

## TECHNICAL SECTION

### Preservation of a miniature and a wall-painting

By T. R. GAIROLA

**I**N THIS ARTICLE IT IS INTENDED TO GIVE THE DETAILS OF THE EXAMINATION AND PRESERVATION OF A MINIATURE PAINTING AND A TEMPERA WALL-PAINTING. IT WILL BE SEEN FROM THIS HOW CERTAIN EVIDENCES AND OPPORTUNITIES CAN BE UTILIZED TO COLLECT RELEVANT DATA FOR THE SCIENTIFIC EXAMINATION AND PRESERVATION OF OLD PAINTINGS.

#### 1. MINIATURE PAINTING

It is an eighteenth-century painting of the Deccani School (Hyderabad). The painting was on the back of another contemporary painting and was covered with four layers of paper, being thus completely hidden. This seems to have been done in order to provide a firm support for the painting which was very fragile and was showing cracks and tears, especially in the green pigmented areas. The dirty-green, blackening and charring effect of green pigment in certain Mughul, Rājasthānī, Deccani and other school miniatures and illustrated manuscripts is well-known to custodians of this material. This malady gets so much advanced in some cases that the support is ultimately reduced to dust, and gaps and losses are caused. As a matter of fact, the green colour first loses its tone-effect, then becomes dirty-green and blackish and finally causes the crumbling of the support. In case there are three, four or more layers of paper applied at the back of a painting to prepare a firm support, the blackening effect is carried through all of them, and many a time simply by examining the back of the painting it can be found where the green pigment has been used in the painting on the front.

Verdigris, which in chemical terminology is called basic copper acetate and in the Indian artist's terminology *zangar*, has been one of the favourite green pigments used by the artists in Europe and in India. A.P. Laurie<sup>1</sup> mentions its use as an artist's material between the fifteenth and nineteenth centuries. The mode of its preparation was known in very early times in Europe<sup>2</sup>, and there are references in certain Indian texts<sup>3</sup> also describing the method of its preparation for artist's use. It is stated to have been prepared by the action of vinegar on copper scrapes. Verdigris is acidic in nature and is reported to be a notoriously unstable substance.<sup>4</sup>

<sup>1</sup> A. P. Laurie, *The Painter's Methods and Materials* (London, 1947).

<sup>2</sup> Rutherford J. Gettens and G. L. Stout, *Painting Materials—A Short Encyclopaedia* (New York, 1947).

<sup>3</sup> *Asraru'l-Khat—a Treatise of the Seventeenth Century dealing with the Art and Technique of Calligraphy*, ed. Md. Fazalullah Ansari.

<sup>4</sup> W. G. Constable, *The Painter's Workshop* (Oxford, 1954).

References to pure green colour in Sanskrit texts are not many.<sup>1</sup> Where they exist, the recipe for green colour is the mixture of yellow and blue colours. Some of them are given below:—

1. Indigo mixed with orpiment yields green.
2. Orpiment mixed with deep-brown gives the shade of a parrot's feather.
3. Indigo, peori, lac-dye, black ink and red lead yield mango-green.
4. Orpiment and indigo also give mango-leaf green.

The miniatures and manuscripts in which this charring effect is noticeable show a high acidity-content at the relevant places and the green gives positive test for copper, as examined by micro-chemical (benzoin and salicylaldehyde) tests. Thus, supported both by literary evidence and chemical tests, the blackening and charring effect of green in the paintings is attributable to the use of verdigris in these illustrations. Irreparable damage and loss are caused to the painting by this pigment.

It was the quest for the examination of this green pigment in this particular painting that gave clue to the fact that there was another painting on its back. The painting was fragile and was found to have been strengthened by giving several layers of paper at the back. The blackened spots at the back were found to be highly acidic, and the effect of the pigment was found carried to the back side; but it did not correspond to the green pigment of the painting on the front. It showed outlines of some definite features quite different from the painting on the front side.

