to immature wearers. Also if camphor is added more frequently in some regions than others, associated risks may vary.

These problems appear to be the result of a general lack of knowledge about *Surma* on the part of researchers. Generally, only lead content is examined, other ingredients are ignored, and any socio-economic information collected on the subjects of the studies is too meagre to allow indisputable conclusions to be drawn.

LABORATORY ANALYSIS

CHAPTER 8

LABORATORY ANALYSIS

Chemical Method and Analysis

Nineteen (19) *Surma* samples, including two of the metallic "stones" or "crystals" ground in making *Surma* were submitted to the Department of Geological Sciences, University of Manitoba (Winnipeg) for analysis by ICP AES (Inductively Coupled Plasma Atomic Emission Spectroscopy). Five *Kajal* samples were submitted for the same analysis. Because larger sample sizes were needed for analysis of *Kajal* than for *Surma*, and because laboratory personnel were uncertain as to the proper technique for putting *Kajal* into solution for testing, we decided to initially attempt only a small number of *Kajal* analyses. *Kajal* samples had a tendency to explode and clog equipment. Five of the initial samples submitted were analyzed with varying degrees of success. Unfortunately, time limits made it impossible to analyze any further samples once successful techniques had been devised.

Samples were analyzed for the presence of the following elements: sulphur (S), zinc (Zn), nickel (Ni), iron (Fe), lead (Pb), magnesium (Mg), manganese (Mn), calcium (Ca), arsenic (As), selenium (Se), and antimony (Sb). Literary references to lead and antimony sulphides led to testing for lead, sulphur and antimony. The other elements were selected because they could be easily tested for by ICP AES, and because laboratory managers at both the University of Manitoba and at Ward Provincial Laboratory (Winnipeg) advised they were potential candidates for alternate/additional

components of *Surma* based on the appearance of the materials themselves and on descriptive material that I provided.

Samples were prepared in two different manners. For the preparation method used for testing for sulphur, see Appendix 2. For the preparation method used for testing for all other elements, see Appendix 3. This is a modification of the Placer Dome Inc. Dome Mine Analytical Services standard method.

Results For full results, see Table 14. The following is a review of those elements that appeared to make up 0.1% or more of at least one sample.

Lead (Pb)and Sulphur (S)

Of nineteen *Surma* samples, 9 had a very high lead content (70%+ Pb), 3 had a high lead content (50-70%), 1 had moderate lead levels (10-50%), 3 were characterized by low lead levels (0.1-10%) and 2 contained no lead. Most of these high lead *Surmas* were also associated with sulphur in sufficient quantity (10-16%) to conclude that galena (PbS) is indeed the common primary component of high lead *Surmas*. However, at least one high lead sample occurred in combination with virtually no sulphur, suggesting that some other compound of lead, or even elemental lead may occur in significant amounts.

The one sample of white *Surma* contained only 1.8% lead, and a light grey *Surma* contained 2.45% lead. These numbers are low enough to suggest that a white lead compound is not generally used in *Surmas*, rather, calcites such as limestone ($CaCo_3$) or dolomite ($CaMg(CO_3)_2$) or even sphalerite (ZnS) may be preferred ingredients. Sphalerite may be colorless, brown or black (Klein and Hurlbut, 1985:276). Other low lead *Surmas* may also be

Table 14 Chemical Analysis

SAMPLE	Color	Region of Origin	As Wt %	Se ppm	Ni ppm	Mn Wt %	Fe Wt %	MgO Wt %	CaO Wt %	Zn Wt %	Sb Wt %	Pb Wt %	S Wt %	Likely Mineral Base
1	bone	Bombay	0.00	0.00	3.00	0.00	0.06	0.16	0.48	64.26	0.00	1.80	15.4	ZnS
2	dark grey	Pakistan	0.00	0.00	8.00	0.01	0.30	1.00	46.50	0.00	0.00	0.00	0.3	CaCo3
3	med. grey	Bangladesh	0.00	7.00	207.00	0.03	1.99	0.42	1.32	0.88	0.22	68.75	n/a	Pbs
4	light grey	Sudan	0.00	0.00	10.00	0.00	0.11	5.99	4.15	0.41	0.00	2.45	15.9	CaMg(CO3)
5	dark grey	U.P., India	0.01	0.00	5.00	0.00	0.01	0.01	0.05	0.03	0.01	96.77	0.5	Pb
6	dark grey	Bombay	0.00	1.00	3.00	0.00	0.26	0.10	0.20	0.38	0.00	68.44	11.5	Pbs
7	dark grey	Punjab	0.00	0.00	2.00	0.00	0.02	0.26	1.85	0.00	0.00	90.00	8	Pbs
8	dark grey	U.P. India	0.00	0.00	136.00	0.00	0.06	0.03	0.03	0.12	0.13	58.77	11.6	Pbs
9	dark grey	Bengal	0.00	4.00	25.00	0.07	1.51	2.80	7.06	0.03	0.61	11.57	11.9	Pbs
10	dark grey	Punjab	0.00	0.00	6.00	0.00	0.15	0.19	7.67	0.01	0.03	70.00	7.8	Pbs
11	dark grey	Bombay	0.00	1.00	9.00	0.00	0.31	0.03	0.07	0.12	0.02	95.15	8.8	Pbs
12	dark grey	Pakistan	0.00	0.00	0.00	0.00	0.03	0.03	0.31	0.16	0.02	95.46	11.9	Pbs
13	dark grey		0.01	0.00	6.00	0.00	0.00	0.01	0.01	0.00	0.01	98.22	12.2	Pbs
14	metallic rock	Pakistan	0.00	0.00	5.00	0.00	0.02	0.02	0.08	0.00	0.01	92	10.5	Pbs
15	Jai Kajal		0.00	0.00	3.00	0.00	0.00	0.01	0.05	0.00	0.00	0.01	0.1	Carbon
16	dark grey		0.00	0.00	0.00	0.01	0.10	0.06	0.42	0.23	0.09	97.26	7.8	Pbs
17	medium grey	Mecca	0.00	0.00	4.00	0.00	0.04	0.02	0.15	0.07	0.03	96.41	11.8	Pbs
18	commercial kajal		0.00	0.00	3.00	0.00	0.03	0.02	0.13	23.67	0.00	0.02	n/a	ZnS
19	dark grey		0.00	0.00	0.00	0.00	0.28	0.05	0.14	0.01	0.05	96.95	11.8	PbS
20	medium grey		0.00	0.00	32.00	0.03	0.10	0.14	28.85	4.40	0.00	0.11	0.99	CaCO3
21	Nepali kajal	Nepal	0.00	0.00	0.00	0.00	0.01	0.03	0.10	0.04	0.00	0.00	n/a	Carbon
22	commercial kajal		0.00	0.00	0.00	0.00	0.03	0.03	0.15	38.40	0.00	4.52	n/a	ZnS
23	grey-black	Jordan	0.00	0.00	0.00	0.00	0.07	0.06	1.33	4.23	0.00	0.00	n/a	ZnS
24	Shingar kajal		0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.01	0.00	0.00	n/a	Carbon

Maximum error for sulphur is +/- 8%

Maximum error for all other elements is +/- 6%

composed of limestone, sphalerite and/or carbon. Only 1 *Kajal* sample contained more than trace amounts of lead. This sample's main ingredient was sphalerite (ZnS) which is commonly associated with galena (PbS) (Bates and Jackson, 1980:600).

Antimony (Sb)

Contrary to the claims of manufacturers and writers (see Illustrations 8 & 12), none of the samples tested contained significant quantities of antimony. Only 3 contained more than trace amounts, the largest totalling 0.61% of the total. This suggests that not only is antimony not a principal ingredient, it is not likely a deliberate addition of any type. Rather, stibnite (Sb_2S_3) is commonly found in association with galena (PbS) and zinc oxide (ZnO) and likely occurs in any samples purely because of this relationship (Bates and Jackson, 1980:611). No *Kajal* samples contained any antimony.

Zinc (Zn)

In 3 *Surma* samples, zinc was the primary ingredient, 64.26%, 4.40% and 4.23% respectively. In the first 2 samples, zinc occurred in combination with a high percentage of sulphur These samples are likely comprised primarily of zinc sulphide, sphalerite (ZnS). Sulphur numbers for the third sample could not be produced, so its composition is less certain. Seven (7) other *Surma* samples contained zinc in proportions ranging from 0.1 to 4.5%. Two *Kajal* samples contained 23.67% and 38.40% zinc. No sulphur data is available for these samples, but they too are most likely sphalerite.

Calcium (Ca) and Magnesium (Mg)

Calcium and magnesium are measured by the presence of their oxide forms of CaO and MgO.

