

TECHNICAL SECTION

THE WEIGHTS OF THE PUNCH-MARKED COINS FROM BARWĀNI (MADHYA BHARAT)

By T. R. GAIROLA

In 1943 a hoard of 3423 silver punch-marked coins was discovered at village Pāti in Barwāni State (now a part of Madhya Bharat) and was forwarded by the Diwan of the State to the Director General of Archaeology. The coins are being studied and classified by Dr. K. N. Puri, Superintendent of the Northern Circle, and it is hoped that his work will shortly be published as a Memoir of the Survey. In the meantime the results of the analysis of the weights of the coins by Mr. T. R. Gairola, Assistant Archaeological Chemist, are published here, for, as has been suggested by scholars working in the line, an accurate recording of the weights of the punch-marked coins is of great importance in the determination of the length of their circulation, as the loss of weight has in all probability a bearing on the number of the symbols on the reverses of the coins.

A STUDY of the weights of 3423 silver punch-marked coins discovered at Pāti in Barwāni, Madhya Bharat, shows that a majority of them weigh between 3·6 gms. and 3·1 gms. Table I gives the number of coins with different ranges of weights.

TABLE I

Range of weights in gms.	Average	No. of coins
3·6498-3·5500 	3·6	48
3·5498-3·4500 	3·5	542
3·4498-3·3500 	3·4	1,502
3·3498-3·2500 	3·3	954
3·2498-3·1500 	3·2	247
3·1498-3·0500 	3·1	68
3·0498-2·9500 	3·0	29
2·9498-2·8500 	2·9	22
2·8498-2·7500 	2·8	6

If a curve is plotted on Hemy's lines¹ with the data given in Table I, it is found that there is a peak-point in the curve at 3.4 gms. weight (fig. 1). Allowing one per cent for the loss of weight due to wear-and-tear and corrosion, the probable weight corresponding to this peak-point comes to 3.43 gms., which is equivalent to four times the smallest weight-unit ($.86 \times 4 = 3.44$ gms.) of the Harappā culture.² Thus, it seems likely that the weight-standard of the Barwāni hoard is akin to that of Mohenjo-daro, the slight deviation being due to wear-and-tear, corrosion and errors during minting.

