NON-DESTRUCTIVE X-RAY FLUORESCENCE ANALYSIS OF ANCIENT BRONZE MIRRORS EXCAVATED IN JAPAN

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INTRODUCTION

From the tombs in the Yayoi and Tumulus periods of Japan about 2500 bronze mirrors have been excavated. They are classified into two groups: (1) mirrors made in China and brought to Japan, called *hakusai-kyō* (imported Chinese mirrors); (2) imitations of the Chinese mirrors made in Japan, called *bōsei-kyō* (copied Japanese mirrors). The number of the *bōsei-kyō* found so far is double that of the imported Chinese mirrors.[1] These Chinese mirrors are distinguished from the copied Japanese mirrors by comparison of shapes, ornamental patterns and skillfulness of manufacturing technique.

The chemical compositions of the mirrors are also one of the effective measures for distinguishing them. According to published data, imported Chinese mirrors have compositions of 60–75% Cu, 17–30% Sn and 3–7% Pb, while their copied Japanese counterparts have 70–90% Cu, 2–20% Sn and 3–8% Pb.[2] The Japanese varieties tend to have higher Cu and lower Sn content.

One of the mirror types which clearly shows the relationship between the two groups is the so-called *sankakuen shinjū-kyō* (mirrors with a raised-triangle rim, representing figures of fabulous beasts and deities; see fig. 1). These raised-triangle rim mirrors are believed to have been made in the Wei period in China on the basis of age inscriptions on the mirrors, but no mirror of this type has been excavated so far in China.[3] This is one of the archaeologically interesting points much discussed heretofore. It is presumed that the raised-triangle rim mirrors were donated by Chinese kings to the missions sent from Japan in the Yayoi period and these imported mirrors must have been the symbols of political authority at that time in Japan. The number of imported Chinese raised-triangle rim mirrors was not large and the supply became so short that Japanese mirrors were manufactured by copying the Chinese ones.[4] It is therefore archaeologically important to distinguish the imported Chinese mirrors from the Japanese copies.

Up to the present, there have been only a few detailed analytical studies on mirrors, probably because chemical analyses usually require several hundred milligrams of metal. As most of the mirrors are quite corroded on the surfaces, an uncorroded sample from the inside is required. This necessitates the defacement of portions of the mirrors. As a result, the analyses to date have been performed on

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[1] Migaku Tanaka, *Taku-ken-kyo* (On the Archaeological Treasures of Japan, Bronze Bells, Weapons and Mirrors), (Tokyo: Kodansha Ltd., 1977).

[2] Yukio Kobayashi, *Kokyō* (Ancient Mirrors), (Tokyo: Gakushei-Sha Ltd., 1965), p. 48. Yukio Kobayashi. *Kodai no Gijutsu* (On the Ancient Techniques), (Tokyo: Hanawa-Shohō Ltd., 1965). Earle R. Caley, *Analysis of Ancient Metals* (New York: Pergamon Press, 1964), p. 118. Giichi Tanabe, "A Study on the Chemical Compositions of Ancient Bronze Artifacts excavated in Japan," *Journal of the Faculty of Science, University of Tokyo, Sec. V*, vol. 11, part 3 (1962), pp. 281–320.

[3] Kobayashi, *Kokyō*, p. 48.

[4] Tanaka, *Taku-ken-kyō*.

FIG. 1.—Raised-triangle rim mirrors with figures of fabulous beast and deities (left: copied Japanese mirror, right: imported Chinese mirror). About one-third natural size.

fragments unsuitable for archaeological research rather than on complete or intact mirrors.

X-ray fluorescence spectroscopy can be used to analyze the surface of both the complete mirrors and mirror fragments without taking samples. As the mirrors are usually corroded and the outside often differs from the underlying metal, the question arose as to whether Japanese and Chinese mirrors could be chemically differentiated by surface analysis.

EXPERIMENTAL

Mirrors Analyzed

The 79 mirrors selected for this study had been previously identified by archaeologists as *hakusai-kyō* or *bōsei-kyō*. The mirrors selected were those which could be clearly differentiated on the basis of visual characteristics. Forty-two mirrors identified as imported Chinese examples and thirty-seven identified as copied Japanese mirrors were used as the basis for the work reported here. Most of the mirrors studied were drawn from the collection of the Kyoto University Faculty of Archaeology. Of these, 27 Chinese mirrors and 20 Japanese mirrors are in the collection of Kyoto University; the rest are from prefectural collections.

Analytical Method

An X-ray fluorescence spectrometer of the Rigaku-Denki Company was used with the following conditions:

Voltage: 40 kVp
Current: 20 mA

Full Scale: 1×10^3–2×10^4 counts
Time Constant: 2 sec.
Scanning Speed: 1°/min.
Crystal: LiF
Target: Cr
Detector: scintillation counter

The irradiation area of this instrument for a sample is usually 30 mm in diameter: in the present case the area was reduced to 15 mm in diameter by masking the mirror with aluminum sheet with a circular window.

Using this arrangement the major bronze elements, copper (Cu), tin (Sn) and lead (Pb), were detected as well as such minor constituents as arsenic (As), bismuth (Bi), silver (Ag), iron (Fe) and antimony (Sb).

For the analytical comparison, the ratios of tin to lead on the surfaces of the mirrors were determined by measuring the intensity ratios of the X-ray lines, PbLγ/CuKβ and SnKα/CuKβ, thus using Cu as an internal reference standard.

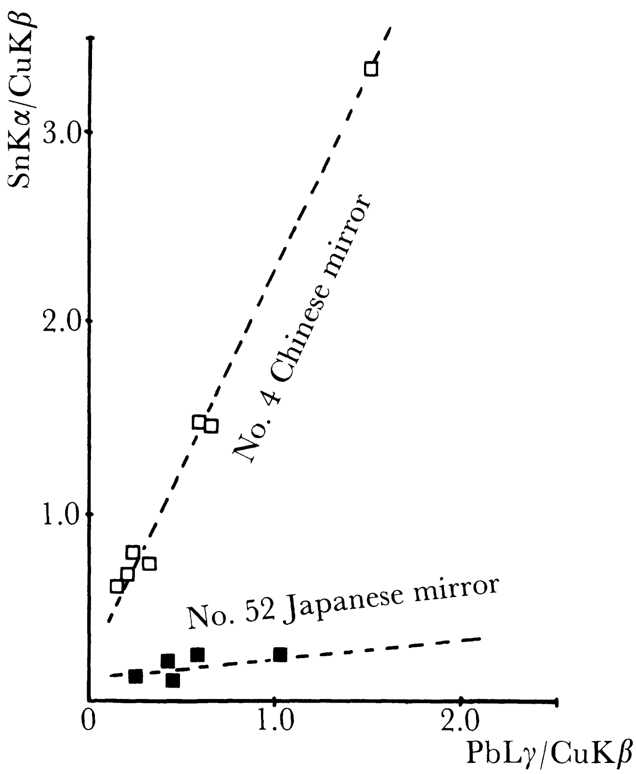

FIG. 2.—The distribution of analytical data in various parts of the same sample.

RESULTS AND DISCUSSION

The results for the 79 mirrors analyzed are shown in Table III. Each mirror was analyzed in a number of surface locations. In the table, the type of surface at the spot analyzed is shown along with the PbLγ/CuKβ and SnKα/CuKβ count ratios, which we refer to below as (x, y) for convenience. Mirror type, archaeological provenance, and some statistics of each analysis are also shown.

Initially, one mirror was selected from each group; various parts of each mirror were analyzed, with all corrosion included. The results of analysis for mirror no. 4 (Chinese) and no. 52 (Japanese) are plotted in Figure 2. The structure of the data appears to be quite linear, with the (x, y) pairs falling along lines of constant proportion.

Assuming for the moment that the data are linear, a linear regression analysis can be performed, using the PbLγ/CuKβ and SnKα/CuKβ ratios as x and y. The slope of the line thus determined can be seen to be equal to

$$\frac{\mathrm{SnK}\alpha/\mathrm{CuK}\beta}{\mathrm{PbL}\gamma/\mathrm{CuK}\beta}, \quad \text{or to} \quad \mathrm{SnK}\alpha/\mathrm{PbL}\gamma.$$

Since the tin concentration should be proportional to the SnKα counts (and similarly for lead), we have:

$$\text{Slope} = \mathrm{k}\,\frac{\mathrm{Sn}\%}{\mathrm{Pb}\%}$$

It can also be reasoned that the line should probably intercept the y-axis at the origin;

if the spectrometer is allowed to run half the time, half of the counts will be accumulated in both the SnKα and PbLγ channels. If the time of a run is reduced, the counts will tend towards (0,0) as a limit; similar arguments can be applied to attenuation of X-rays by unfavorable geometry.

