

## TECHNICAL SECTION

### BĪDRĪ WARE

By T. R. GAIROLA

**B**ĪDRĪ ware' is the name given to a class of damascened metalware, manufactured chiefly at Bidar in Hyderabad State (17°55' N. Lat. and 70°32' E. Long.). Bidar attained celebrity in medieval times under the kings of the Bahmanī dynasty, who shifted their capital to this place in 1424, and later on under the Barīd Shāhis (1536-1619). The successive rulers of both the dynasties embellished the place with a large number of monuments.

It is likely that the Bīdrī industry originated out of the silver and gold inlay-work on steel practised by the Arabs and Persians, steel being substituted by an alloy in India. While Bidar was, and still is, the principal centre of the industry, it subsequently spread to three other places, viz. Lucknow (U.P.), Purnea (Bihar) and Murshidabad (West Bengal).

The process of the manufacture of the ware generally consists of four stages. The first stage is to prepare a metallic cast from a clay mould by the wax-replacement process and then to smoothen the alloy-surface with a file and sand-paper. The second stage is to give a black colour to the metallic surface by dipping it in copper sulphate solution and then to engrave on it the designs, usually floral. The third stage is to inlay the design with silver, and the last is to impart a permanent black colour to the alloy-surface leaving the brilliant metallic designs unaffected. Though the craft requires a high technical and artistic skill, it has been well-perfected. It was at one time practised on a large scale, and specimens of the ware are found present in all good museums of the country and outside. Writing in 1817, Benjamin Heyne remarked: 'The Hindoos have since time immemorial not only excelled their neighbours in the management of metals for useful and curious purposes, but they are even familiarly acquainted with alloys unknown to our practical chemists. Among those in general use that have drawn the attention of Europeans living in India, are the alloys for the gurry, and the Biddery ware.'<sup>2</sup>

The excellence and beauty of the ware depends upon the contrast which the inlaid metal—silver or gold—presents to the black background of the body of the vessel. The

<sup>1</sup> Apart from the references given below, see G. C. M. Birdwood, *The Industrial Arts of India* (London, 1880), II, pp. 163-64, and *Bidri Ware—an Ancient Art* (Government Cottage Industries, Hyderabad). For the history of Bidar, see G. Yazdani, *Bidar—its History and Monuments* (Oxford, 1947).

<sup>2</sup> Benjamin Heyne, 'An account of Biddery (Vidri) ware in India', *Asiatic Journal*, III (1817), pp. 220-22.

black background is obtained instantaneously by rubbing a particular earth mixed with ammonium chloride on the fresh surface of the alloy. The blackening effect is lasting. Though, unfortunately, the industry is dwindling fast, the ware has been priced very high and is even now considered an object of excellence in all exhibitions. The belief that the alloy, of which the vessels are made, imparts certain medicinal and curative properties to the water contained in them adds to the value of the ware. The price of individual pieces depends upon the quantity of the precious metals used and the fineness displayed in the execution of the patterns. Pls. XLVI and XLVII respectively illustrate a high-necked jar and *silafchi* in this ware.

The present work was undertaken to determine the composition of the alloy and the materials used in making the ware. Various recipes were given for the manufacture of the alloys used at the four places mentioned above at the times when the respective wares were examined. These are summarized below.

**BIDAR.**—According to Newbold the composition of the alloy was copper: zinc=1:16, while according to Smith it was copper: zinc=1:4.<sup>1</sup> Heyne examined the alloy and found it to consist of 24 parts of tin and 1 of copper. Wilkins reported subsequently that the ware made at Banaras contained zinc in place of tin along with copper. Yazdani says that the Bidri ware is made of metal composed of zinc 83.5 per cent, copper 12 per cent and lead 3 per cent.<sup>2</sup>

**PURNEA.**—T. N. Mukharji gives the proportion of copper and zinc as 9:176.<sup>3</sup> Earlier, Buchanan-Hamilton gave the composition as copper 460 grains, lead 414 grains and zinc 12,360 grains.<sup>4</sup> But according to Heyne an alloy of 16 oz. of copper, 4 oz. of lead and 2 oz. of tin was mixed with zinc in the proportion of 3 parts of the alloy and 16 parts of zinc.<sup>5</sup> Lead was not reported in the alloy later on.