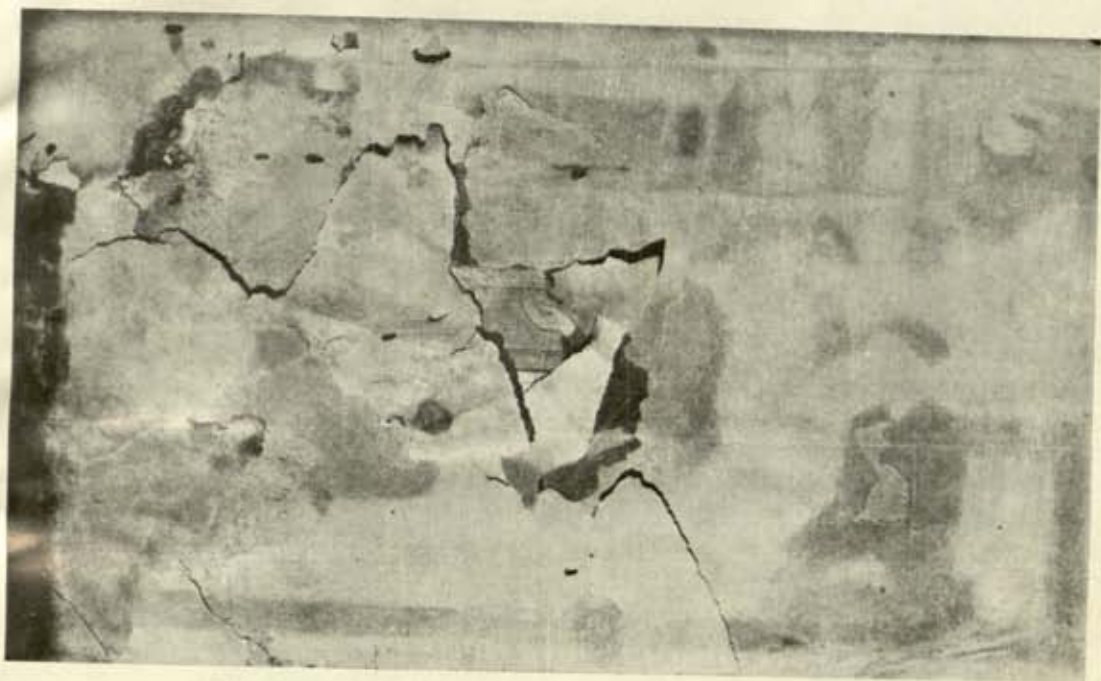
The front side of the painting was given a preservative coating with .5 per cent methyl-methacrylate solution, and when this coating had dried, a Nepalese tissue-paper was put on it. It was then placed on a glass-sheet with the reverse exposed. The back side was damped with water and the first layer of paper removed carefully with the help of an artist's spatula. Encouraging results were obtained and better outlines of the blackening effect were now noticeable. On further moistening it at the back the other layer was removed, and then the presence of another painting at the back was rendered clear. Pl. XLIX A shows how the blackening effect of the green pigment had been carried at the back of two layers of papers and gave clue of a painting underneath with green pigment. These two layers were also removed and the painting dried between absorbent paper under pressure.

When the painting had dried, another coating of .5 per cent methyl-methacrylate solution was given. It was then given an alkaline bath in .1 per cent lime-water to eliminate the acid-effect and thereafter washed free of alkali. The painting was fragile, and as both the sides were painted it was mounted on one side on transparent nylon-gauge, supported by proper paper-margins to balance the strain caused by the nylon-fabric. Pl. XLIX B shows its condition after preservation. As even this composition was not considered sound enough for the proper preservation of the painting, it was mounted between sunken-window mounts.

## 2. TEMPERA WALL-PAINTING

This fragmentary tempera wall-painting is from the collection of wall-paintings brought by Sir Aurel Stein from his two Central Asian expeditions of archaeological and geographical research, extending over the periods 1906-1908 and 1913-16 and now forms part of the collection of the National Museum, New Delhi. It resembles in every respect

<sup>1</sup>Moti Chandra, *Jain Miniature Paintings from Western India* (Ahmadabad, 1949).