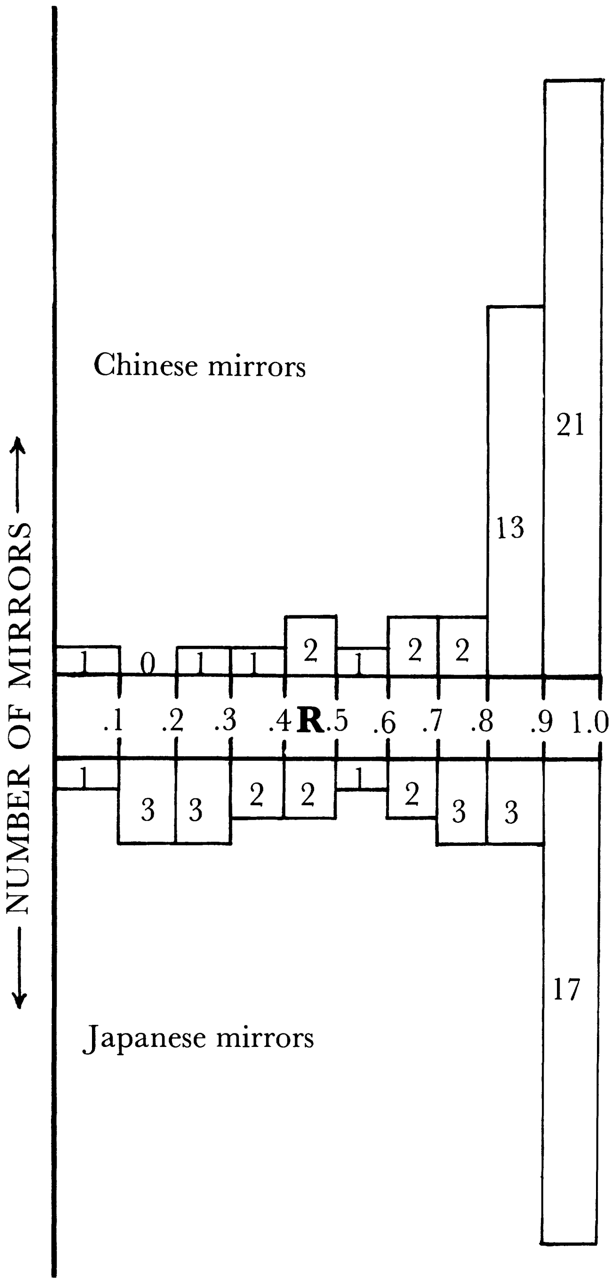

FIG. 3.—Histograms showing correlation coefficients (R) in both groups of mirrors.

A standard least-squares linear regression analysis was performed on each set of (x, y) data, and slopes and intercepts determined. To test the linearity of the data, correlation coefficients were also determined. These are listed in Table III and shown as histograms in Figure 3. It can be clearly seen that the majority of correlation coefficients lie between 0.8 and 1.0; a good indication of the linearity of the data.

After the least squares linear regression had been performed, the slope of the function through the origin was also determined by the following equation:[5]

$$\text{Slope to intercept } (0,0) = \frac{\sum_{i=1}^{n} (x_i y_i)}{\sum_{i=1}^{n} (x_i)^2}$$

$$= \text{adjusted slope}$$

It can be shown that the use of adjusted slope in the analyses below reduces the scatter of the slope data and makes the distribution of slopes approach more clearly to the normal distribution.

To answer the question of the relationship of the X-ray surface analysis data to the actual composition of the mirrors, we have compared the X-ray results to those derived from analysis by wet chemistry for 6 mirrors in Table I. The slope bears a clear relation to the Sn/Pb ratio. In Table Ib, the results from Table Ia are ranked by magnitude, starting with the greatest. Ranking of the least-squares slope and of the adjusted slope from the X-ray results is identical, and agrees very closely

[5] John Mandel, *The Statistical Analysis of Experimental Data* (New York: John Wiley & Sons, Inc., 1964), 245 pp.

TABLE I

Wet Analysis vs. X-ray Spectrometry

a. Amounts

		Wet Analysis					X-ray spectrometry				
Mirror	Origin	Cu	Sn	Pb	Total	Sn/Pb	$\bar{x}$	$\bar{y}$	Intercept	Slope	Adjusted slope
1	Chinese	74.5	17.8	3.4	95.7	5.24	0.27	0.72	0.16	2.10	2.59
29	Chinese	66.7	20.6	7.0	94.3	2.94	0.60	1.04	0.43	1.01	1.58
39	Chinese	74.5	14.5	5.7	94.7	2.54	0.61	0.56	0.05	0.84	0.90
40	Chinese	74.4	17.8	5.6	97.8	3.18	0.38	1.22	0.20	1.22	1.59
41	Chinese	77.0	17.9	3.4	98.3	5.26	0.42	0.91	0.15	1.80	2.09
43	Japanese	78.3	13.6	9.1	101.0	1.50	0.82	0.46	0.26	0.24	0.52

b. Ranks

Mirror	Cu/Sn	Cu/Pb	Sn/Pb	Intercept	Slope	Adjusted slope
1	4	2	2	4	1	1
29	6	5	4	1	4	4
39	2	4	5	6	5	5
40	5	3	3	3	3	3
41	3	1	1	5	2	2
43	1	6	6	2	6	6

with the ranking of Sn/Pb ratios from wet chemical analysis. The only discrepancy in the latter agreement is that mirrors 1 and 41 are interchanged. These mirrors differ very little in Sn/Pb ratio, and an interchanging of these ranks does not seem significant.

It should, therefore, be possible to determine the Sn/Pb ratios from our surface analyses. The least-squares linear regression lines for slope versus Sn/Pb ratio and adjusted slope versus Sn/Pb ratio can be seen in Figure 4. The equations of these lines can be used to determine the Sn/Pb ratios in mirrors from the slopes calculated from surface analysis data.

The questions of errors and confidence limits in this statistical analysis are quite complex, and will not be taken up here. It seems, *a priori*, that the higher the correlation coefficient (R) of the (x, y) values for a given mirror, the more well-defined is the slope, and the better the estimate of the ratio of concentrations, Sn/Pb, will tend to be. It may be that analyses with $R < 0.85$ should be disregarded, or that a sufficient number of analyses should be made on any mirror so that $R > 0.90$. With the idea of improving the correlation of the (x, y) points, 10 mirrors were subjected to statistical analysis on the basis of "clean" readings only (marked C in Table III) or with apparent outlying observations omitted (marked "without analysis No. 5," or otherwise, in Table III). This sort of data selection did not significantly affect the errors in distinguishing Chinese mirrors from Japanese copies.

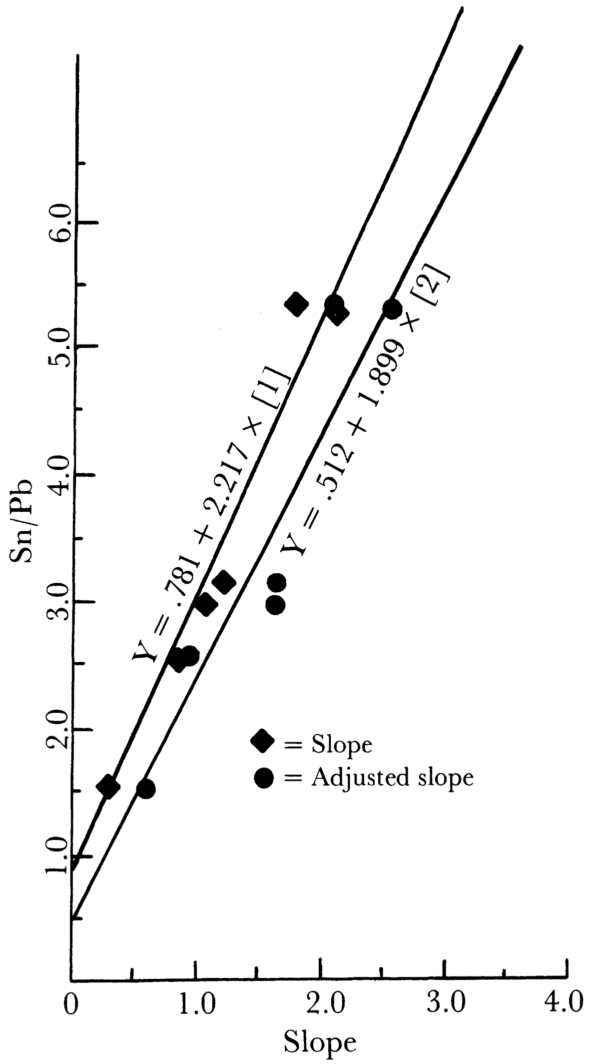

FIG. 4.—Sn/Pb ratio determined by wet chemistry versus the slopes from our X-ray fluorescence data. [1] is the least squares linear regression equation for the line fitted to data using the original slopes, [2] using adjusted slopes.

The variations in our determinations of the Sn/Pb ratio of the mirrors stem from at least four factors:

(a) The variation of composition between individual mirrors of the two classes.

(b) The variation of composition within any one mirror.

(c) Variable removal or displacement of the original elements in the metal by corrosion, later cleaning, etc.

(d) Errors in measurement of the X-ray fluorescence data.

Of these, only the first can be assessed at the moment, though corrosion will be dealt with briefly below. If we look at Tanabe's data[6] (fig. 5), we can clearly see the variation that he found between mirrors of the Japanese and Chinese classes. In Table II the ranges of Sn/Pb ratios found by Tanabe are shown in the first row, followed by the slopes derived from those ratios by equation (1) in Figure 4. It can be seen that the ranges do overlap, especially between the Chinese and Japanese mirrors of the Tumulus period. The ranges agree well between Tanabe's data and our data, and a similar region of overlap can be seen.

If the adjusted slopes from our analyses are plotted, we get the histogram shown in Figure 6. In a slope range below 0.3, only Japanese mirrors are found; above 1.7, only Chinese mirrors, with one exception; in the intermediate range, the area from 0.3 to 0.7 contains mostly Japanese mirrors (16 Japanese and 1 Chinese), and it is most probable that, if the slope falls in this range, the mirror may be identified as Japanese. The area from slope 1.1 to slope 1.7 contains predominantly Chinese mirrors (20 Chinese and 6 Japanese) and mirrors with slopes in this range will probably be Chinese. Mirrors with slopes from 0.7 to 1.1, determined by our method,

[6] Tanabe, "... Chemical Compositions ...", p. 278; see also W. T. Chase and T. O. Ziebold, "Ternary Representations of Ancient Chinese Bronze Compositions," in *Archaeological Chemistry* II, ed. Giles Carter, American Chemical Society Advances in Chemistry Series No. 171 (Washington, D.C., in press).