Fourteen (14) samples contained between 0.1 and 50% CaO. Presence of calcium with little or no magnesium is indicative of the presence of limestone ($CaCO_3$) (about 10 samples). When present in combination with significant amounts of magnesium, dolomite ($CaMg(CO_3)_2$) is the more likely ingredient (about 4 samples). Both the white and the grey *Surma* contained calcium and at least some magnesium. In three of the samples, the calcium compound was the primary ingredient. Three *Kajal* samples contained between 0.10% and 0.15% CaO; they most likely derived from limestone. In none of the three *Kajals* was the calcium compound the primary ingredient.

Iron (Fe)

Ten *Surma* (10) samples contained iron, ranging in percentage from 0.10% to 1.99%. No *Kajal* sample contained more than trace amounts of iron. In no case was the iron compound the primary ingredient.

Toxicology of Elements

The toxicology of lead and galena (PbS) have already been discussed. The following are descriptions of the toxic properties of antimony (Sb), calcium (Ca), magnesium (Mg), iron (Fe), and zinc (Zn) in the forms in which they appear in the samples.

Antimony (Sb)

Antimony is used in alloys, batteries, textiles and safety matches. When it is ingested, gastro-intestinal stress results, as does nephritis and hepatitis, itching, bleeding gums, weight loss and anemia. Fatalities from antimony poisoning are rare but have been known to occur (Dreisbach, 1973:240). Antimony sulphide, Sb_2S_3, is quite insoluble and relatively inert (and so not highly toxic) but can cause dermatitis and conjunctivitis (Arena, 1986:986).

Calcium (Ca)

Calcium carbonate ($Ca\ CO_3$) is a safe, insoluble salt when taken orally (Arena, 1986:540). It is used in cosmetics (Dreisbach,1983:307) and has no known toxic effects on the eyes (Grant, 1974:215).

Magnesium (Mg)

Magnesium is an essential nutrient. It is often taken orally in various forms as an antacid and cathartic (Amdur *et al.*, 1991:668). It is used in cosmetics (Dreisbach, 1983:307) and has no known toxic effects on the eyes (Grant, 1974:215).

Iron (Fe)

Iron is an nutritionally essential metal, although excess exposure can result in vomiting, shock, liver damage and renal failure (Amdur *et al.*, 1991:655). Iron oxide does not cause a physical reaction (Dreisbach, 1983:292). The tissues of the eye can be damaged by rusting iron particles, ultimately resulting in poor reaction to light, cataracts, glaucoma, detached retina, and

blindness, depending on the degree to which the iron particles have invaded the eye (Grant, 1974:595-597).

Zinc (Zn)

Zinc oxide is as innocuous as calcium carbonate (Dreisbach, 1983:307-308). Zinc is a nutritionally essential metal. Excessive exposure to zinc is relatively unknown because zinc does not accumulate in the body with continued exposure (Amdur *et al.*, 1991:660-661). Zinc sulphide has low solubility in water, and only one case is known where it caused irritation to someones eyes and even then negligible tissue damage occurred (Grant, 1974:1099).

In conclusion, *Surma* and *Kajal* samples were found to contain a variety of elements. However, with the exception of those *Surmas* that contained lead (which are highly toxic), most materials identified were relatively innocuous (magnesium, calcium, zinc) or present in very small amounts (antimony, iron) and therefore present little risk.

Surma samples frequently contained large percentages of lead, and one *Kajal* sample contained 4.52% lead. The results of the *Kajal* tests and the presence of zinc and lead were particularly interesting as the preparation methods described to me did not include the addition of any minerals. Although most *Surma* samples did contain lead it is important to note that some had little to no lead and appeared to be based on calcium, zinc and carbon compounds.

Microbial Method and Analysis

In 1989, Abdelaziz and Alkofahi tested 50 samples of '*Al-Kohl*' cosmetics and found microbial contamination to be heavy, frequently exceeding internationally accepted standards. They also, through a series of diagnostic tests, found samples to be contaminated by various Bacillus species, as well as Pseudomonas, Staphylococcus, and coliforms among others. Fungi were found, but Salmonella apparently was not. This is the only available study of its kind focusing on these traditional cosmetics, although Pseudomonas aeruginosa has been associated with eye ointments and S. epidermidis and P. aeruginosa with in-use commercially available eye cosmetics in the United States (Bloomfield *et al.*, 1988).

Although all tests carried out by these authors could not be duplicated at this time due to financial considerations and the unavailability of the necessary technology, I set out to determine the contamination levels of the samples I had collected by completing Total Microbial and Total Yeasts and Molds Counts to determine quantitative levels of contamination. Additionally, I was able to carry out qualitative tests for a limited number of opportunistic organisms. These organisms were chosen on the basis of three criteria:

1 Presence in cosmetics in previous studies

2 Severity of threat to health

3 Testing Procedures: simplicity of tests and availability of materials.

With these considerations in mind, and with the advice of Doug Milley (Cadham Provincial Laboratory, Winnipeg) and Dennis Cote (St. Boniface General Hospital Research Center, Pharmacology Laboratory,

Winnipeg) I determined that the following organisms should be tested for qualitatively: (their brief description is taken from Dorland's Illustrated Medical Dictionary, Taylor, 1988)

Escherichia coli: A gram negative rod-shaped bacteria, this is the predominant organism in the intestines of humans and animals. It is used as an indicator of fecal contamination. E. coli can cause diarrhea, infections of the urinary tract, abscesses, conjunctivitis, occasionally septicemia and a cholera-like disease in humans.

Salmonella species: A group of gram negative rod-shaped bacteria responsible (depending on particular species) for typhoid, paratyphoid, septicemia, gastroenteritits and food poisoning.

Pseudomonas aeruginosa: A gram negative rod-shaped bacteria that plays a major role in nosocomial (iatrogenic) infection, causing infection of the urinary tract, wounds, abscesses and the bloodstream. Infections may be severe or even fatal. Also known to cause eye infections in wearers of contact lenses.

Staphylococcus aureus: A gram positive (cocci) bacteria known for causing food poisoning and toxic shock syndrome.

All materials and methods (see Appendix 4) follow those in the United States Pharmacopeia (1980:1479-1487, 1684-85), with minor modifications as recommended by Dennis Cote and Doug Milley. Laboratory

procedures were carried out under the supervision of Dennis Cote and Pat DeGagne (St. Boniface General Hospital Research Center). All tests were carried out on site at the St. Boniface General Hospital Research Center in Winnipeg.

RESULTS

A total of 13 samples of *Surma* were analyzed for Total Microbial Count, Total Yeasts and Molds and the presence of the four pathogens just listed. Results of these tests can be seen in Table 15.

Although the number of cells of any one microorganism necessary to initiate an infection will vary between individuals and under different environmental conditions, limits are commonly set at 100 aerobic bacteria and 100 fungal cells per g (Abdelaziz and Alkofahi, 1989) or 100 microorganisms per gram (Bloomfield *et al.*, 1988). Any number greater than this limit would therefore represent an unacceptably high level of contamination. As Table 1 demonstrates, 4 of 13 samples were characterized by unacceptably high levels of contamination. Although the number of samples was not large enough to allow statistically significant correlations to be made, we can upon examination of the data recognize several apparent correlations:

1 Both the 'new' and 'in-use' samples had representatives that were excessively contaminated, however, unused materials tended to be somewhat cleaner than in-use samples.

2 The presence of camphor (as recognized by smell) had no apparent influence on the level of contamination.

Table 15 Microbial Analysis

Surma Sample No.	Approx. Age	Origin	In-Use	Container	Color	Smell	Total Microbial Count per gram
11	12 yrs	Pakistan	yes	original	grey/black	none	16,850 cfus/g
15	?	U.P., India	yes	brass	grey/black	none	15 cfus/g
18	3 yrs	Mecca, S.A.	yes	brass (int.)	grey/black	none	5 cfus/g
25	3 yrs	Bangladesh	yes	silver(int.)	grey/black	sl. camphor	1600 cfus/g
34	?	Punjab	yes	brass	grey/black	none	35 cfus/g
35	20+ yrs	U.P., India	yes	brass	grey/black	sl. camphor	25 cfus
38	7 yrs	Pakistan	yes	original	grey/black	none	440 cfus/g
41	5 yrs	Punjab	yes	brass	grey/black	oily	10 cfus/g
100	4 mos.	Bombay	yes	original	grey/black	camphor	50 cfus/g
101	new	Bombay	no	original	grey black	camphor	0
102	new	Bombay	no	original	bone	camphor	5 cfus/g
103	new	Bengal, India	no	original	grey/black	camphor, oily	1300 cfus/g
104	new	Bombay	no	original	grey/black	camphor	0

cfu=colony forming unit
int.=samples were transferred in an intermediate container whose sterility cannot be guaranteed

Table 15 Microbial Analysis con't.