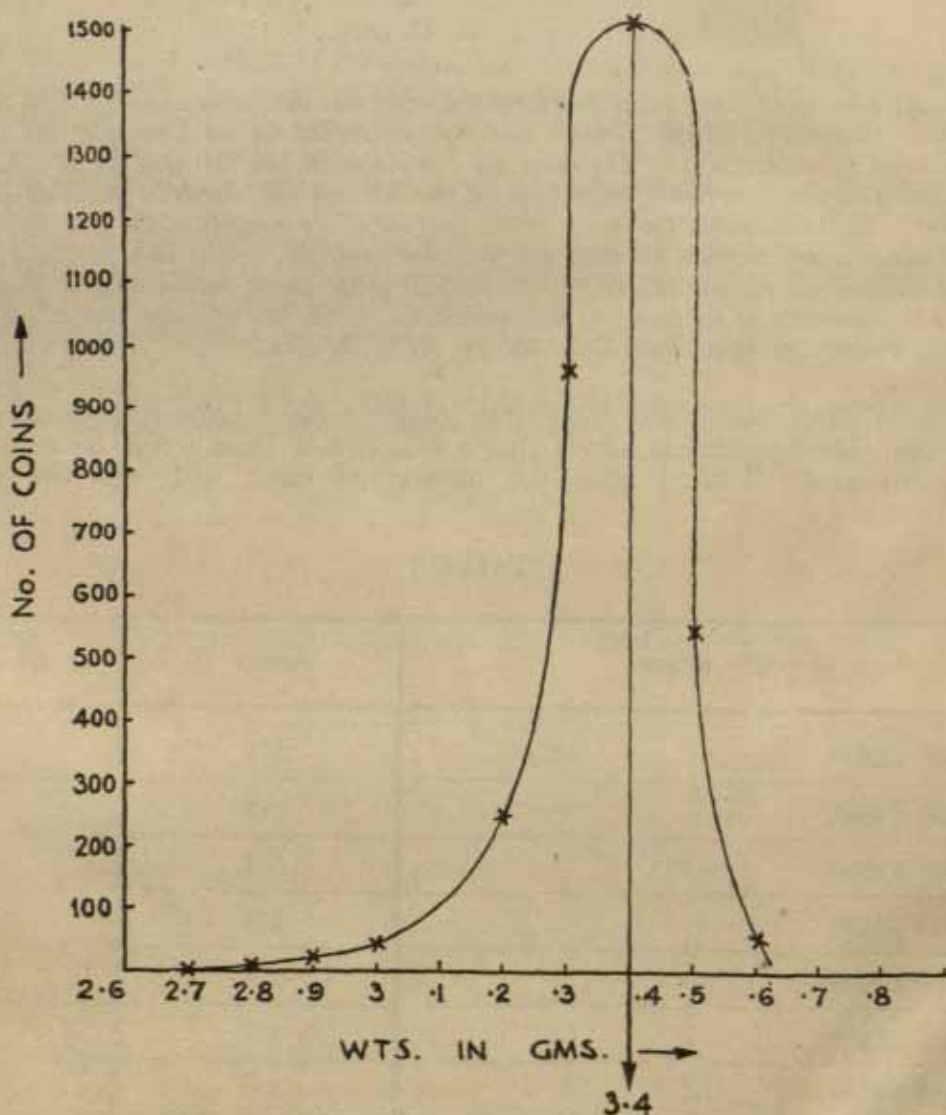


FIG. 1. (Cf. *Journ. Roy. Asiatic Soc.*, Jan. 1937, p. 9)

¹ A. S. Hemy in *Journ. Roy. Asiatic Soc.*, Jan. 1937, pp. 1-25.

² J. Marshall, *Mohenjo-daro and the Indus Civilization* (London, 1931), II, pp. 589-598.

TECHNICAL SECTION

Table II shows that the number of coins falls with the increase in the number of reverse-symbols and gives the curve in fig. 2 if a graph is plotted. The condition of the wear-and-tear of the coins suggests that those with a higher number of reverse-symbols were in circulation for a longer period.