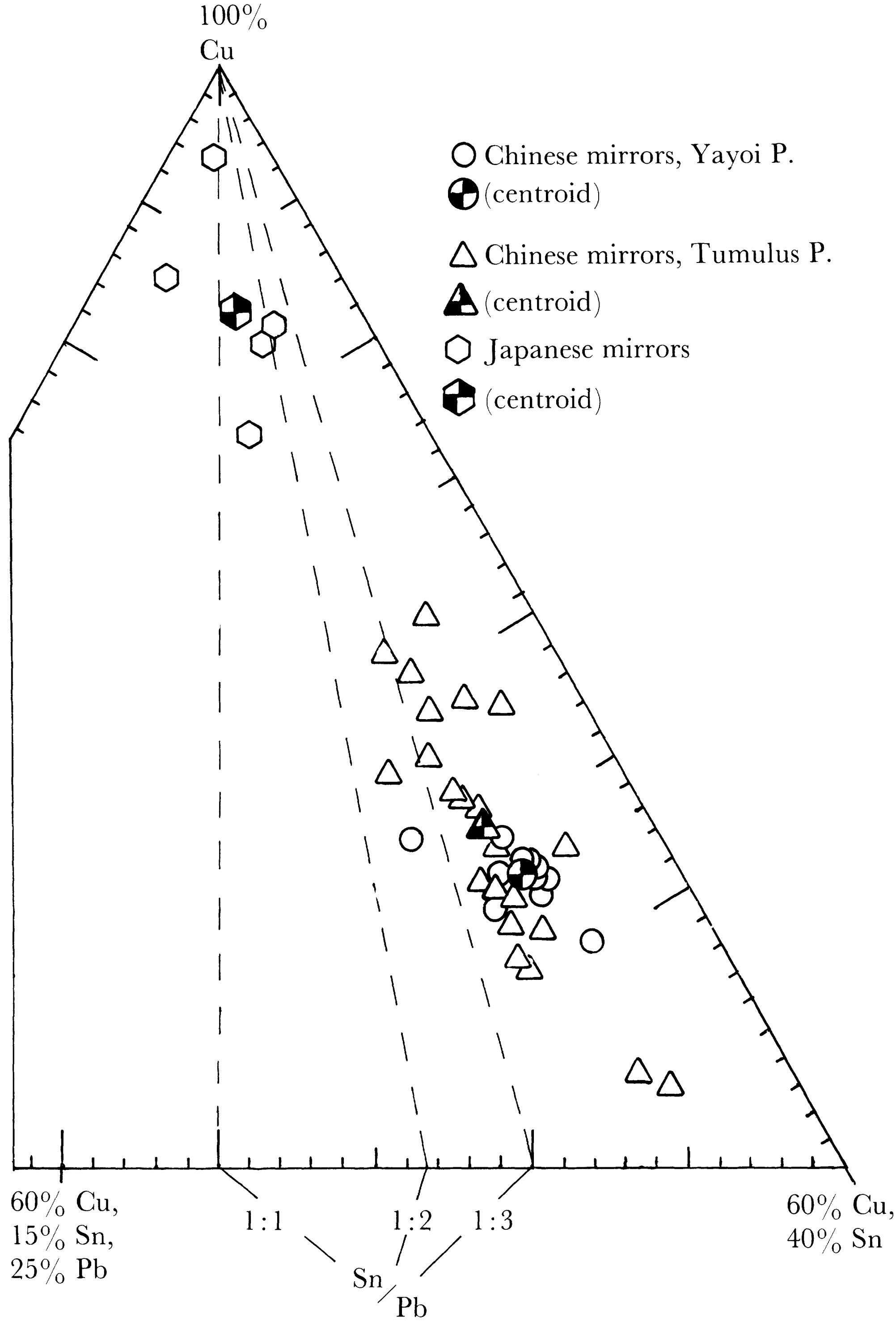

FIG. 5.—Detail of ternary plot (Cu-Sn-Pb)of mirror analyses by Tanabe, showing groups by composition. Lines of constant Sn/Pb ratio are also shown.

TABLE II

Slopes determined from Tanabe's data compared with slopes from our data

		Chinese mirrors		Japanese mirrors
		Yayoi period*	Tumulus period*	Tumulus period*
Data from Tanabe†	Sn/Pb	6.77–3.87	7.74–2.36 (131)§	2.91–0.42
	Slope‡	2.70–1.40	3.14–0.71 (.24)	0.96–0.16
Our data	Slope	2.74– –0.80		2.23– –0.92
	Adjusted slope	2.12–0.33		2.51– –0.08

* Periodization only applies to Tanabe's data here.
† See Footnote 2.
‡ From equation 1, Figure 4.
§ One apparent outlier has this value.

have an equal probability of being Chinese or Japanese, 7 Chinese and 7 Japanese falling in this area. Again, the overlap of adjusted slopes seen in Table II agrees in magnitude with these findings.

Thus, if a mirror was determined by X-ray fluorescence to have a slope of the

$$\frac{\mathrm{SnK}\alpha/\mathrm{CuK}\beta}{\mathrm{PbL}\gamma/\mathrm{CuK}\beta}$$

line of greater than 1.1, we could label it as probably Chinese; if the slope was less than 0.7, it could be labelled probably Japanese; mirrors with intermediate slope would have to be labelled not clearly differentiated.

So, we can quite reliably classify about 80% of the mirrors with this method. Since the mean of the distribution of the (x, y) points for each mirror will lie along the line

$$y = 0.0 + (\text{adjusted slope})x.$$

the differentiation can also be made on a graph like that shown in Figure 7.

The condition and distribution of the corrosion products on the surface also determine the analytical data, but in a very complex way. Figures 8a and 8b show all analytical data for Chinese and Japanese mirrors in this study, with the points labelled in terms of the kind of patina. The results vary according to the surface conditions; corrosion-free areas tend to have low Sn/Cu and Pb/Cu ratios, while the blue and green areas tend towards higher values. The reasons for the variability in the data on corroded surfaces depend on the corrosion mechanics and environment present, and must be left for later analysis. We cannot, at this time, propose any theoretical or mathematical model to account for these effects.

SUMMARY

Thus, a distinction between Chinese and Japanese mirrors of this period seems to be possible, in a majority of cases, by determining the tin to lead ratios non-destructively without taking corrosion conditions of the

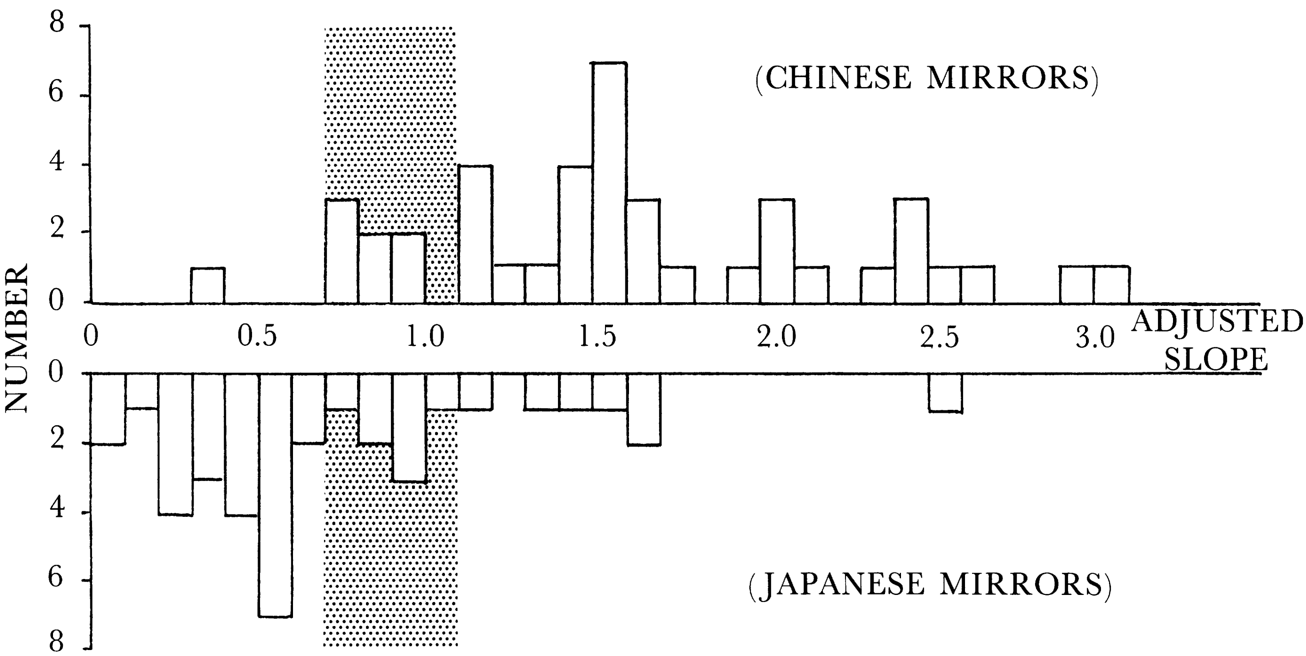

FIG. 6.—Histogram of adjusted slopes from analysis versus number of Chinese and Japanese mirrors. The areas of the two differentiated groups and the area of uncertainty are also shown.

surfaces into account. Obviously this is not a perfect method of distinguishing the two groups, but it can be helpful to archaeologists, who depend mostly on typological study to distinguish such mirrors.

In the future, more data will be available from non-destructive X-ray fluorescence analysis; it will certainly contribute to the archaeology of bronze mirrors excavated in Japan.

With further investigation into the relationship of chemical composition to surface analysis by X-ray spectrometry, there may be a possibility of finding the true chemical composition by analyzing mirrors in any condition, even corroded areas.