Surma Sample No.	Total Yeasts/Molds	Salmonella sp.	E.coli	Pseudomonas aeruginosa	Staphylococcus aureus
11	50 cfus/g	absent	absent	absent	absent
15	5 cfus/g	absent	absent	absent	absent
18	0	absent	absent	absent	absent
25	90 cfus/g	absent	absent	absent	absent
34	20 cfus/g	absent	absent	absent	absent
35	0	absent	absent	absent	**present**
38	20 cfus/g	absent	absent	absent	absent
41	0	absent	absent	absent	absent
100	0	absent	absent	absent	absent
101	0	absent	absent	absent	absent
102	0	absent	absent	absent	absent
103	360 cfus/g	absent	absent	absent	absent
104	0	absent	absent	absent	absent

3 The country/region of origin of the sample had no apparent influence on the level of contamination

4 The age of the sample had no apparent influence on the level of contamination

5 Even the highly contaminated samples, such as No. 11 with a Total Microbial Count of 16,850 cfus/g did not contain the specific dangerous organisms being tested for qualitatively. The only sample to test positive for a specific organism was No. 35, which was found to contain Staphylococcus aureus. This sample was not excessively contaminated and had been kept in its brass container for the more than 20 years since it was last used. When I visited the owner of the sample, she demonstrated the use of the applicator for me and likely contaminated the material at that time (she carried the bacteria on her skin or in her eyes).

DISCUSSION

CHAPTER 9

DISCUSSION

Re-examining the Hypothesis

My investigations into the use of *Surma* and *Kajal* in Winnipeg have led me to the conclusion that *Surma* use here is not as frequent as is found in countries like Saudi Arabia and Israel where its frequency of use among some groups has been documented (Nir *et al.*, 1992; Moghrabi *et al.*, 1989). *Surma* use is also patterned differently among the Winnipeg group than was found among two comparable South Asian immigrant groups in the United Kingdom (Aslam and Wilson, 1990; Bhopal, 1986a). The percentage of *Surma* users in the British groups was similar to my figure of 18%. Most informants had witnessed the practice in Winnipeg, and some parents of teenage and older children admitted applying *Surma* to them in years past. I also observed what appeared to be *Surma* on a small number of young children while attending local South Asian festivals and events. However, none of the young parents I interviewed were currently applying *Surma* to their children. My research has led me to conclude, therefore, that a large scale public health campaign such as exists in Great Britain is not warranted. Still, *Surma* use is common enough and *Surma* is found in enough homes that if the application of *Surma* or *Kajal* did pose a danger to its users, some attention should indeed be paid to the health risk associated with them.

In fact, the laboratory tests conducted during the course of this research do support the hypothesis that the *Surmas* in use locally pose a

threat to their wearers (unfortunately *Kajal* samples could not be analyzed thoroughly enough for strong conclusions to be drawn regarding their components or contaminants). First, *Surmas* are often heavily contaminated with bacteria, yeasts and molds. Although specific virulent pathogens tested for were not apparent (with one exception) in samples collected locally, overall contamination levels were high enough to indicate *Surmas* as likely sources of ocular infection. It goes without saying that other opportunistic pathogens, whose presence was not specifically tested for due to equipment and financial limits, could exist among those general contaminants seen. Although a frequently mentioned justification for the use of *Surma* is that it is cleansing for the eyes, this hardly appears likely.

Second, and perhaps more importantly, the majority of *Surmas* did contain large amounts of lead. Twelve of nineteen samples collected locally contained more than 50% lead, and every sample had at least trace amounts of lead. These numbers are comparable to the various other studies quoted throughout this work, leading to the conclusion that the *Surmas* used in Winnipeg are every bit as dangerous as those used in other parts of the world. All lead-based *Surmas* tested appear to consist of ground galena (PbS), as might be expected, with the exception of one sample which is more likely elemental lead or some other inorganic lead compound. These *Surmas* could not, therefore, be absorbed through the skin (Waldron and Stofen, 1974:38-59), but could be ingested or transported to the gastro-intestinal tract via the nasolacrimal duct. Although some of the lower lead *Surmas* should pose considerably less risk, there is no information available to help evaluate what 'safe' amounts of lead might be. Certainly in the case of children it is better to be overly cautious. *Kajal* samples, while not containing high lead levels, did in two out of five cases contain surprisingly

high percentages of Zinc. These samples were commercially packaged and comparatively hard and dry. One must be cautious, therefore, to assume that all *Kajals* are safe, as a manufacturer could just as easily add one metal as another.

As I have now established that *Surma* is used locally and that those users may be endangering themselves, I will turn my attention to the question of who, specifically, is in the most danger. Infants, children and fetuses in utero can be catastrophically affected by lead poisoning. However, *Surma* users in my sample tended to be middle aged women. No article has been published that suggests that the amount of *Surma* they might absorb/ingest would cause the adult female body any harm. My sample also included some *Surma* users who were younger women of childbearing age, most often Muslims. These women often wore *Surma* because of its association with Islam. They and others like them who adopt this tradition due to religious principles run the risk of subjecting future unborn children to lead exposure. This issue should not be oversimplified. There is rarely a winner when religiously sanctioned traditions clash with science. Great care should be taken to not appear to be secularizing religion in the name of medicine.

My observations also lead me to suggest that although *Surma* use is about equal for Sikhs and Hindus, one category of Sikhs may be subject to special risk; infants and young children who live in an extended family household. Many Sikhs live in extended families, and many Sikh grandparents take an active role in the care of their grandchildren. This is combined with the fact that only in the Sikh tradition (according to my research) is *Surma* applied to newborn infants. Some Sikh children and

infants may be at risk because their grandparents maintain a tradition that their parents, due to lack of time or interest, do not.

In the introductory chapter of this thesis I stated my intention to test the following hypothesis:

> *Surma* and *Kajal* are products that contain contaminants that are potentially harmful to their users. *Surma* and *Kajal* are used by South Asians and Canadians of South Asian descent in Winnipeg. By identifying the socio-demographic profile of the users as part of an ethnographic study, data that could be useful in reducing the health risks associated with the use of *Surma/Kajal* will be produced.

I think it is clear that this hypothesis has been validated with the following exceptions: that I have not been able to test *Kajal* as thoroughly as I intended, and *Surma* use on children is not as high as might have been predicted on the basis of previous studies. I will next consider the ways in which the data can be utilized to reduce risk from *Surma* locally.

Applications of the Data

There are several things that can be done to address the health risks that have been outlined in this thesis. First, I will attempt to publish articles in local/national medical journals outlining my findings. Physicians may not be aware that such preparations are in use in Canada. Once they are informed, they can in turn evaluate and educate their patients when appropriate. They will also have one more question to ask their patients

when symptoms of lead poisoning seem to be present, but no obvious environmental source can be found. The medical profession is highly respected in the South Asian population. Many South Asians are practising physicians or aspiring to become physicians. These individuals could be contacted directly regarding my findings on *Surma*. They likely could address the dangers associated with *Surma* very effectively.

I intend to inform the donors of *Surma* samples of the results of the laboratory tests. The implications for health could be discussed at that time. I will make myself available for questions from anyone who might seek information and will act as a go-between for those who have *Surma* of their own they want analyzed. Ideally, a grapevine will develop where information is shared informally. However, some formal measures should also be taken to facilitate the distribution of this information. These may include contacting local ethnic newspapers and radio/television shows. The leaders of the various groups I interviewed will be contacted and asked for their advice on how to best get the information out.

The data gathered can best be utilized in helping to decide who to target and how to present the material in a culturally appropriate manner. In the first case, I would target women of all ages, but in particular of child bearing age whose origins are in Pakistan, Bangladesh or North India. This would likely mean first focusing on the Sikh and Muslim groups. Presenting the manner in the most appropriate way is more complex issue. Although it could not be properly tested, because *Kajal* is largely a wax or oil based substance, it likely is composed of a much smaller percentage of lead (if any) than *Surma*. It could be recommended as a *Surma* substitute for Sikhs or Hindus, but would not make an appropriate substitute for many Muslims. Pakistanis in particular may be particularly resistant to the notion

of a *Surma* substitute if their *Surma* use is religiously motivated. Haddad and Adair studied several Muslim centers across the United States. They found that Pakistanis more than any other Muslim group favored strict observance of Islam (Haddad and Adair, 1987:31).

One favorable outcome of this study is the discovery that *Surma* is rarely if ever applied to the eyes of children to ward off the evil eye. Instead, a small dot of *Surma*, or far more commonly *Kajal*, is applied to the child's face. This is a much less dangerous practice, and does not take a high priority in developing strategies for education and/or substitution. In some cases the occasional use of eye drops may be seen as an acceptable substitute for medicinal *Surmas*, a substitution that has already been made by a few informants.

It may prove beneficial to stress the fact that some *Surmas* have very little lead (less than 3%) in communications. This is a rather conservative approach, and in fact it might ideally be preferable to advise against using *Surmas* that contain any amount of lead, however small. However, this approach may help reduce the resistance that will likely be encountered. If the message, rather than "Don't use *Surma*" is "Test your *Surma*, and don't use it if it's high lead" it may be more effective. Additionally, the risk to infants, children and pregnant women should be stressed. Again, a gentler message "Don't take chances with those that are vulnerable" will be better received than a harsh, judgmental one "Don't use *Surma*, it will poison you, your child, etc.". If physicians or others choose to be more direct or aggressive that is their business. The anthropologist has little to gain by offending or alienating her informants. Ideally, concerned individuals from within the various groups should be encouraged to take up any "fight", with the anthropologist (in this case myself) acting only as an advisor.