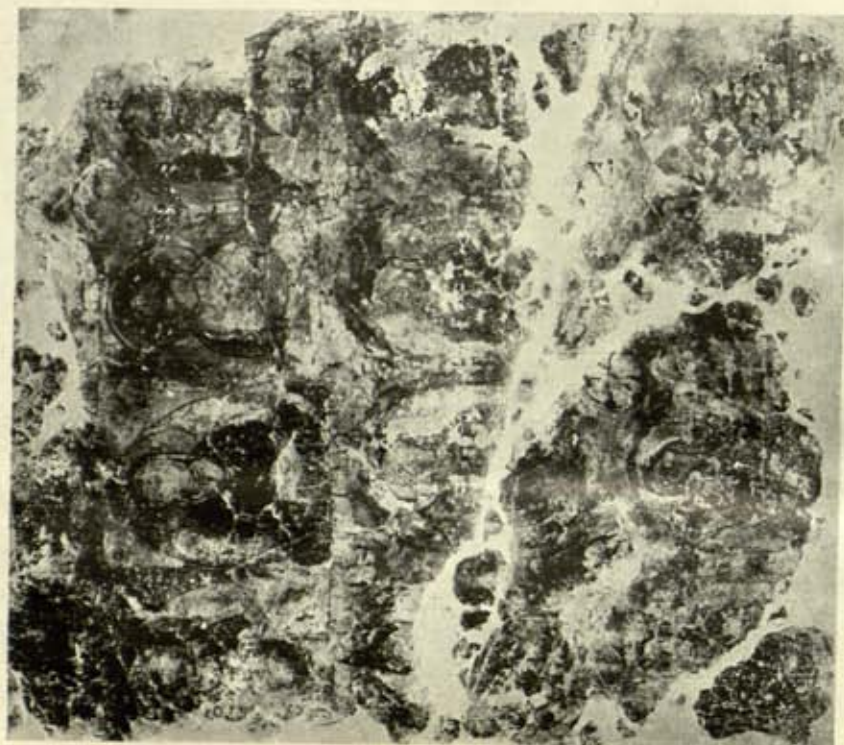


A



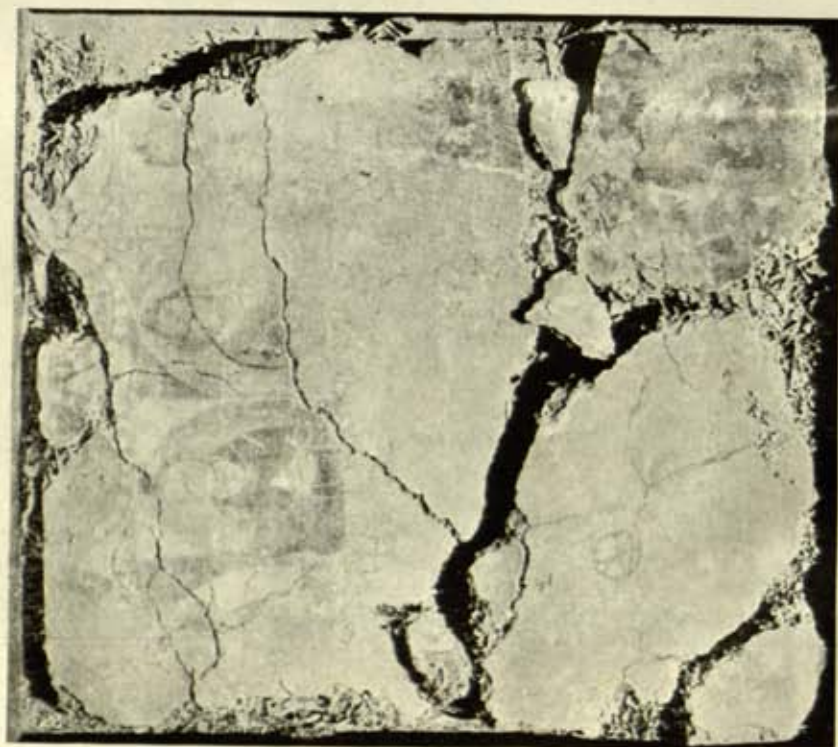
B

*Deccani painting: A, before preservation, showing outlines of charring effect on the back; B, after preservation.*  
See p. 86