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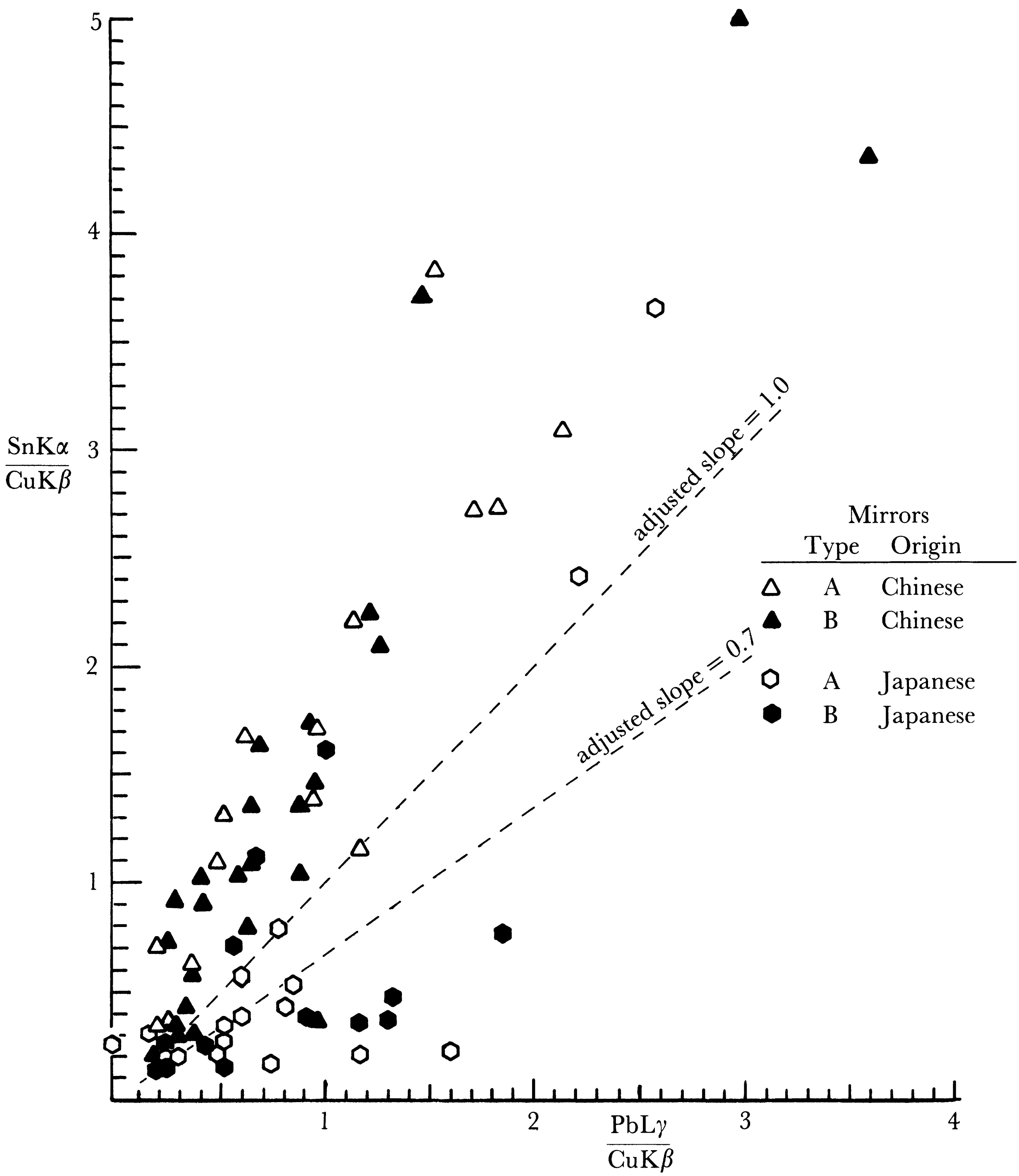

FIG. 7.—PbLγ/CuKβ and SnKα/CuKβ ratios of 79 Chinese and Japanese mirrors; the centroid of each distribution (x,y) is plotted. The two dotted lines show the area of uncertainty, and are repeated on Figure 8.

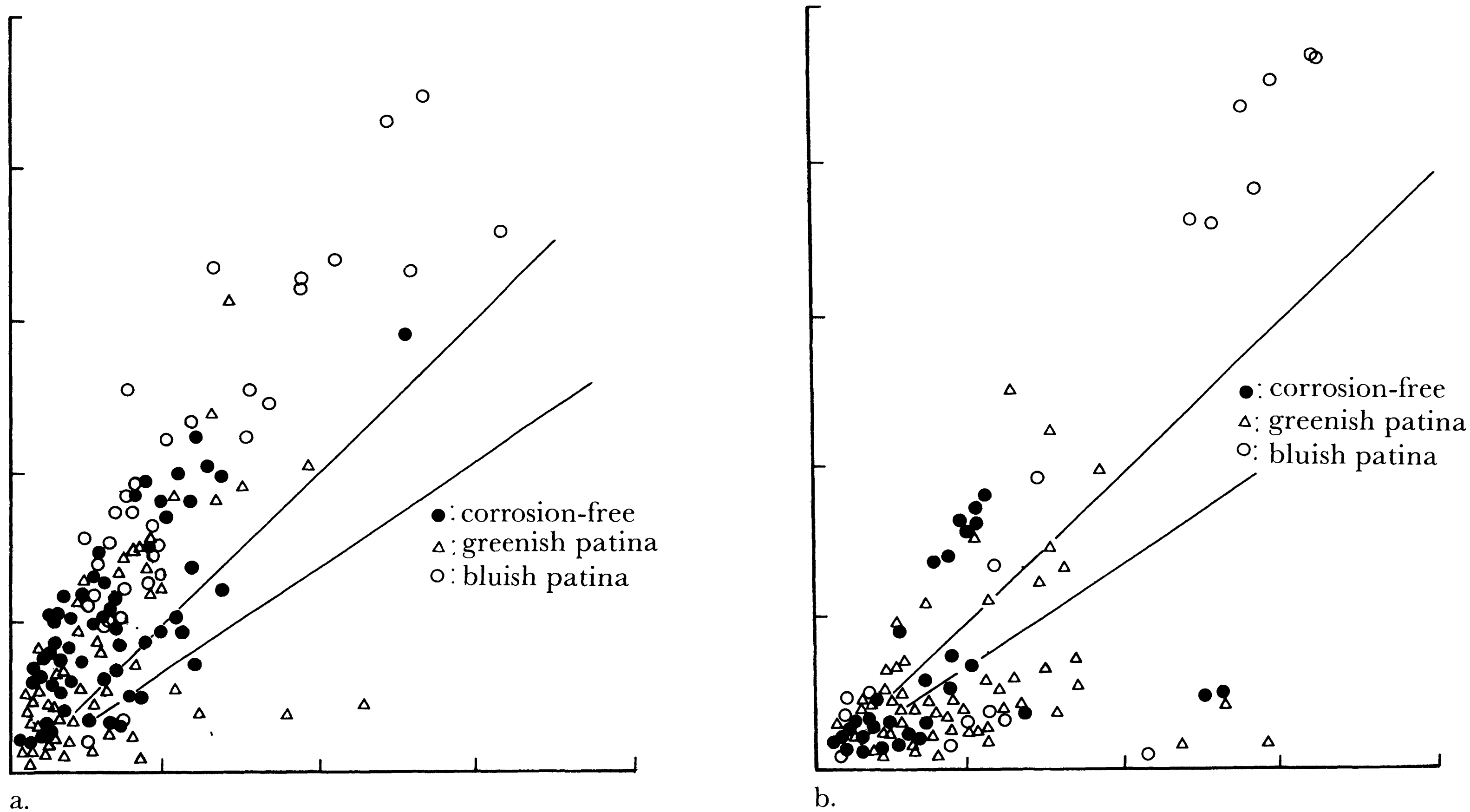

FIG. 8.—$PbL\gamma/CuK\beta$ and $SnK\alpha/CuK\beta$ ratios as determined on the three types of surfaces on the mirrors. Figure 8a shows Chinese mirrors, and 8b shows Japanese mirrors.