Undoubtedly, some *Surma* users will continue to wear high-lead *Surmas*, regardless of what anyone does. Healy and Aslam (1986a, 1986b) found that some *Surma* users believed that *Surma* made in the home was safe. Bhopal (1986a) recorded the same claims as well as the belief that *Surmas* prepared by holy persons were safe, and discounted all warnings to the contrary. Perry and Eaton (1991) report that educational campaigns about *Surma* dangers in Great Britain have been only marginally successful.

Implications for Health, Local and Otherwise

This study suggests that there are serious implications for local health. If my data were extrapolated to the entire South Asian population of Winnipeg, I would estimate that *Surma* was in use in approximately 1600 households. Of course, the sample was not representative enough to allow for such a conclusion: perhaps I could instead suggest that *Surma* may be used in *as many as* 1600 households locally. Even if the number was as few as several hundred, that number does not include households of other Muslim/Middle Eastern families who may also use *Surma*. When expanded to the rest of Canada, and indeed to all countries where the traditional users have migrated, the scope of the problem becomes even more alarming. While *Surma* use in Winnipeg is perhaps not frequent enough to initiate emergency response measures, the suggestions previously made to address dangers from *Surma* locally are certainly justified. This information should also be made available to other urban centers in Canada, especially those that have high South Asian population densities.

Limitations of the Research

The most serious limitations of this research were the sample size and the way the sample was chosen. A sample size of 50 chosen non-randomly produces data that is not necessarily representative of the population as a whole, although I do feel that the data gathered fairly reflects trends and behaviors among South Asians in Winnipeg. The most serious danger resulting from this would be if the number of *Surma* users was seriously underrepresented and therefore the risks to local users were much more serious than they appear. The sample is likely biased in favor of professional informants. Sikhs were underrepresented in the sample and Christians were not included at all.

The relatively small number of *Surma* samples tested is not problematic in terms of evaluating the risk of lead poisoning. Several other studies are available whose conclusions are consistent with my own in this regard. However, a larger number of samples would have proved useful in building up a profile of other *Surma* components. Tests for a wider variety of bacteriological contaminants would be equally informative. Lead and camphor are colloquially said to have antiseptic properties. What, if any, bacterial strains might *Surma* actually inhibit? Additionally, more effective means of analyzing *Kajal* should be devised so that firm conclusions can be drawn regarding it as well.

Further studies on *Surma* might consider it within the context of ethnographic art and the many rich South Asian decorative traditions. Perceptions about *Surma* and beauty might be examined from a variety of perspectives, including those of children and teenagers both in South Asia and among immigrant groups such as the one studied in Winnipeg. The

most interesting research possibilities would involve travel to South Asia, in particular North India where so many traditions co-exist. Further ethnographic data on *Surma* use could be gathered. Matched pair studies could be conducted to determine how frequently and heavily *Surma* has to be applied before blood lead levels are affected. Factory production of *Surma* and *Kajal* could be observed and raw materials traced to their sources. Yet another useful expansion of this study would be to Middle Eastern groups. Studies in and around Israel could examine *Surma* use in Muslims and non-Muslims of similar economic and educational status. The results could help support (or refute) the conclusions I have drawn regarding the relationship of *Surma* use with Islam.

Fashions in cosmetics fluctuate over time. In 1994 there was a resurgence of the '*Kohled*' look in Europe and North America. Several fashion magazines (Flare, 1994 (April):30, Flare, 1994 (August):49, Images, 1994 (Spring):14, Allure, 1994 (February):26) and even newspapers (Winnipeg Free Press, 1994 (March 16) promoted this 'new' look. One publication (Flare, 1994 (April):30) even featured a slightly confused description of *Kohl's* history, including its use by Cleopatra:

> The ancient Egyptians used to line their eyes heavily, first with *Kohl* and then with a black or grey powder consisting of antimony or stibium, black manganese oxide, burnt almond and lead.

These fashion writers appear unaware that not only has *Kohl* influenced modern beauty standards, it is still used in its original and potentially toxic form in many regions of the world. Why this beauty standard has proved so enduring cross-culturally would make for an interesting study. Additionally, the fact that this beauty standard exists in

both Eastern and Western cultures means that the appearance of a *Surma/Kajal* wearer does not conflict with wider cultural norms. Therefore, *Kajal* and *Surma* may be maintained longer than *bindi, sindhu* and similar traditions. This fact must be considered in any analysis of cosmetics use in South Asian immigrant groups.

CONCLUSIONS

CHAPTER 10

CONCLUSIONS

The use of the medicinal eye cosmetics *Surma* and *Kajal* is a tradition of great antiquity that has been maintained into the present day. South Asians use these products for their medicinal, aesthetic and supernatural/religious properties and in many cases do not find that their use conflicts with their new Canadian lifestyle. While not as frequent as might have been feared, *Surma* and *Kajal* use was nevertheless found to be prevalent enough to warrant serious considerations of their potential risks to the health of local users.

Surma samples were found frequently to be heavily contaminated and to contain a high percentage of lead. *Kajal* samples could not be tested as to their microbial contaminants. They appeared to be a less likely source of lead than Surma, but as only five samples were tested, results have to be considered somewhat inconclusive. Antimony, popularly regarded as *Surma's* primary ingredient, was not found present in a significant amount in any sample.

While *Surma* users may be putting themselves at risk for infection and lead poisoning, two groups were identified as being particularly likely candidates for these problems. The first group, Sikh infants and children may be at special risk. The Sikh tradition (unlike that of other groups) appears to encourage or accept the use of *Surma* on infants. Sikhs are also more likely to live in an extended family, increasing the chance of exposure for children cared for by grandparents. These grandparents may continue

practices that the child's parents have lost interest in or do not have time for.

The second group that raises concern is young Muslim women. These women sometimes wear *Surma* because of its association with the Islamic tradition. *Surma* brought from Mecca on *Hajj* replaces commercial eye-liner on their dressing tables. Many of these women will be having children of their own over the next ten years. Although there is not a tendency to apply *Surma* to infants in the Muslim group, it is used on young children. Additionally, the mothers may be endangering their unborn children through their own use of *Surma*. Hindus are less likely to wear *Surma* than *Kajal*, but some, in particular those from northern India, also use *Surma* and apply it to their children's eyes.

Culturally appropriate methods should be taken to inform the population about the risks they are incurring. A non-confrontational approach, concentrating on those at highest risk would be best undertaken by informing high-profile community leaders (physicians, religious leaders) of the findings of this study. Culturally appropriate substitutions may be recommended; where they are not available, testing of *Surma* in use should be encouraged. Hopefully, the health risks can be minimized without compromising respect for the traditions that have created them.

SURMA AND *KAJAL* INGREDIENTS AS IDENTIFIED BY THEIR MANUFACTURERS

APPENDIX 1

SURMA AND *KAJAL* INGREDIENTS AS IDENTIFIED BY THEIR MANUFACTURERS

The composition of *Surma* may be said to include antimony (see Illustration 8), pearl (see Illustration 9) or simply '*Surma*' (see Illustrations 10 & 11; *Surma* is occasionally used synonymously with antimony, and to the best of my knowledge with nothing else). Alternately, no ingredients may be listed on packaging. Camphor (*Kapoor, Kafoor*) may also be included.

The following letter (see Illustration 12) came as a response to a request for information about *Surma* written by an informant on my behalf. This same informant graciously provided the translation that follows:

Dear Mr. _____:

This is in response to your recent letter. Antimony Nigrum is a well known mineral; bright and black coloured. This naturally occurring mineral is dug out of ores. It is usually found mixed with sulphur. The antimony of Isphahan (Iran), mixed at a place called Bajur near Peshawar (Pakistan) is considered the best. The black antimony of inferior quality is known as "*surmi*". It is mixed with sulphur and zinc and is quite hard. The antimony of Kandhar (Afghanistan) is essentially a mixture of sulphur and lead.

The white antimony, which is sometimes mistaken as black real antimony, is a variety of carbonate of lime.

सन्दीप ठन्डा सुरमा (R.)

Formula Sandeep Thanda Surma
Contents Each Gram

Just Phal	0.0145 Gm.
Moti Seep	0.0145 Gm.
White Crystal Antimony	0.0218 Gm.
Sat Nemboo	0.0236 Gm.
Kalmi Shora	0.0437 Gm.
Phatkari Phal	0.1820 Gm.
Bhuri Mirch	0.0507 Gm.
Bhim Saini Kapoor	0.1377 Gm.
Vel Alisahi Khurad	0.0014 Mt.
Kajal Phul Shahi	0.0042 Gm.
Sat Podina	0.0236 Gm.
Black Crystal Antimony	0.0437 Gm.
Sabaga Phul	Q.S.