B

*Wall-painting from Central Asia: B, after preservation. See p. 87*



A

*Wall-painting from Central Asia: A, before preservation. See p. 87*

PRESERVATION OF A MINIATURE AND A WALL-PAINTING

TABLE  
DATA FOR CENTRAL ASIAN WALL-PAINTINGS

SITE AND LOCATION	Miran (Lat. 39.5°N.; Long. 89°E.)	Kizil (Lat. 38.5°N.; Long. 76.5°E.)	Tunhuang (Lat. 40.2°N.; Long. 95°E.)		Bezeklik (Turfan) (Lat. 43°N.; Long. 89°E.)
			Wan-Fo-Hsia caves	Wei caves	
PERIOD	Third-fourth century	Sixth-seventh century	Eighth-ninth century	Fifth century	Eighth-ninth century
GROUND	Loess with leaves, reed-stern and a thin coat of burnt gypsum	Clay-wall overlaid with layer of gypsum	Clay finished with a coat of kaolin mixed with chalk	Mixture of china clay (kaolin) and chalk containing iron oxide	Coarse support of mud containing lime, husk and fibre and ground of clay and gypsum
WHITE	Burnt gypsum	Gypsum	Lead	Kaolin, white lead blackened by oxidation	Gypsum
YELLOW	Yellow ochre	..	Gamboge	..	..
GREEN	Malachite	Copper present but not malachite	Malachite	Malachite	Malachite
BLUE	..	Ultramarine	Azurite indigo	Ultramarine	..
BROWN	..	..	..	..	Suenna
RED	Ferric oxide	Native ferric oxide and red lead	Lead, red ochre and vermilion	Vermilion madder	Red lead
BLACK	..	..	Carbon	Carbon	Carbon
EXAMINER AND ANALYST	A. Church	Rutherford J. Gettens	Rutherford J. Gettens	A. E. Werner	Carbon
REFERENCE	<i>Serindia</i> (Oxford, 1921)	<i>Technical Studies, VI</i> , (Fogg Art Museum, Harvard, April 1938)	<i>Basil Gray, Buddhist Cave-Paintings at Tun-huang</i> (London, 1959)		National Museum, New Delhi

the Bezeklik wall-paintings of Turfan (Lat. 43°N.; Long. 89°E.) belonging to the eighth-ninth century. Pl. L A shows its condition before it was taken up for preservation.

