

## A Microscopical Finder-slide

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### SUMMARY

The finder-slide is produced by photographic reduction of a typescript chart. By its use, recorded objects can be re-located on different microscopes.

THE problem of locating objects of interest on a microscope slide, so that they may be found again for subsequent study, has always been of great importance. Several suggestions have been put forward in order to achieve this end, e.g. finder-slides and verniers on a mechanical stage. A finder-slide consists of a reference grid, which when substituted in place of the object slide, enables a reading to be taken, so allowing the position of the slide to be duplicated at any time. Such a device was published by Maltwood in 1858. At first he used coloured lines drawn out on paper which was then gummed to the slide, but soon this was abandoned in favour of a series of squares, one-fiftieth of an inch across, each containing two reference numbers enabling the square to be located by giving its 'latitude' and 'longitude'.

The squares forming his original chart were drawn out by hand on a sheet of paper 10 inches square, which was photographed to give a negative 1 inch square. From this a positive was printed, and after grinding the edges of the slide, a cover glass was cemented over the photographic emulsion. Later, Maltwood used smaller squares and instituted the idea of printing many finder-slides from one accurately ground negative.

These Maltwood finders have been unobtainable for many years. An example now in the possession of Dr. J. R. Baker led us to consideration of the possibility of producing a similar finder-slide by modern methods. This was achieved as follows. A table was typed on several sheets of white paper which were later glued together to form one large chart, 2 ft 6 in. by 1 ft 8 in., divided into 100 × 60 squares, each square containing two numbers indicating 'latitude' and 'longitude'. The top row was numbered 1, the second 2, and so on down the chart to row 60. Horizontal columns were numbered 1-100 from left to right. When complete, the chart was photographed to give a quarter-plate negative on Ilford N 40 Process plate. Great care was needed in arranging the lighting in order to ensure that the large chart was evenly illuminated. The final arrangement consisted of four 40-watt 'Silverlight' bulbs, one at each corner of the paper, the evenness of the illumination being checked by use of a Weston meter. Exposure was 8 seconds at an aperture of f. 12, and the period of development in Ilford caustic hydroquinone (I.D. 13) was 2 minutes at 20° C. When dry, the negative was masked with lantern-slide binding-strip to produce a neat print. Printing was by projection, the final size of the image being 1½ by 1¼ in. The prints were made on lantern slides (Ilford special lantern plate, normal grade) which had been cut in half. Care was taken to ensure that the intended lower edge and left-hand side of the finder were

always formed from the original edges of the lantern plate. When printing, the edge of the chart was brought very close to the lower edge of the lantern plate, in order that there should always be a portion of the finished chart in the field of view of the microscope, wherever the detail might be on the object slide. In order to obtain interchangeability of finders, it was necessary, during printing, to see that each cut lantern-plate was well pushed up to the edges of the printing mask. The period of development was 2 minutes at 20° C in I.D. 13. After fixing, washing, and drying in the usual manner, the photograph of the chart was mounted in DPX under a number 1 coverglass. No heat was applied during the drying, as this would probably have caused some melting of the gelatine emulsion base, with consequent distortion of the lines and figures. It might be possible to use gentle heat to help drying if, before mounting, the slides were passed through a weak formalin bath in order to harden the gelatine. When dry, the superfluous mountant and emulsion were removed by scraping with a razor-blade and the finder finished with a 'ringing' of black enamel.

There are three main differences between our technique and that used by Maltwood. (1) A typewriter was used to prepare the chart, in order to minimize the labour of writing out some thousands of figures. (2) Photographic reduction of this to the final size took place in two stages. (3) Printing was by projection. The second and third items help to minimize the loss of definition that may occur if single-stage reduction is followed by contact printing.

In one batch of twenty finders produced at the same time, the degree of interchangeability is good, the maximum deviation being only one square throughout the batch. Between the two best finders the deviation is only one-quarter of a square. If extra accuracy with respect to interchangeability is desired, the edges of the lantern plates may be ground before printing.

The method of use is very simple. The object to be logged is placed in the centre of the microscope field. The slide is removed and replaced by the finder, without movement of the stage of the microscope. The finder is focused with the 16 mm objective and the number of the square occupying the centre of the field is noted. Readings may also be taken with the 4-mm objective, one square then occupying almost the whole field. To locate the object at any future time, this procedure is reversed. It must be noted that the finder-slide can only be used on a microscope equipped with some form of locating device, so that the slides can always be replaced in the same position relative to the stage. Should a greater degree of localization be necessary, Maltwood's original system may be used. He gave the square reference in the usual manner, and then marked the position of the object within the square by means of a cross on a small drawing of a square.

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#### REFERENCE

MALTWOOD, T., 1858. *Trans. micr. Soc.*, 6, 59.