ਸਨਦੀਪ ਠਨ੍ਡਾ ਸੁਰਮਾ ਨੇਤ ਜ੍ਯੋਤਿ ਵਧਾਤਾ ਹੈ। ਜੁਸ੍ਟ, ਬਾਬਾ, ਸੁਵਾਦ, ਕੁਕਰੇ, ਖਾਰਸ਼, ਖਟਵਾਲ, ਜਾਲੀ, ਪਾਨੀ ਕਾ ਬਹਨਾ ਆਦਾ ਕੇ ਲਿਏ ਗੁਣਕਾਰੀ ਹੈ. ਸੁਵਹ ਸ਼ੀਤ ਯਾਮ ਕੀ ਦੋ ਵੀ ਸਲਾਈ ਪ੍ਰਯੋਗ ਕਰੇ ਸਠਦੀਪ ਠੰਡਾ ਸੁਰਮਾ ਅਖਾਂ ਦੀ ਰੋਸ਼ਨੀ ਵਧਾਉਂਦਾ ਹੈ। ਧੁੰਦ, ਜਾਲਾ, ਗੁਬਾਰ, ਕੁਕਰੇ, ਖਾਰਸ਼, ਖਟਵਾਲ, ਝਾਲੀ, ਪਾਣੀ ਵਹਨਾ, ਆਦਿ ਦੇ ਲਈ ਲਾਭਦਾਇਕ ਹੈ। ਸਵੇਰ ਤੇ ਸ਼ਾਮ ਨੂੰ ਵੀ-ਦੋ ਸਲਾਈ ਵਰਤ।

Sandeep Thanda Surma Makes Eyes Healthy. It is Most useful For Blurre Togey cobwed Granulated Itchings Lachrymated Con geste Condylomated Weakened Eyes, use Morning & Evening

Illustration 8 *Surma* **Package Insert, Sample AB-4** (not submitted for microbial analysis)

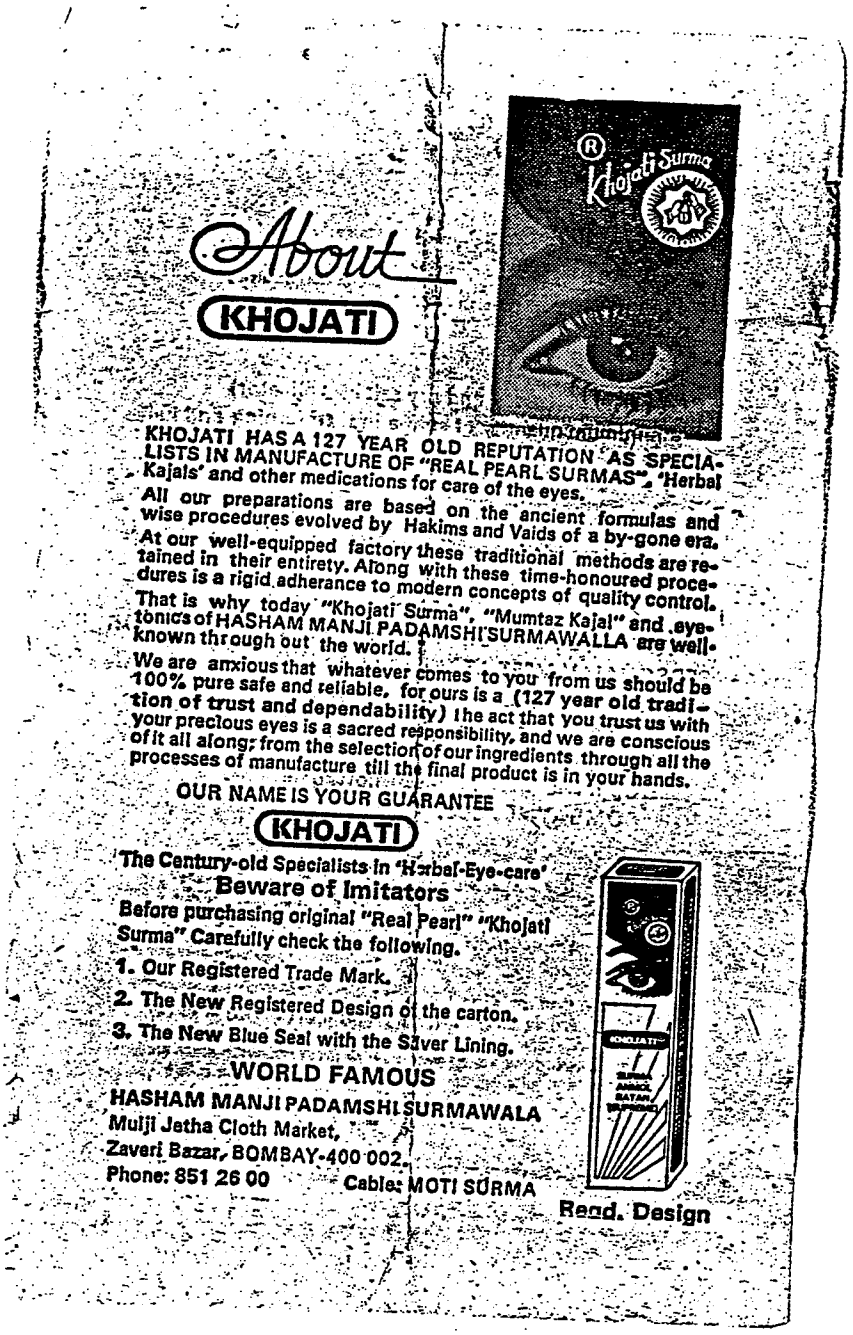
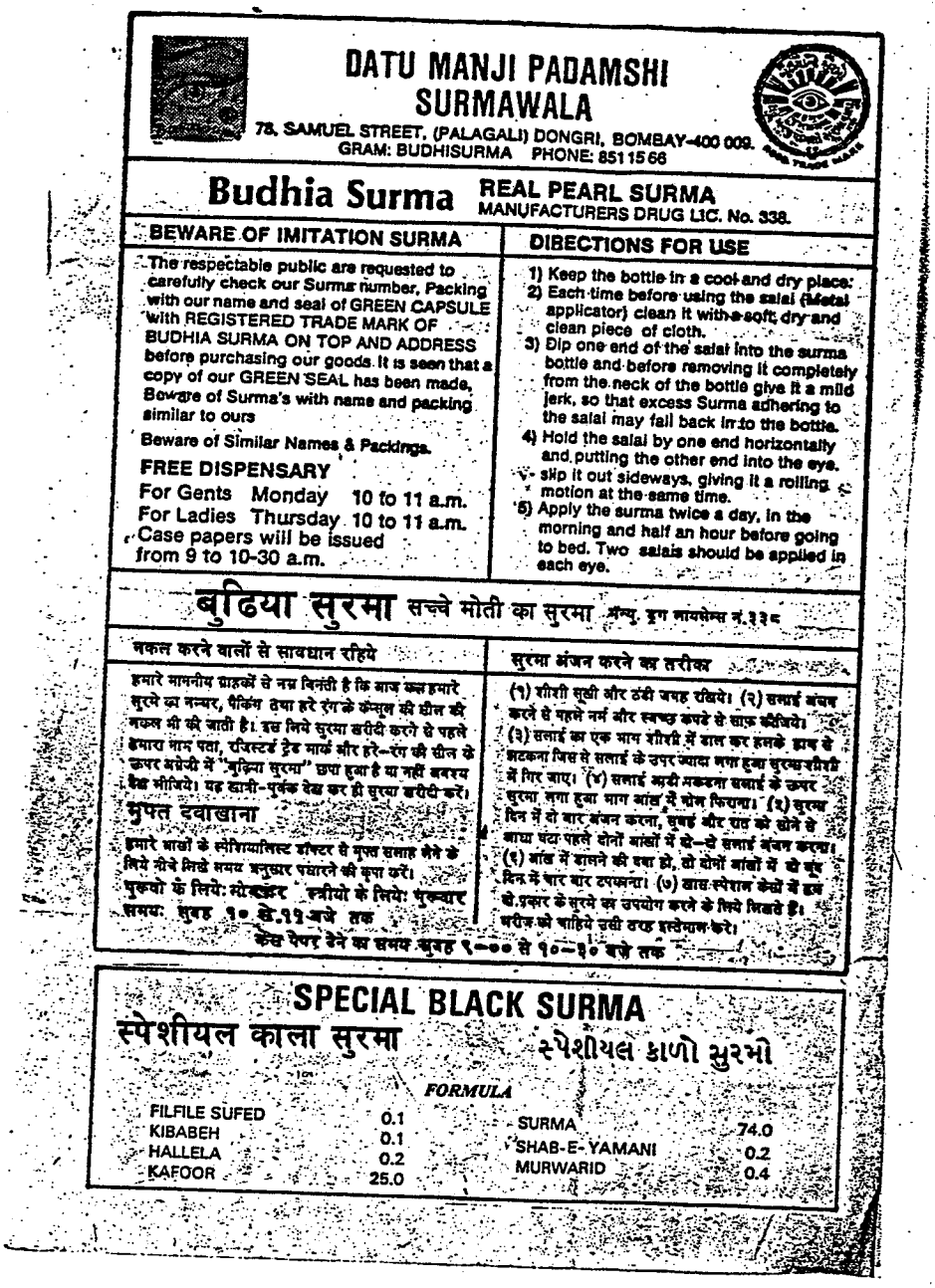


Illustration 9 ***Surma*** **Package Insert, Sample 102 (AB-1)**



DATU MANJI PADAMSHI
SURMAWALA

78, SAMUEL STREET, (PALAGALI) DONGRI, BOMBAY-400 009.
GRAM: BUDHISURMA PHONE: 851156

Budhia Surma REAL PEARL SURMA
MANUFACTURERS DRUG LIC. No. 338.