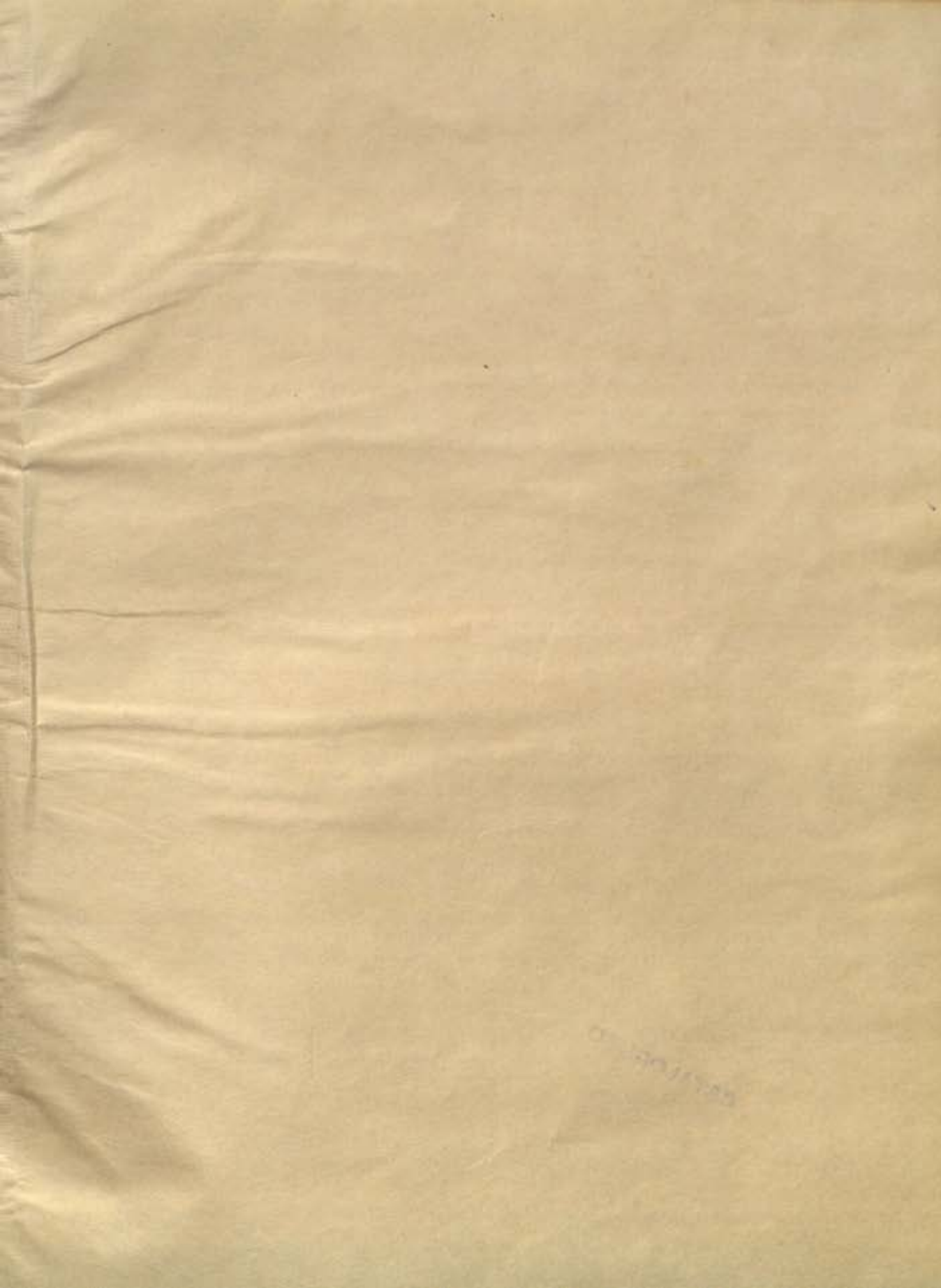
Before preservation was attempted, a scientific examination of the painting was carried out. The pigments used in the painting are red, black, green, white and brown. The support was coarse and consisted of mud containing lime mixed with husk and fibre, the ground being gypsum ( $\text{CaSO}_4$ ). The white pigment is also gypsum and the green shows the presence of copper and may be malachite. The red pigment shows the presence of lead and may be red lead. The brown is sienna and black carbon-black. Wall-paintings from Central-Asian sites, such as Miran, Kizil and Tunhuang (Wan-Fo-Hsia and Wei caves), had been examined earlier, and it would be interesting to make comparative study of these along with this Bezeklik painting. The data derived out of the study are given in the Table on p. 87.

For preservation the different pieces of the painting were cleaned of all surface-dirt and mud-accumulation with a soft Chinese paint-brush, making use of an aqueous mixture of rectified spirit. The adhesive of the pigments seemed to have been decomposed: they were loose, falling off, and coming out on the tip of the finger when touched. After the cleaning process was completed the pieces were given two successive coatings of preservative solutions in order to fix the colours. This having been done, they were protected from the front side with tissue-paper saturated with thymol-solution, and a sheet of glass was placed over it and turned upside down.

Most of the mud, husk and fibre was scraped off carefully till only about  $\frac{1}{8}$  in. of them was left. Then a thickness of plaster of Paris  $\frac{3}{16}$  in. was built up over the mud-backing and an aluminium netting buried under another  $\frac{3}{16}$  in. thick layer of plaster of Paris laid over it. All this was done in such a way that a margin of about  $1\frac{1}{2}$  in. all round was left. When the thus-formed panel had dried for two days, it was turned back to expose the painted side. The covering tissue-paper was removed and an aluminium-frame provided to hold the painted panel securely. After the complete drying up of the painting the gaps as well as borders were given a neutral tint with oil-paint. Pl. L B shows its condition after preservative treatment.