Table III

Surface analysis by X-ray fluorescence of Chinese and Japanese mirrors

Mirror Number*	Type†	Archaeological Provenance	Analysis Number	Surface Condition‡	SnKα/CuKβ	PbLγ/CuKβ
1	B	Hyōgo Prefecture	1	C	0.68	0.20
		N=11 R=0.966§	2	G	1.03	0.44
		X MEAN=0.265 Y MEAN=0.717	3	C	1.43	0.60
		Y =0.162+2.098X	4	G	0.57	0.18
		ADJUSTED SLOPE=2.585	5	G	0.85	0.31
			6	G	0.44	0.15
			7	G	0.79	0.24
			8	G	0.52	0.16
			9	G	0.68	0.24
			10	G	0.35	0.14
			11	G	0.55	0.25
2	A	Kumamoto Prefecture	1	G	0.23	0.29
		N=5 R=−0.203	2	G	0.23	0.31
		X MEAN=0.276 Y MEAN=0.312	3	G	0.35	0.28
		Y=0.436+−0.449X	4	G	0.32	0.21
		ADJUSTED SLOPE=1.106	5	G	0.43	0.29
3	B	Kyōto Prefecture	1	G	2.38	1.31
		N=4 R=0.965	2	G	1.55	0.91
		X MEAN=0.938 Y MEAN=1.730	3	G	1.84	1.08
		Y=0.443+1.372X	4	G	1.15	0.45
		ADJUSTED SLOPE=1.797				
4	A	Kyōto Prefecture	1	C	1.45	0.62
		N=7 R=0.996	2	C	1.46	0.60
		X MEAN=0.519 Y MEAN=1.293	3	C	0.62	0.15
		Y=0.233+2.044X	4	C	0.67	0.20
		ADJUSTED SLOPE=2.306	5	C	0.79	0.24
			6	C	3.33	1.50
			7	C	0.73	0.32
5	B	Kyōto Prefecture	1	G	1.92	0.87
		N=4 R=0.988	2	G	1.18	0.54
		X MEAN=0.660 Y MEAN=1.363	3	B	1.85	0.85
		Y=−0.442+2.735X	4	G	0.50	0.38
		ADJUSTED SLOPE=2.125				
6	B	Kyōto Prefecture	1	C	1.04	0.30
		N=4 R=0.405	2	C	1.19	0.35
		X MEAN=0.302 Y MEAN=0.908	3	C	0.69	0.19
		Y=0.531+1.244X	4	G	0.71	0.37
		ADJUSTED SLOPE=2.907				
7	A	Kyōto Prefecture	1	B	2.52	0.76
		N=4 R=0.993	2		3.34	1.32
		X MEAN=1.538 Y MEAN=3.830	3	G	3.71	1.57
		Y=0.939+1.880X	4		5.75	2.50
		ADJUSTED SLOPE=2.404				
8	A	Kyōto Prefecture	1	C	1.05	0.26
		N=4 R=0.982	2	C	1.02	0.28
		X MEAN=0.822 Y MEAN=2.078	3	C	1.39	0.75
		Y=0.243+2.230X	4	G	4.85	2.00
		ADJUSTED SLOPE=2.400				
9	A	Kyōto Prefecture	1	B	2.45	1.68
		N=4 R=0.885	2	B	2.53	1.55
		X MEAN=1.842 Y MEAN=2.745	3		4.29	2.43
		Y=−1.741+2.435X	4	B	1.71	1.71
		ADJUSTED SLOPE=1.522				
10	A	Kyōto Prefecture	1	C	0.77	0.23
		N=4 R=0.738	2	G	1.27	0.47
		X MEAN=0.488 Y MEAN=1.088	3	G	1.13	0.50
		Y=0.716+0.762X	4	B	1.18	0.75
		ADJUSTED SLOPE=2.048				
11	A	Kyōto Prefecture	1	G	0.68	0.32
		N=4 R=0.959	2	B	1.19	0.46
		X MEAN=1.142 Y MEAN=2.220	3	B	2.22	1.53
		Y=0.043+1.905X	4	G	4.79	2.26
		ADJUSTED SLOPE=1.931				
12	A	Kyōto Prefecture	1	B	1.08	0.50
		N=4 R=0.935	2	B	4.46	2.68
		X MEAN=1.728 Y MEAN=2.732	3	B	2.13	1.84
		Y=0.133+1.505X	4	B	3.26	1.89
		ADJUSTED SLOPE=1.569				
13	A	Kyōto Prefecture	1	C	0.85	0.27
		N=4 R=0.986	2	C	0.75	0.20
		X MEAN=0.958 Y MEAN=1.728	3	B	1.98	0.77
		Y=0.728+1.044X	4	B	3.33	2.59
		ADJUSTED SLOPE=1.420				
14	A	Ōsaka Prefecture	1	C	0.29	0.25
		N=5 R=−0.272	2	G	0.34	0.24
		X MEAN=0.218 Y MEAN=0.310	3	G	0.45	0.18
		Y=0.484+−0.799X	4	G	0.21	0.19
		ADJUSTED SLOPE=1.384	5	C	0.26	0.23
15	A	Kyōto Prefecture	1	C	1.96	1.38
		N=5 R=0.960	2	C	1.79	1.17
		X MEAN=0.952 Y MEAN=1.386	3	C	1.05	0.84
		Y=0.040+1.414X	4	C	1.18	0.70
		ADJUSTED SLOPE=1.453	5	C	0.95	0.67

* Mirrors 1 to 42: Chinese
43 to 79: Japanese

† Type A: Triangle-rim mirrors
Type B: Others

‡ Surface conditions: C = clean metal
G = greenish patina
B = bluish patina

§ N = Number of (x, y) observations
R = Correlation coefficient

The means of the x and y distributions ($\bar{x}, \bar{y}$) are shown below, as is the regression equation derived by least squares and the "adjusted" slope–see text.

TABLE III (continued)

Mirror Number*	Type†	Archaeological Provenance	Analysis Number	Surface Condition‡	SnKα / CuKβ	PbLγ / CuKβ
16	A	Kyōto Prefecture	1	B	3.61	2.43
		N=10 R=0.989	2	B	1.91	1.43
		X MEAN=2.139 Y MEAN=3.102	3	G	0.92	0.53
		Y=0.025+1.439X	4	B	4.34	2.77
		ADJUSTED SLOPE=1.449	5	B	4.66	3.23
			6	B	4.51	2.98
			7	B	2.20	1.53
			8	G	1.50	1.04
			9	B	3.79	2.87
			10	B	3.58	2.58
17	A	Kyōto Prefecture	1	G	1.97	0.76
		N=7 R=0.669	2	G	1.35	0.51
		X MEAN=0.621 Y MEAN=1.667	3	G	1.72	0.83
		Y=0.605+1.701X	4	G	1.06	0.46
		ADJUSTED SLOPE=2.642	5	B	2.06	0.64
			6	B	1.83	0.64
			7	G	1.68	0.51
18	B	Kyōto University	1	G	0.22	0.27
		N=13 R=0.761	2	G	0.96	0.83
		X MEAN=0.563 Y MEAN=0.398	3	G	0.25	0.80
		Y=0.007+0.718X	4	G	0.25	0.25
		ADJUSTED SLOPE=0.709	5	G	0.46	0.57
			6	G	0.12	0.18
			7	G	1.02	1.14
			8	G	0.21	0.28
			9	G	0.22	0.29
			10	G	0.31	0.80
			11	G	0.47	0.56
			12	G	0.25	0.51
			13	G	0.43	0.84
19	B	Kyōto University	1	G	0.06	0.15
		N=16 R=0.636	2	B	0.06	0.15
		X MEAN=0.226 Y MEAN=0.185	3	B	0.12	0.27
		Y=0.019+0.733X	4	B	0.31	0.26
		ADJUSTED SLOPE=0.805	5	G	0.11	0.16
			6	B	0.42	0.17
			7	G	0.27	0.27
			8	G	0.12	0.20
			9	G	0.39	0.58
			10	C	0.27	0.24
			11	G	0.10	0.19
			12	G	0.04	0.14
			13	G	0.28	0.27
			14	C	0.14	0.17
			15	C	0.05	0.13
			16	G	0.22	0.26
20	B	Kyōto University	1	G	0.07	0.39
		N=18 R=0.477	2	G	0.22	0.44
		X MEAN=0.391 Y MEAN=0.298	3	G	0.17	0.55
		Y=0.076+0.568X	4	G	0.21	0.63
		ADJUSTED SLOPE=0.716	5	G	0.07	0.44
			6	G	0.07	0.24
			7	G	0.07	0.22
			8	G	0.56	0.47
			9	G	0.28	0.72
			10	G	0.25	0.64
			11	C	1.18	0.89
			12	C	0.61	0.32
			13	C	0.30	0.19
			14	C	0.27	0.14
			15	C	0.24	0.20
			16	C	0.26	0.14
			17	C	0.25	0.16
			18	C	0.28	0.26
21	B	Kyōto University	1	C	0.25	0.70
		N=15 R=0.475	2	C	0.24	0.62
		X MEAN=0.971 Y MEAN=0.361	3	G	0.46	2.27
		Y=0.225+0.140X	4	C	0.26	0.75
		ADJUSTED SLOPE=0.329	5	C	0.25	0.70
		"C" Data Only:	6	G	0.38	1.82
		N=11 R=0.952	7	C	0.25	0.68
		X MEAN=0.767 Y MEAN=0.351	8	C	0.26	0.68
		Y=−0.340+0.902X	9	B	0.30	0.79
		ADJUSTED SLOPE=0.478	10	G	0.41	1.24
			11	C	0.26	0.63
			12	C	0.35	0.74
			13	C	0.50	0.88
			14	C	0.74	1.23
			15	C	0.51	0.83
22	B	Kyōto University	1	B	1.51	0.98
		N=12 R=0.980	2	B	1.03	0.67
		X MEAN=0.948 Y MEAN=1.453	3	B	1.20	0.81
		Y=−0.063+1.600X	4	B	1.21	0.76
		ADJUSTED SLOPE=1.542	5	B	1.32	1.07
			6	B	1.04	0.64
			7	B	1.25	0.90
			8	B	0.98	0.66
			9	B	1.44	0.96
			10	B	3.41	2.13
			11	B	1.64	0.95
			12	B	1.41	0.85
23	B	Kyōto University	1	C	0.27	0.22
		N=16 R=−0.022	2	C	0.30	0.27
		X MEAN=0.313 Y MEAN=0.304	3	C	0.29	0.29
		Y=0.311+−0.022X	4	G	0.14	0.29
		ADJUSTED SLOPE=0.754	5	G	0.16	0.17
		"C" Data Only:	6	G	0.10	0.88
		N=6 R=0.413	7	G	0.20	0.22
		X MEAN=0.302 Y MEAN=0.360	8	G	0.19	0.17
		Y=0.075+0.966X	9	G	0.22	0.25
		ADJUSTED SLOPE=1.206	10	G	0.16	0.17
			11	G	0.60	0.28
			12	C	0.67	0.32
			13	B	0.46	0.45
			14	C	0.40	0.42
			15	C	0.27	0.29
			16	G	0.44	0.32

TABLE III (continued)