BEWARE OF IMITATION SURMA

The respectable public are requested to carefully check our Surma number, Packing with our name and seal of GREEN CAPSULE with REGISTERED TRADE MARK OF BUDHIA SURMA ON TOP AND ADDRESS before purchasing our goods. It is seen that a copy of our GREEN SEAL has been made, Beware of Surma's with name and packing similar to ours

Beware of Similar Names & Packings.

FREE DISPENSARY

For Gents Monday 10 to 11 a.m.
For Ladies Thursday 10 to 11 a.m.
Case papers will be issued from 9 to 10-30 a.m.

DIRECTIONS FOR USE

1) Keep the bottle in a cool and dry place.
2) Each time before using the salai (Metal applicator) clean it with a soft, dry and clean piece of cloth.
3) Dip one end of the salai into the surma bottle and before removing it completely from the neck of the bottle give it a mild jerk, so that excess Surma adhering to the salai may fall back into the bottle.
4) Hold the salai by one end horizontally and putting the other end into the eye, slip it out sideways, giving it a rolling motion at the same time.
5) Apply the surma twice a day, in the morning and half an hour before going to bed. Two salais should be applied in each eye.

बुढिया सुरमा सच्चे मोती का सुरमा रजि. ट्रेड मार्क नं. ३३८

नकल करने वालों से सावधान रहिये

हमारे माननीय ग्राहकों से नम्र विनंती है कि आज कल हमारे सुरमे का नम्बर, पैकिंग तथा हरे रंग के कैप्सूल की सील की नकल भी की जाती है। इस लिये सुरमा खरीदते से पहले हमारा नाम पता, रजिस्टर्ड ट्रेड मार्क और हरे-रंग की सील के ऊपर अंग्रेजी में "बुढ़िया सुरमा" छपा हुआ है या नहीं अवश्य देख लीजिये। यह छानी-पूर्वक देख कर ही सुरमा खरीदे करें।

मुफ्त दवाखाना

हमारे आखों के स्पेशियालिस्ट डॉक्टर से मुफ्त सलाह लेने के लिये नीचे लिखे समय अनुसार पधारने की कृपा करें।
पुरुषों के लिये: सोमवार स्त्रीयों के लिये: गुरुवार
समय: सुबह १० से ११ बजे तक

सुरमा अंजन करने का तरीका

(१) शीशी सूखी और ठंडी जगह रखिये। (२) सलाई अंजन करने से पहले नर्म और स्वच्छ कपडे से साफ़ कीजिये। (३) सलाई का एक भाग शीशी में डाल कर हलके झटका जिस से सलाई के उपर ज्यादा लगा हुआ सुरमा शीशी में गिर जाए। (४) सलाई आधी मकडना सलाई के ऊपर सुरमा लगा हुआ भाग आंख में घोल फिराना। (५) सुरमा दिन में दो बार अंजन करना, सुबह और रात को सोने से आध्या घंटा पहले दोनों आखों में दो-दो सलाई अंजन करना। (६) आंख में डालने की दवा हो, तो दोनों आंखों में दो बूंद दिन में चार बार टपकना। (७) खास स्पेशल केसों में इस दो प्रकार के सुरमे का उपयोग करने के लिये लिखते हैं। खरीदक को चाहिये उसी तरह इस्तेमाल करे।

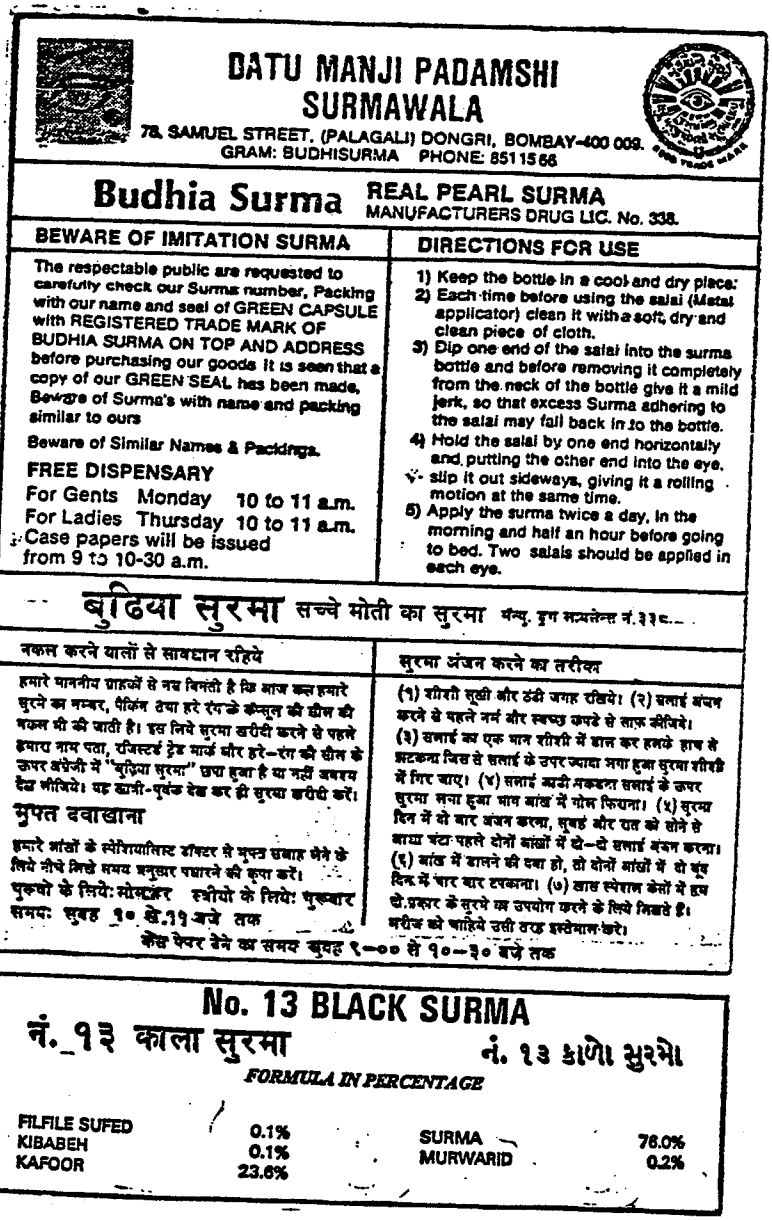
केस पेपर देने का समय सुबह ९-०० से १०-३० बजे तक

SPECIAL BLACK SURMA
स्पेशीयल काला सुरमा સ્પેશીયલ કાળો સુરમો

FORMULA

FILFILE SUFED	0.1	SURMA	74.0
KIBABEH	0.1	SHAB-E-YAMANI	0.2
HALLELA	0.2	MURWARID	0.4
KAFOOR	25.0		

Illustration 10 *Surma* **Package Insert, Sample 101 (AB-6)**



DATU MANJI PADAMSHI SURMAWALA

78, SAMUEL STREET, (PALAGALI) DONGRI, BOMBAY-400 009.
GRAM: BUDHISURMA PHONE: 8511566

Budhia Surma

REAL PEARL SURMA
MANUFACTURERS DRUG LIC. No. 338.

BEWARE OF IMITATION SURMA

The respectable public are requested to carefully check our Surma number, Packing with our name and seal of GREEN CAPSULE with REGISTERED TRADE MARK OF BUDHIA SURMA ON TOP AND ADDRESS before purchasing our goods It is seen that a copy of our GREEN SEAL has been made, Beware of Surma's with name and packing similar to ours

Beware of Similar Names & Packings.

FREE DISPENSARY

For Gents Monday 10 to 11 a.m.
For Ladies Thursday 10 to 11 a.m.
Case papers will be issued from 9 to 10-30 a.m.