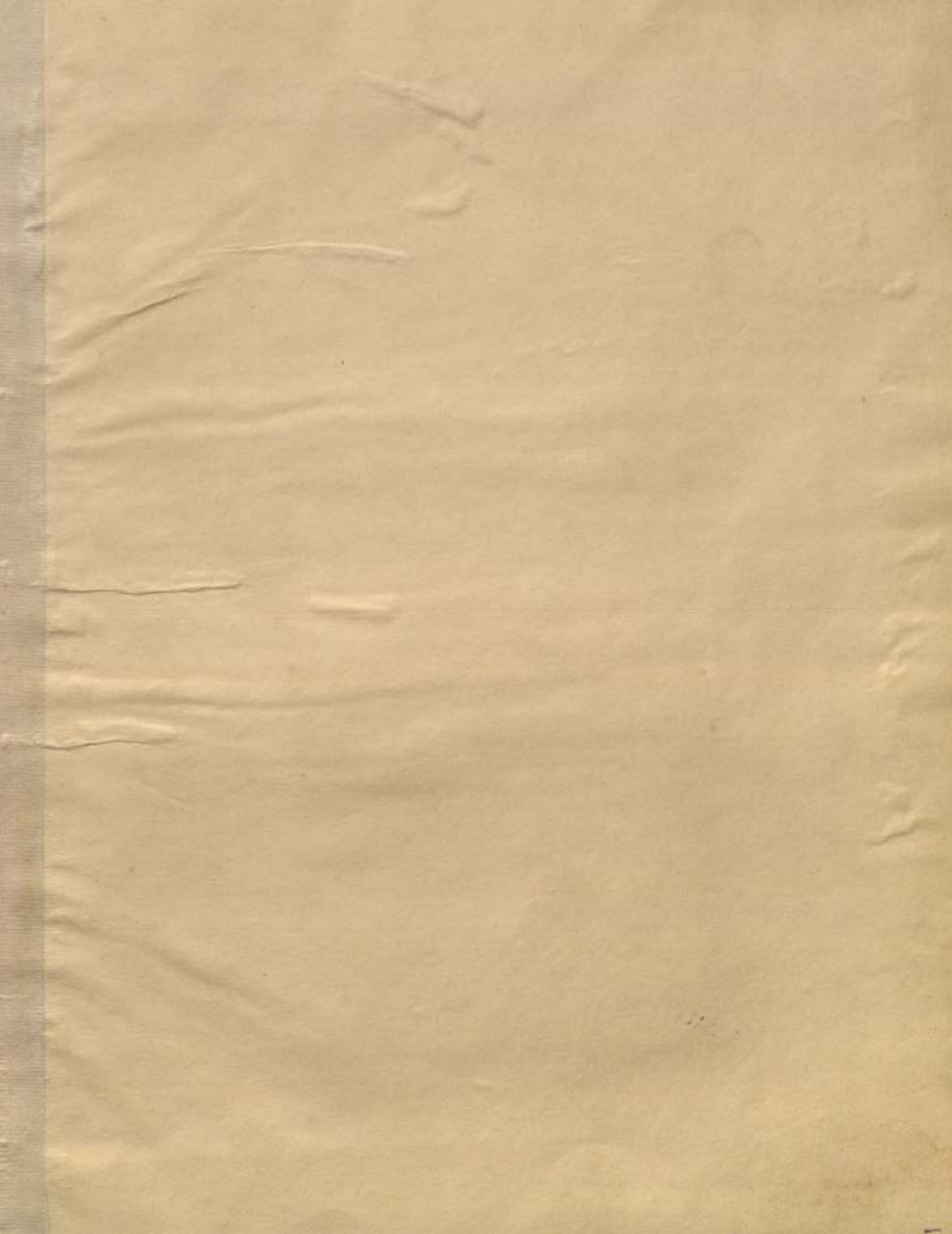
[Received on the 16th November 1960.—Ed.]