**MURSHIDABAD.**—Mukharji reports that tin was a constituent of the alloy, and lead is reported by George Watt to have been entirely omitted.<sup>6</sup>

**LUCKNOW.**—Besides the usual copper and zinc, steel-powder is reported to have been added to give additional strength to the compound, the proportions being 4 oz. of copper, 4 oz. of steel-powder and 12 oz. of zinc. Watt writes that at Lucknow the chief metal was zinc, the others, viz. lead, tin and copper, being added each in the proportion of 1/16th part of the zinc.

A sample of the alloy-specimen, collected from the market at Hyderabad and reported to represent Bidri work, was put to chemical analysis, and the result obtained was as follows: lead=1.65 per cent; copper=3.65 per cent; zinc 92.72 per cent. Both tin and iron were found absent.

The ingredients of the mixture used to impart black colour to the fresh alloy-surface vary in the four different centres of manufacture of the ware, but the principal constituents producing the tint are ammonium chloride ( $\text{NH}_4\text{Cl}$ ), saltpetre ( $\text{KNO}_3$ ) and blue vitriol ( $\text{CuSO}_4$ ).

The earth used at Bidar to make the surface black after the completion of the inlay-work was also collected and analysed. It gave the following results: water-soluble

<sup>1</sup> Quoted by T. N. Mukharji, 'Bidri-ware', *Journal of Indian Art*, no. 6 (April 1885), pp. 40-44.

<sup>2</sup> Yazdani, *op. cit.*, p. 20 n.

<sup>3</sup> Mukharji, *op. cit.*

<sup>4</sup> Francis Buchanan, *An Account of the District of Purnea in 1809-10* (Patna, 1928), p. 534.

<sup>5</sup> Quoted by Mukharji, *op. cit.*

<sup>6</sup> George Watt, *Indian Art at Delhi* (Calcutta, 1903), pp. 46-49.

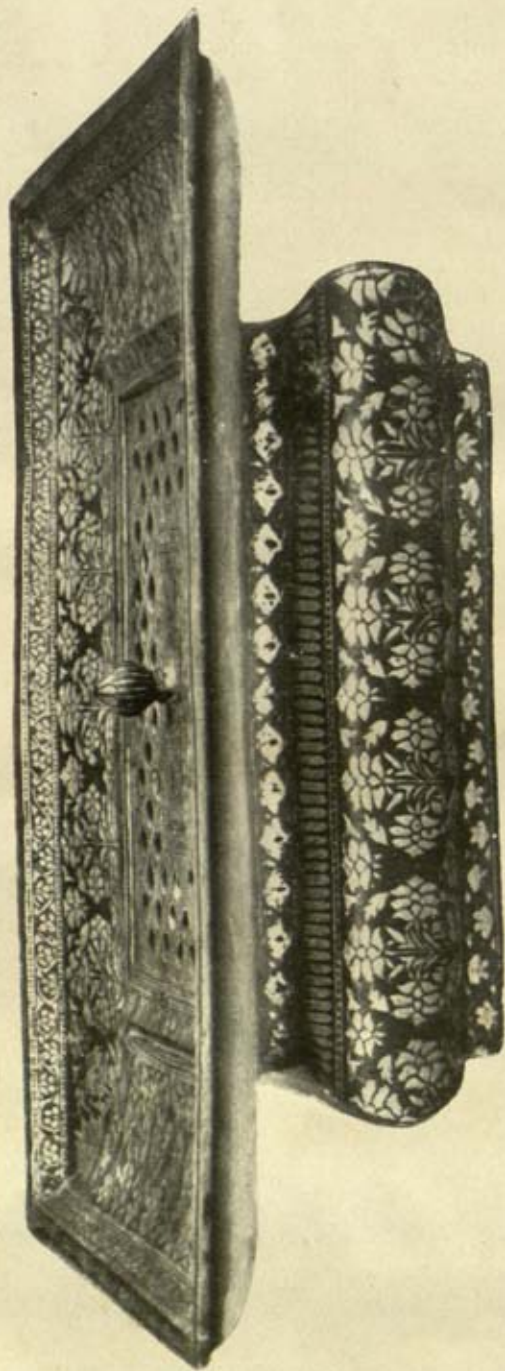
constituents=14 per cent (nitrate and chloride present but sulphate and ammonia absent). The insoluble portion contains calcium carbonate and sufficient quantity of iron as digested with 6N.HCl.