DIRECTIONS FOR USE

1) Keep the bottle in a cool and dry place.
2) Each time before using the salai (Metal applicator) clean it with a soft, dry and clean piece of cloth.
3) Dip one end of the salai into the surma bottle and before removing it completely from the neck of the bottle give it a mild jerk, so that excess Surma adhering to the salai may fall back in to the bottle.
4) Hold the salai by one end horizontally and putting the other end into the eye. slip it out sideways, giving it a rolling motion at the same time.
5) Apply the surma twice a day, in the morning and half an hour before going to bed. Two salais should be applied in each eye.

बुढिया सुरमा सच्चे मोती का सुरमा

नकल करने वालों से सावधान रहिये

हमारे माननीय ग्राहकों से नम्र विनंती है कि आज कल हमारे सुरमे का नम्बर, पैकिंग तथा हरे रंग के कैप्सूल की सील की नकल भी की जाती है। इस लिये सुरमा खरीदी करने से पहले हमारा नाम पता, रजिस्टर्ड ट्रेड मार्क और हरे-रंग की सील के ऊपर अंग्रेजी में "बुढ़िया सुरमा" छपा हुआ है या नहीं अवश्य देख लीजिये। यह बातों-पूर्वक देख कर ही सुरमा खरीदी करें।

मुफ्त दवाखाना

हमारे आंखों के स्पेशियालिस्ट डॉक्टर से मुफ्त सलाह लेने के लिये नीचे लिखे समय अनुसार पधारने की कृपा करें।

पुरुषो के लिये: सोमवार स्त्रीयो के लिये: गुरुवार
समय: सुबह १० से ११ बजे तक

सुरमा अंजन करने का तरीका

(१) सीसी सूखी और ठंडी जगह रखिये। (२) सलाई अंजन करने से पहले नर्म और स्वच्छ कपडे से साफ कीजिये। (३) सलाई का एक भाग सीसी में डाल कर हलके हाथ से झटकना जिस से सलाई के उपर ज्यादा लगा हुआ सुरमा सीसी में गिर जाए। (४) सलाई आधी नकदल सलाई के ऊपर सुरमा लगा हुआ भाग आंख में गोल फिराना। (५) सुरमा दिन में दो बार अंजन करना, सुबह और रात को सोने से आध्य घंटा पहले दोनों आंखों में दो-दो सलाई अंजन करना। (६) आंख में डालने की दवा हो, तो दोनों आंखों में दो बूंद दिन में चार बार टपकाना। (७) खास स्पेशल केसों में इस दो प्रकार के सुरमे का उपयोग करने के लिये लिखते हैं। गरीब को चाहिये उसी तरह इस्तेमाल करे।

केस पेपर देने का समय सुबह ९-०० से १०-३० बजे तक

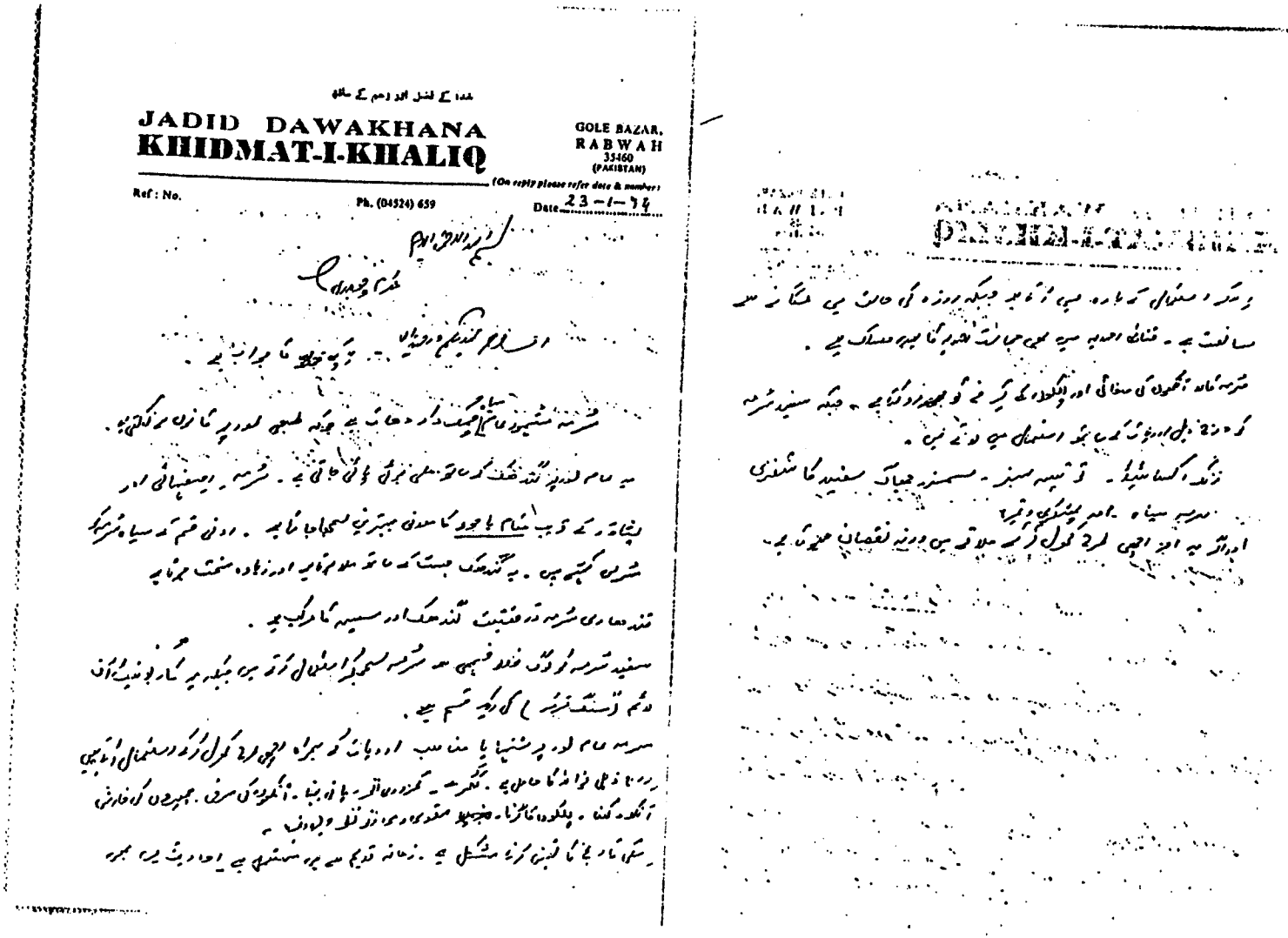
No. 13 BLACK SURMA

नं. १३ काला सुरमा
નં. ૧૩ કાળો સુરમો

FORMULA IN PERCENTAGE

FILFILE SUFED	0.1%	SURMA	76.0%
KIBABEH	0.1%	MURWARID	0.2%
KAFOOR	23.6%		

Illustration 11 *Surma* **Package Insert, Sample 104 (AB-11)**



JADID DAWAKHANA
KHIDMAT-I-KHALIQ

GOLE BAZAR,
RABWAH
35460
(PAKISTAN)

(On reply please refer date & number)

Ref : No.

Ph. (04524) 659

Date 23-1-94

Illustration 12 Letter from a *Surma* Manufacturer/Distributor (print copy is due to condition of original document)

Antimony is usually used separately or is ground with other medicines to cure some of the following ailments: trachoma, weak eyesight, watery eyes, redness of eyes, sore eyes, itching of eyes, falling of eyelashes etc.

It is difficult to ascertain and trace the history of its use. The fact is that antimony has been used since time immemorial. It is also mentioned in the books of Islamic traditions (Hadith). Its use is not recommended if a Muslim is observing an obligatory fast. Ahmadiyya Islamic School of thought also contains these ideas.

Black antimony helps in the cleansing of eyes and in preventing the falling of eye lashes. White antimony may be used in conjunction with and in combination with the following: Zinc Oxide, (?), foam of the sea, (?), black antimony and alum etc. These ingredients should be thorough blended to prevent any harm.

(Unfortunately, a sample of the *Surma* produced by this company was not available for testing)

Most manufactured *Kajals* do not include lists of ingredients. However three samples did so as follows:

(1)	*Bhimseni Karpur*	0.8%	=	(Camphor)
	Khobara Tail	65.2%	most =	(Cobra Tail!)
	Kajali	3.6 %	likely =	(Carbon)
	Karpur	2.4%	=	(Camphor)
	Waxy Base	Q.S.		

(2)	Castor Oil	74.98%		
	Bees Wax	13%		
	Vegetable Black	12%		
(3)	Castor Oil	67.98%		
	Bees Wax	14%		
	Paraffin Wax	6%		
	Bhimseni Kapoor	1.5%	most =	(Camphor)
	Kapoor	1.1%	likely =	(Camphor)
	Vegetable Black	8.62%		

CHEMICAL TESTING-PREPARATION OF SAMPLES FOR TESTS FOR SULPHUR

APPENDIX 2

CHEMICAL TESTING-PREPARATION OF SAMPLES FOR TESTS FOR SULPHUR

Sulphur determinations were carried out on a LECO induction furnace.