Mirror Number*	Type†	Archaeological Provenance	Analysis Number	Surface Condition‡	SnKα/CuKβ	PbLγ/CuKβ
24	B	Kyōto University	1	C	1.74	1.09
		N=12 R=0.784	2	C	1.71	0.94
		X MEAN=0.893 Y MEAN=1.370	3	C	2.08	1.30
		Y=0.126+1.394X	4	C	2.23	1.22
		ADJUSTED SLOPE=1.521	5	C	1.78	0.83
			6	G	0.40	0.19
			7	G	0.91	0.47
			8	G	1.48	0.87
			9	C	0.68	0.73
			10	G	1.35	1.20
			11	G	0.91	1.00
			12	G	1.19	0.88
25	B	Kyōto University	1	B	1.16	0.52
		N=15 R=0.841	2	B	2.19	1.02
		X MEAN=1.227 Y MEAN=2.271	3	B	1.51	0.66
		Y=1.282+0.807X	4	B	1.79	0.79
		ADJUSTED SLOPE=1.579	5	B	1.66	0.82
			6	B	3.42	3.52
			7	B	1.59	0.55
			8	B	1.70	0.72
			9	B	2.38	1.20
			10	B	1.86	0.86
			11	B	2.66	1.41
			12	G	3.16	1.43
			13	B	3.15	1.85
			14	B	2.73	1.46
			15	B	3.11	1.59
26	B	Kyōto Prefecture	1	B	1.10	0.79
		N=15 R=0.881	2	C	0.71	0.44
		X MEAN=0.889 Y MEAN=1.053	3	C	0.79	0.40
		Y=0.180+0.981X	4	G	0.33	0.42
		ADJUSTED SLOPE=1.115	5	G	0.37	0.34
			6	G	0.29	0.36
			7	B	0.95	0.55
			8	G	0.53	0.42
			9	B	1.16	0.50
			10	G	2.05	1.98
			11	G	0.55	1.08
			12	C	0.92	0.96
			13	C	1.19	1.42
			14	G	2.90	2.56
			15	C	1.95	1.12
27	B	Siga Prefecture	1	C	0.85	0.50
		N=14 R=0.900	2	B	1.25	0.67
		X MEAN=0.647 Y MEAN=1.103	3	B	1.19	0.53
		Y=0.154+1.466X	4	B	1.77	1.09
		ADJUSTED SLOPE=1.679	5	G	0.74	0.38
			6	C	1.03	0.55
			7	C	1.47	0.82
			8	C	0.88	0.40
			9	C	0.95	0.81
			10	C	1.25	0.75
			11	C	0.79	0.54
			12	G	0.62	0.41
			13	C	1.82	1.06
			14	G	0.83	0.55
28	B	Siga Prefecture	1	C	0.82	0.55
		N=16 R=0.871	2	C	0.91	0.65
		X MEAN=0.639 Y MEAN=0.814	3	G	1.75	1.27
		Y=0.098+1.121X	4	C	0.83	0.66
		ADJUSTED SLOPE=1.256	5	G	0.47	0.35
			6	G	0.49	0.29
			7	G	0.79	0.93
			8	G	0.55	0.34
			9	C	0.84	0.72
			10	G	0.65	0.69
			11	G	0.53	0.35
			12	G	0.55	0.65
			13	C	0.71	0.53
			14	C	1.07	0.73
			15	C	0.92	0.67
			16	G	1.15	0.84
29	B	Hyōgo Prefecture	1	G	1.28	0.64
		N=10 R=0.808	2	B	1.36	0.59
		X MEAN=0.601 Y MEAN=1.040	3	C	1.05	0.40
		Y=0.432+1.012X	4	G	1.89	1.51
		ADJUSTED SLOPE=1.577	5	C	1.10	0.53
			6	G	0.97	0.57
			7	G	0.63	0.35
			8	G	0.49	0.48
			9	G	0.61	0.48
			10	C	1.02	0.46
30	A	Gitu Prefecture	1	C	1.48	1.26
		N=15 R=0.810	2	C	1.50	2.33
		X MEAN=1.181 Y MEAN=1.176	3	C	1.69	1.27
		Y=0.592+0.494X	4	B	1.42	1.50
		ADJUSTED SLOPE=0.912	5	G	1.43	2.01
			6	G	1.08	0.86
			7	G	0.81	0.92
			8	G	0.96	0.83
			9	G	1.47	1.51
			10	C	1.08	1.21
			11	G	1.21	1.40
			12	G	0.95	0.70
			13	C	0.62	0.42
			14	C	1.33	1.23
			15	C	0.61	0.26
31	B	Saga Prefecture	1	G	5.50	4.67
		N=13 R=0.981	2	G	7.05	6.00
		X MEAN=3.594 Y MEAN=4.391	3	C	3.23	2.03
		Y=0.590+1.058X	4	C	1.52	1.02
		ADJUSTED SLOPE=1.179	5	G	4.13	3.38
			6	C	1.72	1.12
			7	G	3.08	2.01
			8	B	2.03	1.74
			9	G	6.20	5.70
			10	B	2.19	1.24

TABLE III (continued)

Mirror Number*	Type†	Archaeological Provenance	Analysis Number	Surface Condition‡	SnKα/CuKβ	PbLγ/CuKβ
			11	G	5.39	4.53
			12	G	9.56	7.69
			13	G	5.48	5.59
32	B	Saga Prefecture	1	B	2.06	0.56
		N=13 R=0.644	2	C	0.61	0.17
		X MEAN=0.686 Y MEAN=1.635	3	G	1.09	0.53
		Y=0.712+1.346X	4	C	1.88	0.79
		ADJUSTED SLOPE=2.095	5	C	1.69	0.59
		"C" Data Only:	6	B	3.48	1.13
		N=6 R=0.965	7	B	1.43	0.88
		X MEAN=0.410 Y MEAN=1.013	8	C	0.30	0.20
		Y=−0.005+2.483X	9	C	0.49	0.21
		ADJUSTED SLOPE=2.475	10	C	1.11	0.50
			11	B	2.30	1.44
			12	B	2.04	1.50
			13	B	2.78	0.42
33	B	Saga Prefecture	1	C	0.65	0.51
		N=13 R=0.825	2	G	0.54	0.56
		X MEAN=0.706 Y MEAN=0.616	3	C	0.60	0.37
		Y=−0.088+0.997X	4	G	0.27	0.40
		ADJUSTED SLOPE=0.902	5	C	0.45	0.23
		"C" Data Only:	6	G	0.50	0.56
		N=3 R=0.961	7	G	1.95	1.65
		X MEAN=0.370 Y MEAN=0.567	8	G	0.10	0.43
		Y=0.302+0.714X	9	B	0.67	0.70
		ADJUSTED SLOPE=1.460	10	B	0.85	1.05
			11	G	1.10	1.32
			12	G	0.14	0.80
			13	G	0.19	0.60
34	B	Saga Prefecture	1	C	0.58	0.56
		N=13 R=0.824	2	C	0.65	0.57
		X MEAN=0.348 Y MEAN=0.425	3	G	0.14	0.26
		Y=0.071+1.017X	4	G	0.22	0.13
		ADJUSTED SLOPE=1.177	5	C	0.64	0.42
			6	G	0.16	0.15
			7	G	0.19	0.12
			8	C	0.71	0.45
			9	G	0.29	0.15
			10	G	0.19	0.18
			11	G	0.41	0.60
			12	C	0.57	0.36
			13	C	0.77	0.57
35	B	Saga Prefecture	1	G	5.89	2.19
		N=10 R=0.938	2	G	5.13	1.92
		X MEAN=1.477 Y MEAN=3.723	3	G	6.30	2.75
		Y=0.198+2.387X	4	C	2.68	0.86
		ADJUSTED SLOPE=2.498	5	G	0.89	0.45
			6	G	1.47	0.85
			7	B	4.08	1.48
			8	B	4.13	1.25
			9	B	3.50	1.78
			10	B	3.16	1.24
36	B	Saga Prefecture	1	B	4.63	3.16
		N=14 R=0.834	2	B	2.91	1.99
		X MEAN=2.979 Y MEAN=5.077	3	B	3.79	1.95
		Y=0.389+1.574X	4	B	5.85	4.00
		ADJUSTED SLOPE=1.691	5	B	5.95	3.45
			6	G	7.30	2.40
			7	C	1.44	1.18
			8	G	7.63	5.02
			9	B	5.50	3.29
			10	B	5.64	3.36
			11	G	2.69	1.98
			12	G	6.00	3.55
			13	B	8.00	4.00
			14	B	3.75	2.38
37	B	Saga Prefecture	1	G	1.43	0.99
		N=14 R=0.972	2	B	2.08	1.27
		X MEAN=1.269 Y MEAN=2.110	3	B	2.86	2.00
		Y=0.265+1.454X	4	G	0.77	0.43
		ADJUSTED SLOPE=1.633	5	G	0.85	0.42
			6	G	2.39	1.26
			7	B	1.50	0.88
			8	B	3.15	2.00
			9	B	3.27	2.04
			10	B	1.38	0.69
			11	B	2.68	1.66
			12	B	2.78	1.43
			13	B	2.24	1.38
			14	B	2.16	1.31
38	A	Gunma Prefecture	1	G	0.77	0.12
		N=4 R=0.298	2	G	1.23	0.31
		X MEAN=0.220 Y MEAN=0.720	3	G	0.51	0.17
		Y=0.444+1.256X	4	C	0.37	0.28
		ADJUSTED SLOPE=3.046				
39	A	Hyōgo Prefecture	1	C	0.53	0.61
		N=10 R=0.880	2	C	0.53	0.52
		X MEAN=0.609 Y MEAN=0.555	3	G	0.95	1.14
		Y=0.045+0.838X	4	G	0.84	0.90
		ADJUSTED SLOPE=0.898	5	G	0.25	0.17
			6	G	0.44	0.51
			7	G	0.70	0.81
			8	B	0.21	0.21
			9	C	0.89	0.69
			10	B	0.21	0.53
40	A	Hyōgo Prefecture	1	C	0.58	0.32
		N=10 R=0.983	2	C	0.50	0.20
		X MEAN=0.376 Y MEAN=0.654	3	B	0.44	0.21
		Y=0.197+1.215X	4	B	0.39	0.21
		ADJUSTED SLOPE=1.585	5	C	0.37	0.19
			6	G	0.56	0.30
			7	G	0.47	0.25
			8	G	0.90	0.58
			9	G	1.32	0.89
			10	G	1.01	0.71

TABLE III (continued)