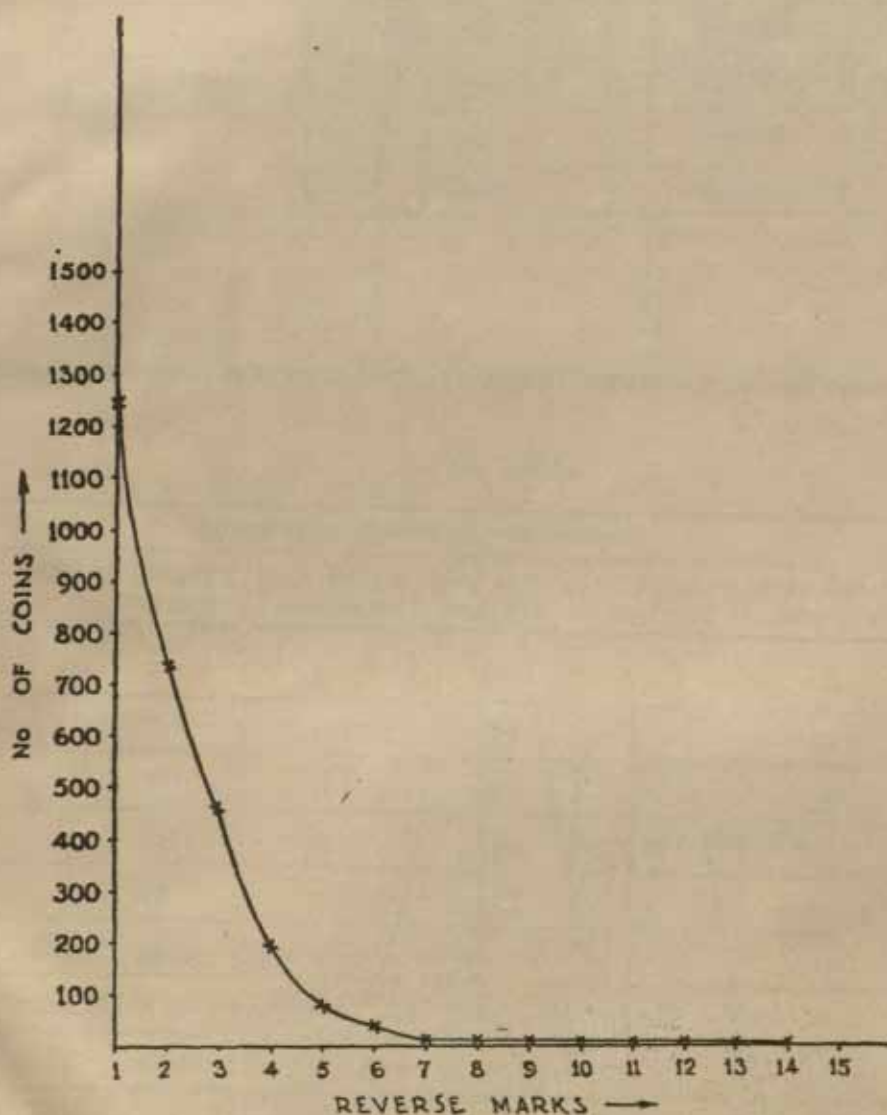


FIG. 2. (Cf. *Current Science*, July 1940, p. 313)

TABLE II

<i>No. of reverse-symbols</i>	<i>No. of coins¹</i>
1	1,243
2	733
3	457
4	194
5	77
6	41
7	12
8	15
9	8
10	7
11	3
12	2
13	3
14	3

Table III shows the coins arranged in order of the numbers of their reverse-symbols and weight-group.

TABLE III

No. of reverse-symbols	Number of coins in each weight-group					
	3'5748-5250 3'55 gms.	3'5248-4750 3'50 gms.	3'4748-4250 3'45 gms.	3'4248-3750 3'40 gms.	3'3748-3250 3'35 gms.	3'3248-2750 3'30 gms.
0	...	...	10	3	1	...
1	49	131	256	334	247	135
2	21	47	131	184	187	87
3	10	24	53	95	135	75
4	3	3	28	39	47	32
5	...	...	2	3	15	13
6	...	...	1	4	6	5
7	...	...	...	...	1	2
8	...	...	...	...	...	3

Plotting Hemy's curves for each group of reverse-symbols, the weights are found as follows from the peak-points of the curves.

¹ Coins bearing illegible marks have been excluded.

TABLE IV

No. of reverse-symbols	Standard-weight	Remarks
1	3.3900	from Curve A (fig. 3)
2	3.3700	from Curve B (")
3	3.3575	from Curve C (")
4	3.3500	from Curve D (fig. 4)
5	3.3275	from Curve E (")
6	3.3200	from Curve F (")