Typically, 0.1 g of sample was weighed onto 0.4 g MgO which was previously weighed into a LECO crucible. The powders were mixed intimately.

The crucible was covered with two lids and placed in the furnace. The mixture was fired for a minimum of 7 1/2 minutes or until no further titration was observed. The percent sulphur was read from the titration burette and then corrected for dilution.

Difficulties with the Research

A number of difficulties were encountered in the course of the chemical analysis that set the results of this research back by almost a year. Initial delays resulted from the need to obtain a standard for antimony that could be used to confirm the accuracy of results. Then, it was discovered that the student who was employed in the sample preparation used incorrect dilution factors. While investigating this, Wayne Blonski (Laboratory Manager, Geological Sciences, University of Manitoba) realized that the methodology in use would not provide accurate values for sulphur content. He also decided to personally handle any further procedures. As I was

reluctant to remove sulphur from the list of elements, Wayne Blonski proceeded on a lengthy research project attempting to discover an appropriate method of sample preparation. This proved extremely difficult, as the individual samples were so small that standard means could not be applied. Finally, after several months and some failed attempts, the methods described in this Appendix and Appendix 3 were devised. They made it possible for the described tests to be carried out.

CHEMICAL TESTING-PREPARATION OF SAMPLES FOR ALL OTHER TESTS

APPENDIX 3

CHEMICAL TESTING-PREPARATION OF SAMPLES FOR ALL OTHER TESTS

The preparation method used was a modification of the Placer Dome Inc. Dome Mine Analytical Services standard method and was presented to me as follows:

Principle: The concentration of the elements is determined by inductively coupled argon plasma emission spectrometry, after acid digestion with nitric, hydrochloric and perchloric acids.

Equipment:
(1) 250 ml teflon beakers
(2) Teflon covers
(3) Teflon speedi-vac covers
(4) Sartorius semi-micro balance or equivalent
(5) Weigh dishes
(6) Hotplate
(7) Fine wash spray bottle

Reagents:
(1) 1000ppm standard solutions for elements
(2) Distilled deionized water
(3) Perchloric acid (reagent grade)
(4) Nitric acid (reagent grade)
(5) Hydrochloric acid (reagent grade)

(6) Hydrofluoric acid (reagent grade)

Method:

1. Weigh .1 gram samples into 250 ml teflon beakers.
2. Moisten with a small amount of distilled deionized water.
3. Add 20 ml concentrated HCl, cover with teflon cover, and boil gently for approximately 15 minutes.
4. Cool, add 15 ml concentrated nitric acid and 1 ml hydrofluoric acid. Digest until brown fumes disappear.
5. Cool, add 10 ml perchloric acid (only for dry samples, paste types too volatile in this medium), cover with teflon cover, and evaporate mixture to fumes of perchloric until a moist paste is formed.
6. Add 35 ml of 3% HNO_3.
7. Cover the beaker with a teflon cover and boil the solution for approximately 15 minutes to dissolve the soluble salts.
8. Cool, then filter
9. Dilute to 50 ml volume with distilled deionized water

Blank: All reagents added to empty beakers as samples

"Blanks" were run as negative controls concurrently with samples. Positive controls, in the form of a standard solutions and lead concentrate CPB-1 also ran at the same time as the samples. CPB-1 is produced by the Canadian Certificate Reference Materials Program and contains a number of elements in known quantities.

MICROBIAL TESTING

APPENDIX 4

MICROBIAL TESTING

Materials and Methods

Tested samples:

A total of 13 samples were tested to identify their microbial contents. The samples were comprised of 9 in use samples of *Surma* collected from local informants from various regions of South Asia and 4 unopened samples of *Surma* purchased locally, in Toronto and in South Asia.

Materials and Media:

The following dehydrated media were used for testing: Trypticase Soy Broth (TSB) with Tween 80 added, Trypticase Soy Agar (TSA), MacConkey Agar (MA),Bismuth Sulfite Agar (BSA), and Sabouraud Dextrose Agar Medium (SDA). Vogel Johnson Agar (VGA) was prepared as follows: a solution of 10.0g Pancreatic Digest of Casein, 5.0g Yeast Extract, 10.0g Mannitol, 5.0g Dibasic Potassium Phosphate, 5.0g Lithium Chloride, 10.0g Glycine, 16.0g Agar, 25.0mg Phenol Red and 1000 mL Water was boiled for 1 minute, sterilized, and cooled to between 45 C and 50 C. 200 mg Potassium Tellurite solution (1 in 100) is then added. Cetrimide Agar Medium (CAM) was prepared as follows: 20.0g Pancreatic Digest of Gelatin, 1.4g Magnesium Chloride, 10.0g Potassium Sulfate, 13.6g Agar, and 0.3g Cetyl

Trimethylammonium Bromide (Cetrimide) are dissolved in 1000mL Water, then 10.0ml Glycerin is added to the solution, which is then heated with frequent agitation and boiled for 1 minute to effect solution.

Additionally, live cultures of Salmonella species, E. coli, S. aureus, P. aeruginosa and Bacillus species were used in positive controls for all tests.

Methods:

Step 1; Preparing Dilutions

Take the 500 mg sample and disperse it in Trypticase Soy Broth (TSB) containing Tween 80 (emulsifier) to make 2.5 ml. Add specimen to medium not more than 1 hour after preparing medium. Prepare dilutions to the following ratios: 1, 1:10, 1:100, 1:1000, and 1:10,000.

Step 2; Total Aerobic Microbial Count

Plate 1 ml of each dilution in duplicate and cover with 15-20 ml TSA that has been cooled to 45 C. Cover, mix, invert and incubate (with tubes of dilutions) overnight. Examine and count, taking the average of the two dishes in number per g or ml of specimen. This medium must be prepared and used fresh. One negative (sterile) and one positive (inoculated with Bacillus) control are run concurrently with the test.

Step 3; Total Yeasts and Molds

Plate 1 ml of the full strength dilution and carry on as in step 2 except use the same amount of SDA instead of TSA and incubate 5-7 days at 20-25 C.

Step 4; Test for presence of individual Bacterial Species

Take broth growth from the dilution that has a reasonable amount of bacterial growth observable, most likely the 1:100 dilution and streak growth onto MAM (E. coli), BSA (Salmonella species), VJA (Staphylococcus aureus), CAM (Pseudomonas aeruginosa). Incubate overnight and examine for growth. Positive and negative controls are run simultaneously as in steps 2 and 3, with the appropriate bacterial culture used in each case.

Step 5; Confirmation tests

Do oxidase and gram stain testing if necessary

LIMITS

1 Media that counteract preservatives were not used in the testing. I assumed that preservatives were not added to this product.

2 Preparatory testing to determine whether samples or some component therein might themselves inhibit the growth of bacteria was not carried out as samples were too small to allow both this procedure and testing for microbial contaminants.

3 The United States Pharmacopeia (1980:1479-1487, 1684-85), recommends 10.0 g of sample for each individual testing procedure, while the Food and Drug Administration (1984:25.01-25.19) indicates that a 1.0 ml sample is adequate for 'microbial testing'. Because of the shortage and small size of samples, 1.0 g samples were utilized here for microbial analysis. Based on the FDA (1.0 g is equivalent to 1.0 ml in this case) criteria, a 1.0 g sample should be considered adequate as long as it is remembered that as in

any sampling, the smaller the sample size, the less representative it is likely to be.

4 The single largest difficulty encountered during the testing was the inability to put samples of *Kajal* into solution. I had hoped to compare the microbial profiles of the oil based Kajals with the powdered Surmas, of which only 13 samples were large enough to allow 1.0 g for microbial analysis and still allow 0.5+ g for chemical analysis. *Kajal* samples were more numerous; however, they proved impossible to put into solution or suspension. Simply adding the sample to the TSB (with polysorbate 80) and agitating briefly, which had been a perfectly adequate method for the *Surma* samples proved ineffective for the *Kajal*. I next tried following the recommended procedure in the FDA Bacteriological Analytical Manual (1984:25.01-25.19), whereby for oil-based cosmetics, the recommended procedure was to add 1 ml Polysorbate 80 directly to the sample and to dispense the product with a spatula before adding broth . This proved only partially effective.

No other chemicals could be found that would affect the suspension without also killing microorganisms present in the sample. Sonication, prolonged agitation and gently heating the sample (all of which may be fatal to bacteria) were attempted in moderate degrees. No methods, whether recommended or somewhat questionable could effectively put more than 50% of the sample tested into suspension. No laboratory blenders small enough to work on a 10 ml sample were available, although my experience working with the substances suggests that the sample would have likely adhered to the blades of the blender rather than disperse.

Finally, as the consistency of the *Kajal* samples varied from that of dry shoe polish to Zincofax (soft and creamy), there was no reason to suppose that any one method (if found) would be successful on more than one sample. Reluctantly, therefore, the proposal to analyze *Kajal* samples was abandoned.

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