Mirror Number*	Type†	Archaeological Provenance	Analysis Number	Surface Condition‡	SnKα/CuKβ	PbLγ/CuKβ
41	B	Hyōgo Prefecture	1	C	1.16	0.52
		N=10 R=0.986	2	C	0.89	0.38
		X MEAN=0.423 Y MEAN=0.910	3	C	0.79	0.34
		Y=0.150+1.798X	4	B	0.79	0.39
		ADJUSTED SLOPE=2.092	5	G	1.22	0.58
			6	G	0.32	0.15
			7	G	1.41	0.74
			8	G	0.45	0.17
			9	G	1.33	0.67
			10	C	0.74	0.29
42	A	Kyōto–Nara Prefecture?	1	G	1.17	0.73
		N=14 R=0.927	2	G	0.11	0.03
		X MEAN=0.219 Y MEAN=0.364	3	G	0.16	0.04
		Y=0.082+1.283X	4	G	0.28	0.06
		ADJUSTED SLOPE=1.480	5	G	0.31	0.11
			6	G	0.28	0.22
			7	G	0.21	0.11
			8	G	0.30	0.11
			9	G	0.21	0.09
			10	G	0.16	0.17
			11	G	0.61	0.39
			12	G	0.82	0.60
			13	G	0.26	0.09
			14	G	0.21	0.32
43	A	Hyōgo Prefecture	1	C	0.72	0.84
		N=11 R=0.379	2	C	0.49	0.41
		X MEAN=0.819 Y MEAN=0.455	3	C	0.44	0.47
		Y=0.255+0.244X	4	G	0.27	0.83
		ADJUSTED SLOPE=0.523	5	G	0.37	0.79
			6	G	0.44	0.70
			7	G	0.62	1.42
			8	G	0.33	0.61
			9	G	0.56	1.19
			10	G	0.08	0.78
			11	C	0.69	0.97
44	A	Fukuoka Prefecture	1	G	0.49	0.31
		N=5 R=−0.116	2	B	1.32	1.16
		X MEAN=0.860 Y MEAN=0.548	3	B	0.63	0.46
		Y=0.608+ −0.070X	4	G	0.23	0.23
		ADJUSTED SLOPE=0.346	5	B	0.07	2.14
		Without Analysis No. 5:				
		N=4 R=0.986				
		X MEAN=0.540 Y MEAN=0.668				
		Y=0.083+1.082X				
		ADJUSTED SLOPE=1.188				
45	A	Fukuoka Prefecture	1	G	0.13	0.63
		N=5 R=0.397	2	G	0.15	0.51
		X MEAN=0.492 Y MEAN=0.228	3	G	0.63	0.59
		Y=−0.117+0.700X	4	G	0.06	0.42
		ADJUSTED SLOPE=0.476	5	G	0.17	0.31
46	A	Fukuoka Prefecture	1	G	0.15	1.11
		N=5 R=−0.707	2	G	0.39	0.54
		X MEAN=1.186 Y MEAN=0.208	3	G	0.13	2.36
		Y=0.332+ −0.104X	4		0.14	1.34
		ADJUSTED SLOPE=0.109	5	G	0.23	0.58
47	A	Fukuoka Prefecture	1	G	0.20	0.33
		N=5 R=0.725	2	G	1.08	1.11
		X MEAN=0.620 Y MEAN=0.406	3	G	0.36	0.28
		Y=−0.104+0.822X	4	G	0.20	0.63
		ADJUSTED SLOPE=0.687	5	G	0.19	0.75
48	A	Fukuoka Prefecture	1	G	0.12	0.40
		N=4 R=0.246	2	G	0.31	4.68
		X MEAN=1.612 Y MEAN=0.250	3	G	0.43	0.50
		Y=0.222+0.018X	4	B	0.14	0.87
		ADJUSTED SLOPE=0.080				
49	A	Ōsaka Prefecture	1	C	0.33	0.25
		N=5 R=0.986	2	C	0.30	0.24
		X MEAN=0.606 Y MEAN=0.594	3	C	0.35	0.36
		Y=0.154+0.727X	4	G	1.30	1.61
		ADJUSTED SLOPE=0.874	5	G	0.69	0.57
50	A	Ōsaka Prefecture	1	C	0.19	0.19
		N=5 R=0.118	2	G	0.19	0.25
		X MEAN=0.278 Y MEAN=0.194	3	G	0.22	0.22
		Y=0.184+0.037X	4	G	0.15	0.31
		ADJUSTED SLOPE=0.645	5	G	0.22	0.42
51	A	Ōsaka Prefecture	1	C	0.24	0.15
		N=5 R=0.813	2	G	0.27	0.66
		X MEAN=0.306 Y MEAN=0.208	3	C	0.21	0.18
		Y=0.156+0.170X	4	C	0.19	0.14
		ADJUSTED SLOPE=0.540	5	C	0.22	0.33
		"C" Data Only:				
		N=4 R=0.181				
		X MEAN=0.200 Y MEAN=0.215				
		Y=0.206+0.043X				
		ADJUSTED SLOPE=0.945				
52	A	Ōsaka Prefecture	1	C	0.25	0.58
		N=5 R=0.625	2	G	0.21	0.41
		X MEAN=0.540 Y MEAN=0.184	3	G	0.12	0.25
		Y=0.109+0.050X	4	G	0.11	0.44
		ADJUSTED SLOPE=0.503	5	G	0.23	1.02
53	A	Ōsaka Prefecture	1	C	0.24	0.31
		N=10 R=0.668	2	B	0.33	0.36
		X MEAN=0.540 Y MEAN=0.263	3	G	0.31	0.69
		Y=0.179+0.054X	4	G	0.15	0.38
		ADJUSTED SLOPE=0.410	5	G	0.21	0.49
			6	C	0.39	1.34
			7	C	0.30	0.66
			8	C	0.20	0.52
			9	C	0.29	0.37
			10	G	0.21	0.28
54	B	Ōsaka Prefecture	1	C	0.20	0.29
		N=6 R=−0.114	2	C	0.22	0.63

Table III (continued)

Mirror Number*	Type†	Archaeological Provenance	Analysis Number	Surface Condition‡	SnKα / CuKβ	PbLγ / CuKβ
		X MEAN=0.398 Y MEAN=0.255	3	B	0.24	0.44
		Y=0.269+0.043X	4	G	0.30	0.31
		ADJUSTED SLOPE=0.575	5	C	0.31	0.47
		"C" Data Only:	6	C	0.26	0.25
		N=4 R=0.055				
		X MEAN=0.410 Y MEAN=0.248				
		Y=0.241+0.015X				
		ADJUSTED SLOPE=0.533				
55	A	Ōsaka Prefecture	1	C	0.14	0.19
		N=6 R=0.359	2	C	0.15	0.24
		X MEAN=0.258 Y MEAN=0.157	3	G	0.22	0.24
		Y=0.119+0.145X	4	G	0.15	0.27
		ADJUSTED SLOPE=0.563	5	B	0.11	0.18
			6	C	0.17	0.43
56	A	Ōsaka Prefecture	1	C	0.19	0.33
		N=7 R=−0.244	2	G	0.16	0.30
		X MEAN=0.753 Y MEAN=0.164	3	G	0.10	0.64
		Y=0.172+−0.011X	4	G	0.15	0.56
		ADJUSTED SLOPE=0.085	5	G	0.15	2.90
			6	G	0.16	0.22
			7	G	0.24	0.32
57	A	Ōsaka Prefecture	1	C	0.12	0.23
		N=6 R=0.881	2	C	0.21	0.66
		X MEAN=0.552 Y MEAN=0.167	3	G	0.21	0.97
		Y=0.076+0.164X	4	G	0.21	0.66
		ADJUSTED SLOPE=0.279	5	G	0.10	0.32
			6	C	0.15	0.47
58	A	Kyōto Prefecture	1	G	8.92	4.25
		N=7 R=0.868	2	G	6.56	3.75
		X MEAN=2.583 Y MEAN=3.666	3	G	1.07	0.71
		Y=−1.455+1.983X	4	G	3.95	2.45
		ADJUSTED SLOPE=1.529	5	G	1.20	1.44
			6	G	3.44	3.80
			7	G	0.52	1.68
59	A	Ōsaka Prefecture	1	C	0.24	0.24
		N=7 R=0.968	2	C	0.26	0.31
		X MEAN=0.527 Y MEAN=0.344	3	C	0.21	0.24
		Y=0.103+0.457X	4	C	0.31	0.39
		ADJUSTED SLOPE=0.569	5	B	0.25	0.26
			6	G	0.87	1.60
			7	C	0.27	0.65
60	A	Fukuoka Prefecture	1	G	0.44	0.38
		N=11 R=0.360	2	B	0.28	0.16
		X MEAN=0.212 Y MEAN=0.318	3	G	0.30	0.18
		Y=0.219+0.469X	4	B	0.35	0.17
		ADJUSTED SLOPE=1.384	5	G	0.09	0.16
			6	G	0.46	0.22
			7	G	0.30	0.14
			8	B	0.43	0.22
			9	B	0.26	0.33
			10	G	0.31	0.13
			11	B	0.28	0.24
61	B	Ōsaka Prefecture	1	G	0.69	1.66
		N=13 R=0.925	2	G	0.29	0.62
		X MEAN=0.926 Y MEAN=0.394	3	G	0.33	0.59
		Y=0.089+0.329X	4	G	0.28	0.59
		ADJUSTED SLOPE=0.412	5	G	0.38	0.82
			6	G	0.47	1.16
			7	G	0.36	0.74
			8	G	0.59	1.25
			9	G	0.40	0.95
			10	G	0.14	0.20
			11	G	0.46	1.36
			12	G	0.37	0.94
			13	G	0.36	1.16
62	B	Kyōto Prefecture	1	C	1.72	1.08
		N=13 R=0.953	2	G	0.94	0.54
		X MEAN=0.825 Y MEAN=1.339	3	C	1.62	0.89
		Y=−0.502+2.233X	4	G	0.47	0.37
		ADJUSTED SLOPE=1.677	5	G	0.49	0.52
			6	C	1.37	0.82
			7	C	1.56	0.91
			8	C	1.37	0.78
			9	G	0.40	0.52
			10	C	1.53	0.96
			11	C	1.61	1.05
			12	G	2.57	1.23
			13	C	1.76	1.05
63	B	Tottori Prefecture	1	G	0.56	0.41
		N=10 R=0.940	2	G	1.24	0.91
		X MEAN=0.588 Y MEAN=0.706	3	G	1.23	1.03
		Y=0.041+1.131X	4	G	0.40	0.35
		ADJUSTED SLOPE=1.188	5	G	0.76	0.59
			6	G	0.86	0.59
			7	G	0.38	0.30
			8	G	0.77	0.79
			9	G	0.74	0.81
			10	G	0.12	0.10
64	B	Saga Prefecture	1	G	0.44	1.69
		N=10 R=0.970	2	G	0.38	1.26
		X MEAN=1.307 Y MEAN=0.365	3	G	0.44	1.41
		Y=0.029+0.257X	4	G	0.48	1.74
		ADJUSTED SLOPE=0.277	5	G	0.56	2.09
			6	G	0.31	1.05
			7	G	0.21	0.85
			8	G	0.18	0.59
			9	G	0.32	1.05
			10	G	0.33	1.34
65	B	Saga Prefecture	1	B	1.13	3.02
		N=10 R=0.949	2	B	1.95	4.81
		X MEAN=1.853 Y MEAN=0.753	3	B	1.14	3.80
		Y=0.087+0.360X	4	B	1.43	2.53
		ADJUSTED SLOPE=0.387	5	G	0.71	2.25
			6	G	0.38	0.58
			7	G	0.20	0.35
			8	G	0.20	0.34