This earth is collected by the local manufacturers from the bottom of old walls inside the fort of Bidar and is then mixed with ammonium chloride and water and rubbed on the fresh surface of the alloy. The change is almost sudden and is quite lasting. Laboratory-experiments suggest that the blackening of the lustrous surface is effected by ammonium nitrate and ammonium hydroxide or ammonium chloride and also with a mixture of an alkali nitrate and ammonium chloride. In the Bidar earth the active agent for producing the black surface is an alkali nitrate, which, when mixed with excess ammonium chloride and rubbed with water on the alloy, gives the required black tint.<sup>1</sup> The high percentage of oxide of iron and carbonate and chloride of calcium may not be a useless ingredient in the earth so far as its use in blackening the alloy is concerned.

<sup>1</sup>A blackening effect can also be produced with a solution of copper sulphate alone, but it is not so permanent and pleasant in appearance.



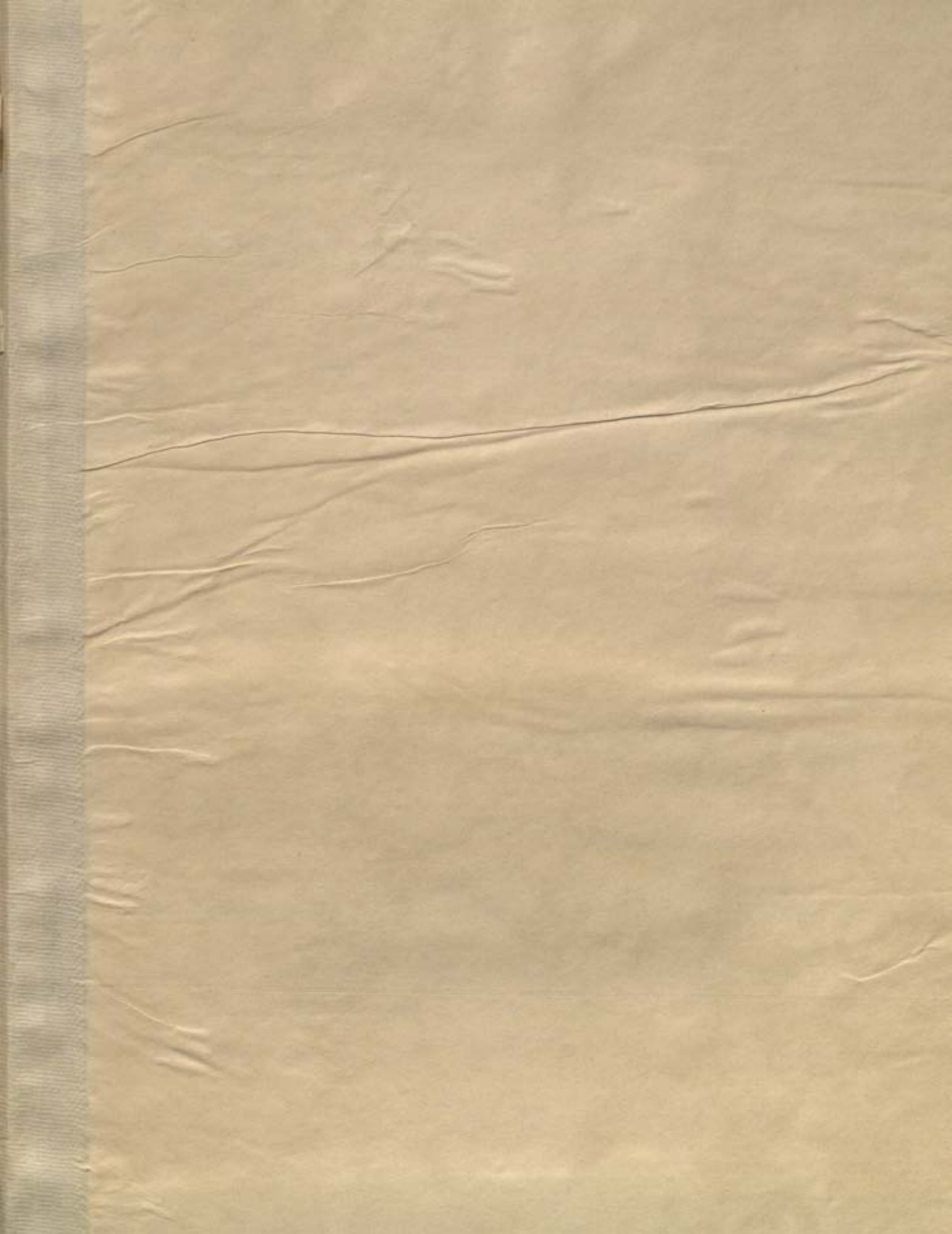
A high-necked jar in Bidri ware. See page 117