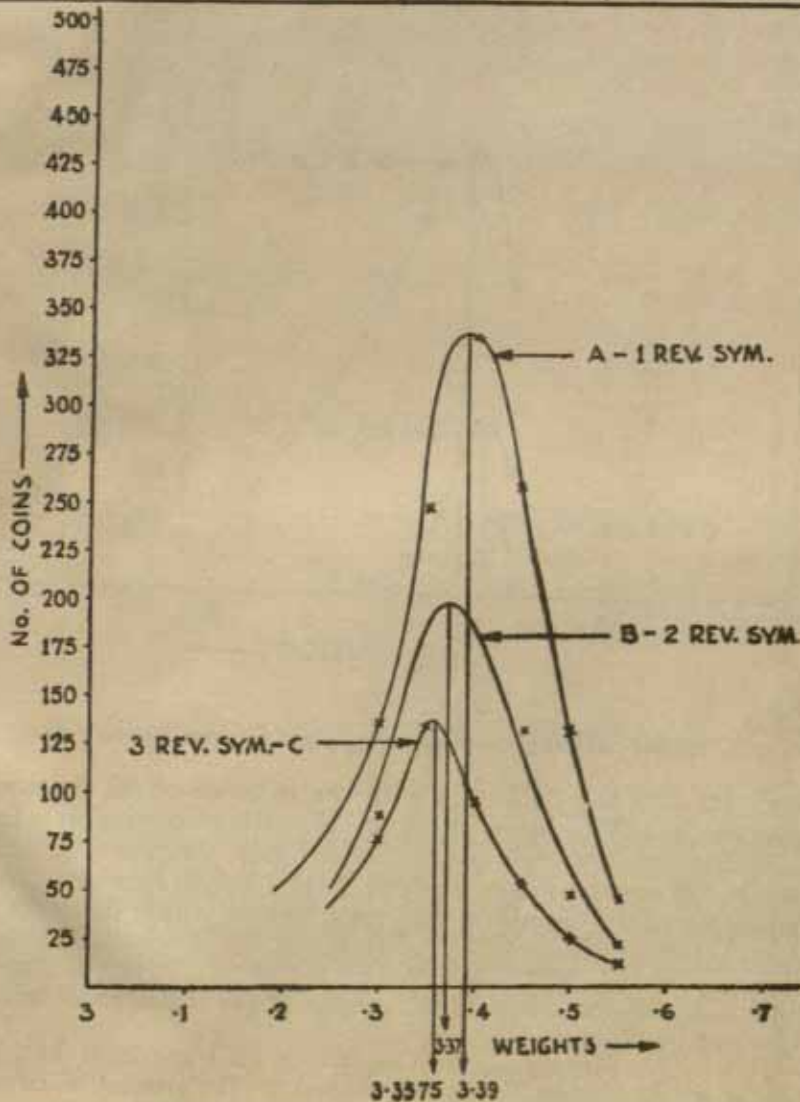


FIG. 3. Standard weights of coins bearing 1, 2 and 3 reverse-symbols

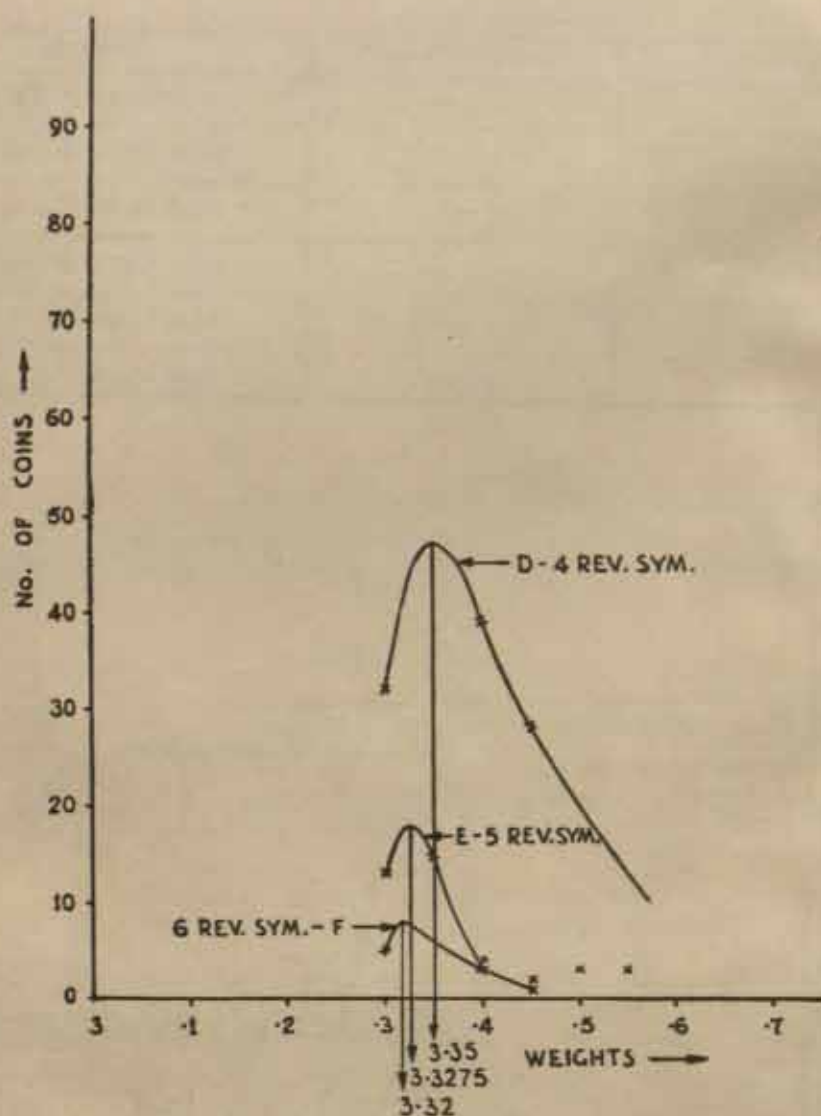


FIG. 4. Standard weights of coins bearing 4, 5 and 6 reverse-symbols

The standard-weights thus fall uniformly with the increase of the reverse-symbols' and, when plotted, give the line GH, shown in fig. 5. The linear regression is found to be given, on calculation by the equation $y=3.4088-.0158x$, where y represents the standard-weight and x the number of reverse-symbols. The loss of weight between the successive reverse-symbols is indicative of the length of the period during which the coins had been in circulation.²