TABLE III (continued)

Mirror Number*	Type†	Archaeological Provenance	Analysis Number	Surface Condition‡	SnKα/CuKβ	PbLγ/CuKβ
			9	G	0.19	0.52
			10	G	0.20	0.33
66	B	Saga Prefecture	1	G	0.15	0.30
		N=10 R=0.933	2	G	0.11	0.19
		X MEAN=1.166 Y MEAN=0.349	3	G	0.17	0.34
		Y=0.103+0.210X	4	G	0.24	0.76
		ADJUSTED SLOPE=0.264	5	G	0.16	0.27
			6	G	0.35	0.92
			7	G	0.47	1.71
			8	G	0.69	2.88
			9	G	0.69	1.94
			10	G	0.46	2.35
67	B	Saga Prefecture	1	G	0.26	0.43
		N=10 R=0.780	2	G	0.30	0.61
		X MEAN=0.446 Y MEAN=0.243	3	G	0.27	0.47
		Y=0.069+0.390X	4	G	0.30	0.57
		ADJUSTED SLOPE=0.539	5	G	0.22	0.40
			6	G	0.27	0.41
			7	G	0.20	0.36
			8	G	0.17	0.29
			9	G	0.25	0.45
			10	G	0.19	0.47
68	A	Saga Prefecture	1		0.12	0.08
		N=6 R=0.473	2		0.13	0.14
		X MEAN=0.262 Y MEAN=0.155	3		0.13	0.20
		Y=0.129+0.100X	4		0.15	0.15
		ADJUSTED SLOPE=0.422	5		0.16	0.64
		Without Analysis No. 5:	6		0.24	0.36
		N=5 R=0.930				
		X MEAN=0.186 Y MEAN=0.154				
		Y=0.074+0.432X				
		ADJUSTED SLOPE=0.748				
69	A	Saga Prefecture	1		0.28	0.39
		N=5 R=0.831	2		0.14	0.05
		X MEAN=0.176 Y MEAN=0.206	3		0.14	0.06
		Y=0.112+0.532X	4		0.33	0.25
		ADJUSTED SLOPE=0.945	5		0.14	0.13
		Without Analysis No. 4:				
		N=4 R=0.975				
		X MEAN=0.158 Y MEAN=0.175				
		Y=0.107+0.429X				
		ADJUSTED SLOPE=0.817				
70	A	Nara Prefecture	1	G	0.92	1.12
		N=15 R=0.948	2	G	1.07	1.47
		X MEAN=1.264 Y MEAN=1.144	3	G	0.45	0.51
		Y=0.050+0.865X	4	G	1.12	1.30
		ADJUSTED SLOPE=0.898	5	G	2.14	2.58
			6	G	2.16	2.41
			7	G	1.10	1.16
			8	G	1.00	0.81
			9	G	0.92	1.10
			10	B	1.33	1.35
			11	G	1.78	1.53
			12	G	1.21	1.15
			13	G	0.45	0.63
			14	G	1.06	1.24
			15	G	0.45	0.60
71	A	Nara Prefecture	1	G	2.92	2.58
		N=17 R=0.974	2	G	3.72	3.48
		X MEAN=2.212 Y MEAN=2.435	3	G	1.96	1.90
		Y=0.266+0.981X	4	G	0.61	0.41
		ADJUSTED SLOPE=1.056	5	G	0.67	0.56
			6	G	1.06	0.75
			7	G	1.01	0.69
			8	G	4.53	4.00
			9	G	0.99	0.70
			10	G	0.57	0.38
			11	G	0.70	0.45
			12	G	2.46	2.23
			13	G	2.84	2.25
			14	G	1.80	2.28
			15	G	6.00	6.00
			16	G	5.18	3.94
			17	G	4.38	5.00
72	B	Nara Prefecture	1	G	0.22	0.24
		N=16 R=0.794	2	C	0.23	0.27
		X MEAN=0.251 Y MEAN=0.228	3	C	0.22	0.23
		Y=0.036+0.764X	4	C	0.23	0.28
		ADJUSTED SLOPE=0.906	5	G	0.22	0.24
		"C" Data Only:	6	G	0.22	0.25
		N=5 R=0.975	7	G	0.23	0.24
		X MEAN=0.254 Y MEAN=0.224	8	G	0.20	0.23
		Y=0.155+0.272X	9	G	0.22	0.25
		ADJUSTED SLOPE=0.875	10	G	0.22	0.24
			11	C	0.23	0.28
			12	C	0.21	0.21
			13	G	0.20	0.22
			14	G	0.22	0.26
			15	G	0.26	0.25
			16	G	0.31	0.32
73	B	Kyōto–Nara Prefecture?	1	G	0.09	0.23
		N=12 R=0.471	2	G	0.16	0.42
		X MEAN=0.578 Y MEAN=0.150	3	G	0.09	0.20
		Y=0.092+0.099X	4	G	0.19	0.45
		ADJUSTED SLOPE=0.232	5	G	0.19	0.46
			6	G	0.23	0.86
			7	G	0.25	0.94
			8	G	0.18	0.58
			9	G	0.08	0.38
			10	G	0.10	0.66
			11	G	0.12	0.69
			12	G	0.12	1.07
74	B	Kyōto–Nara Prefecture?	1		0.24	0.23
		N=15 R=0.849	2		0.11	0.26
		X MEAN=0.249 Y MEAN=0.182	3		0.43	0.41
		Y=0.067+1.000X	4		0.10	0.19
		ADJUSTED SLOPE=0.775	5		0.40	0.52

TABLE III (continued)

Mirror Number*	Type†	Archaeological Provenance	Analysis Number	Surface Condition‡	SnKα/CuKβ	PbLγ/CuKβ
			6		0.17	0.26
			7		0.02	0.12
			8		0.01	0.21
			9		0.13	0.27
			10		0.06	0.12
			11		0.07	0.09
			12		0.23	0.25
			13		0.30	0.23
			14		0.11	0.19
			15		0.35	0.39
75	B	Kyōto Prefecture	1	B	0.77	0.49
		N=6 R=0.955	2	B	0.71	0.52
		X MEAN=0.682 Y MEAN=1.128	3	B	1.02	0.71
		Y= −0.038+1.710X	4	G	2.18	1.29
		ADJUSTED SLOPE=1.663	5	C	0.82	0.49
			6	C	1.27	0.59
76	B	Nara Prefecture	1	G	0.27	0.07
		N=12 R= −0.535	2	G	0.25	0.09
		X MEAN=0.084 Y MEAN=0.260	3	G	0.22	0.09
		Y=0.337+ −0.916X	4	G	0.25	0.10
		ADJUSTED SLOPE=2.512	5	G	0.26	0.10
			6	G	0.26	0.09
			7	G	0.26	0.08
			8	G	0.28	0.08
			9	G	0.25	0.08
			10	G	0.28	0.07
			11	G	0.26	0.08
			12	G	0.28	0.08
77	B	Nara Prefecture	1	B	0.74	0.47
		N=13 R=0.985	2	B	0.62	0.32
		X MEAN=1.032 Y MEAN=1.656	3	G	1.30	0.58
		Y=0.299+1.315X	4	G	0.85	0.48
		ADJUSTED SLOPE=1.434	5	G	0.80	0.49
			6	B	0.65	0.35
			7	G	0.36	0.24
			8	G	1.17	0.61
			9	B	0.69	0.43
			10	G	1.24	0.64
			11	G	3.82	2.09
			12	G	6.29	4.86
			13	G	3.00	1.86
78	B	Ōsaka Prefecture	1	B	0.46	1.20
		N=14 R=0.871	2	G	0.55	1.57
		X MEAN=1.344 Y MEAN=0.496	3	G	0.69	2.10
		Y=0.201+0.219X	4	G	0.58	1.75
		ADJUSTED SLOPE=0.356	5	G	0.53	1.63
			6	G	0.51	1.75
			7	G	0.45	1.06
			8	G	0.54	1.67
			9	G	0.47	1.09
			10	B	0.40	0.83
			11	B	0.35	1.10
			12	C	0.34	0.72
			13	B	0.40	0.80
			14	G	0.67	1.54
79	A	Kyōto Prefecture	1	C	0.53	0.86
		N=7 R=0.965	2	G	1.95	1.85
		X MEAN=0.797 Y MEAN=0.807	3	G	0.26	0.16
		Y=0.074+0.920X	4	G	0.41	0.34
		ADJUSTED SLOPE=0.978	5	G	0.42	0.29
			6	G	0.65	0.52
			7	G	1.43	1.56