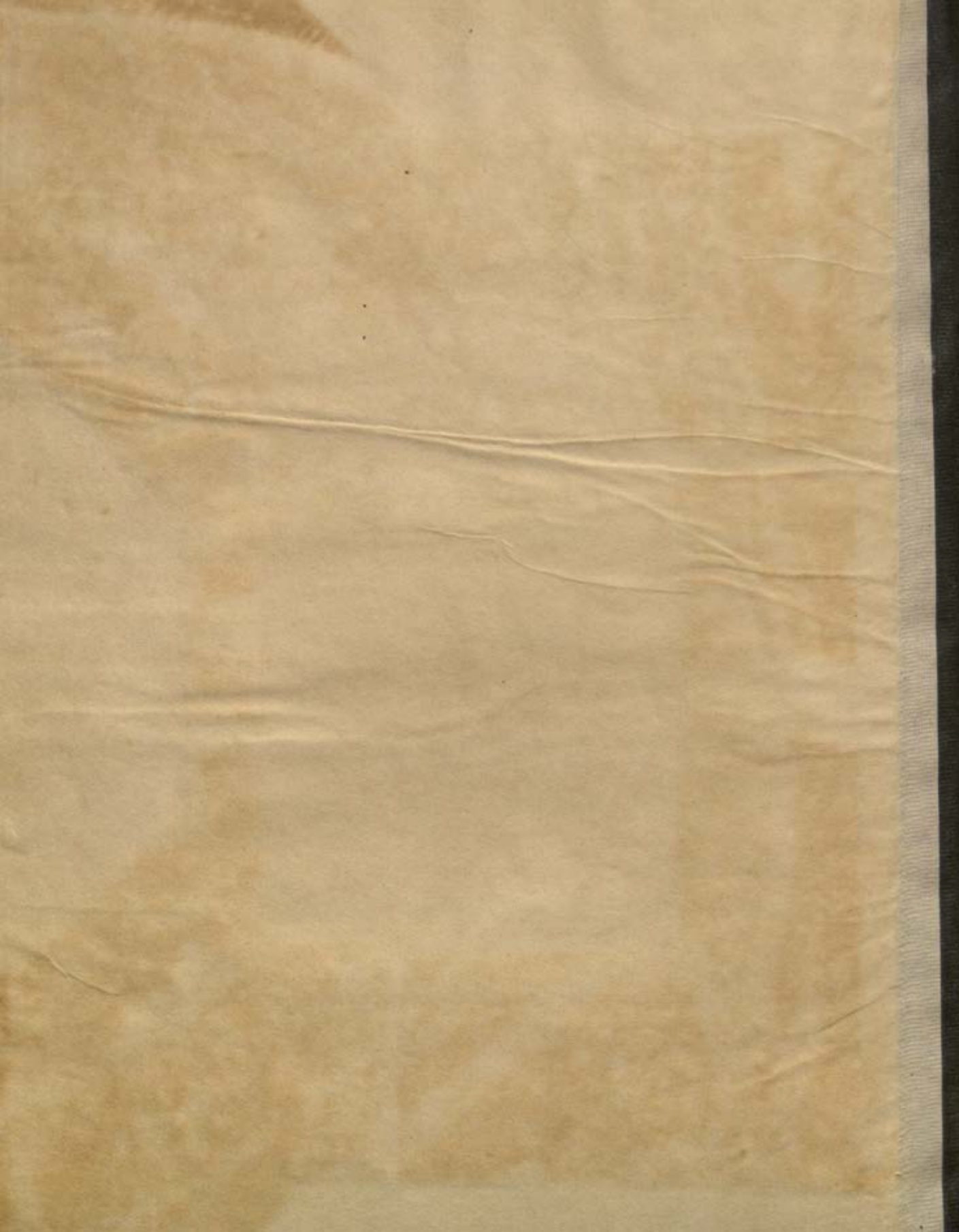
*A silafchi in Bidri ware. See page 117*











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