¹ D. D. Kosambi, 'A statistical study of the weights of old Indian punch-marked coins', *Current Science*, July 1940, pp. 312-314.

² The Master of Mint, His Majesty's Mint, Calcutta, in his letter dated the 4th July 1945, informed me: 'The loss of weight in coins is primarily caused by the amount of circulation they have endured.'

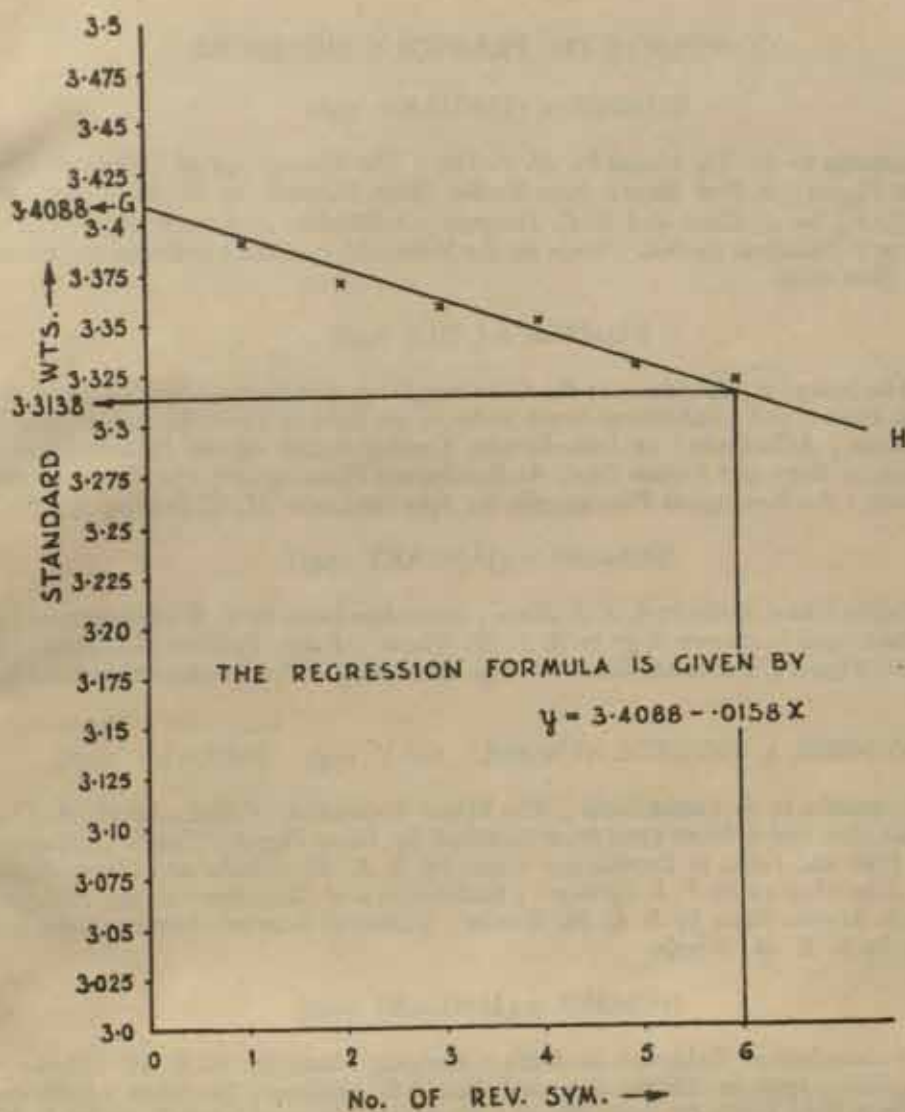


FIG. 5

$$y = mx + c$$

$$3.4088 = 0 + c$$

$$3.3138 = 6m + 3.4088$$

$$\therefore -m = \frac{.0950}{6} = .0158$$

$$\text{or } m = -.0158$$

i.e. .0158 is the discount on the value of each reverse-symbol.