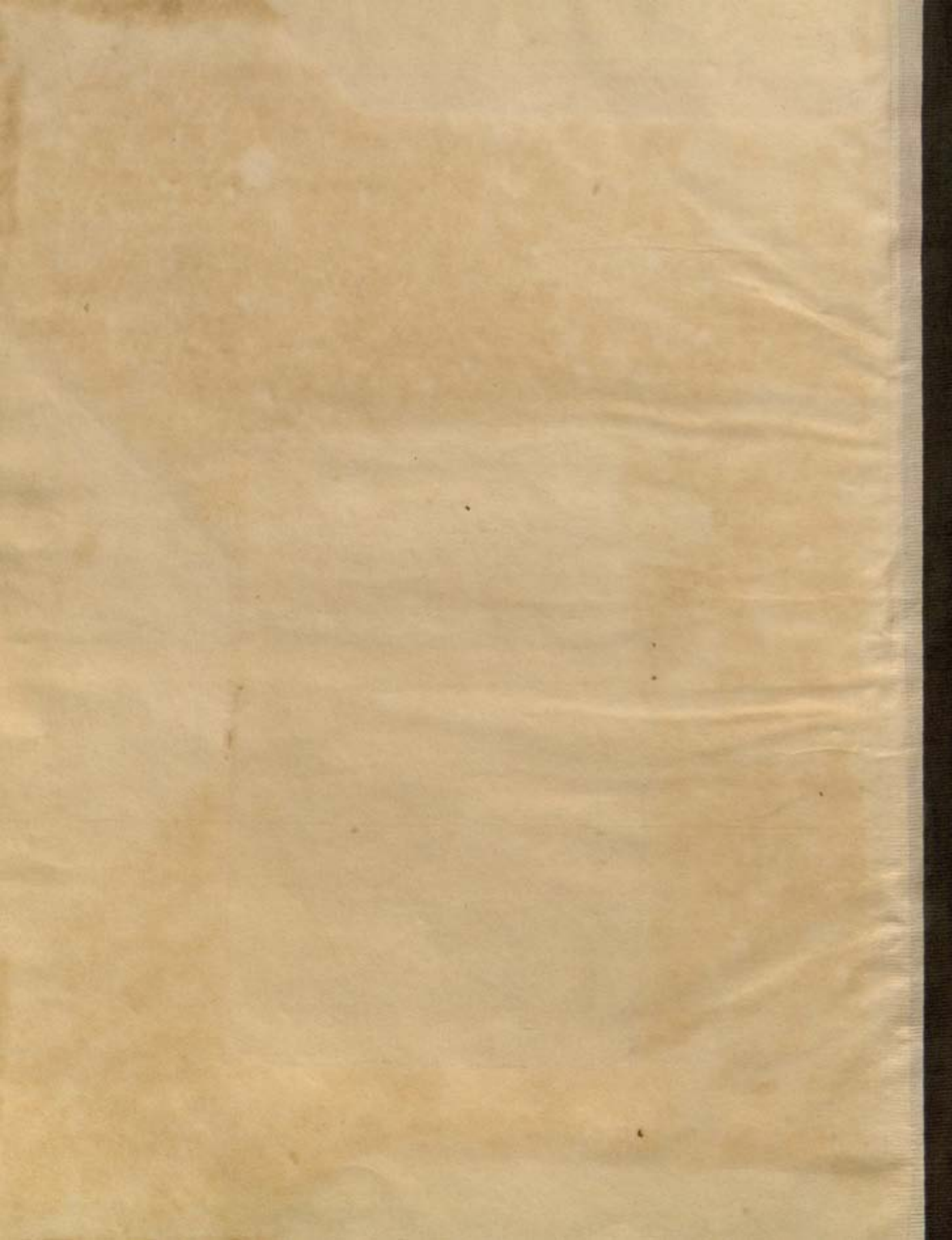




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