We are therefore led to confirm the theory that the reverse-symbols were fixed during the circulation of the coins at regular intervals. Systematic chemical analyses combined with a study of weights may, however, throw further light on the relationship of the number of reverse-symbols on the coins and the duration of their circulation.

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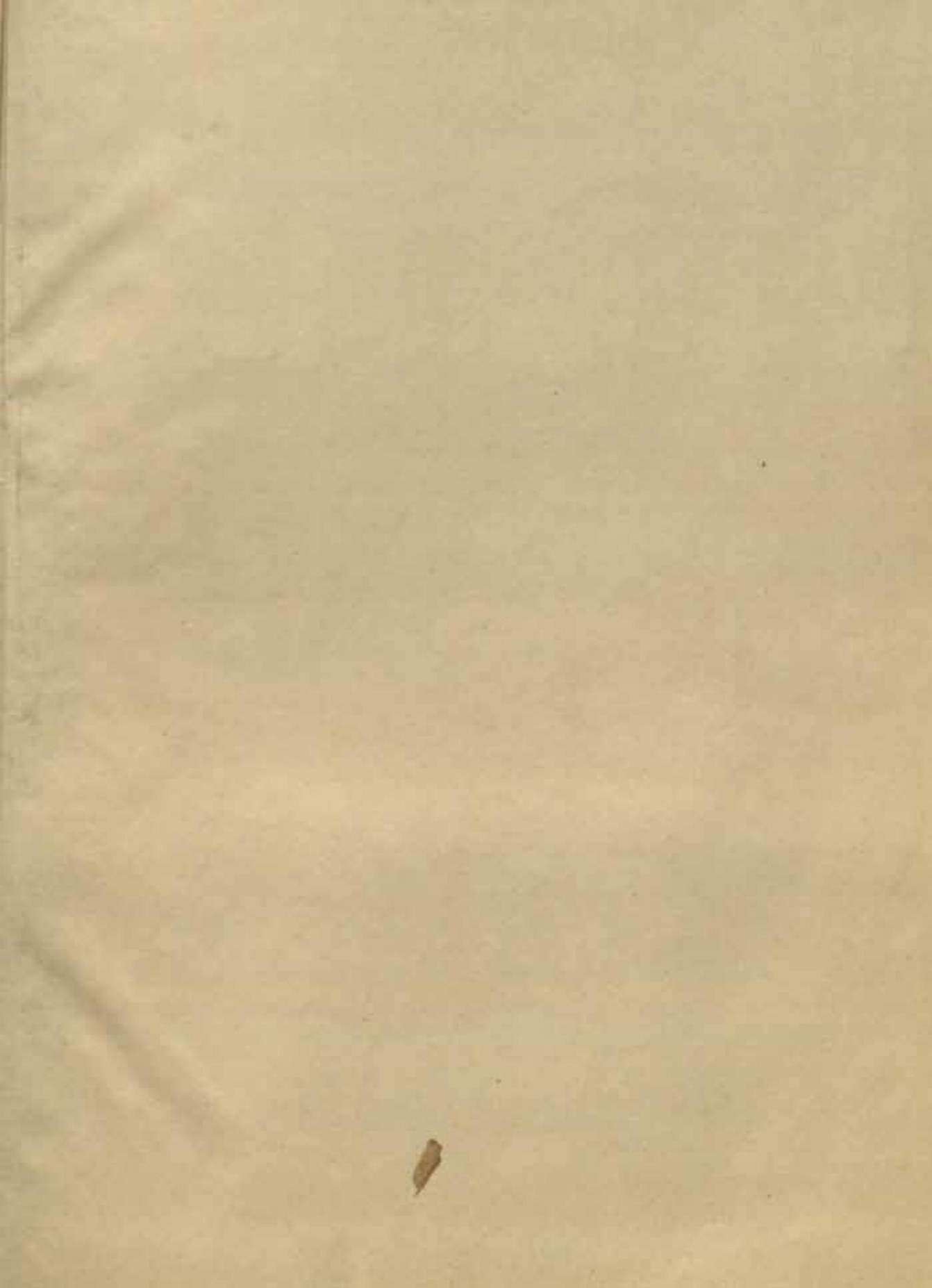
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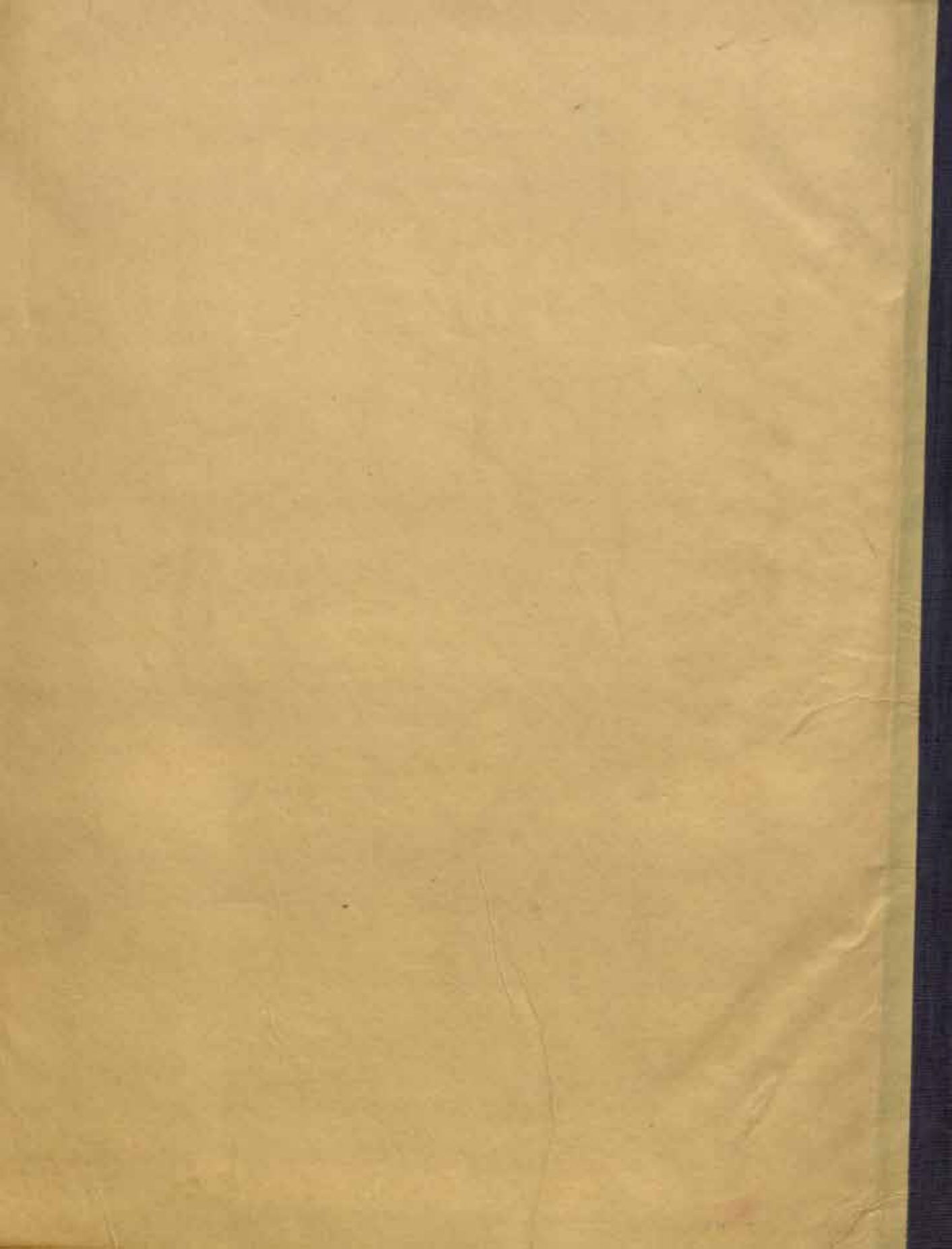
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