

## TECHNICAL NOTE

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### A Technique for Comparing Soil Colors in the Forensic Laboratory

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**ABSTRACT:** The implementation of a simple aid that facilitates the designation and comparison of color in forensic soil cases is presented. The aid, a mount for forensic soil samples, when used in conjunction with the Munsell® Soil Color Charts allows the color of forensic soil samples to be accurately described and compared.

**KEYWORDS:** forensic science, soil, soil color

Color is an important identifying feature of soil [1]. The significance of color in forensic soil comparisons has been well documented in the literature [2-7]. While, there are a number of color systems that can be used to designate color [7,8], the Munsell system is the most useful for soil color because of the availability of the Munsell® Soil Color Charts. The Munsell® Soil Color Charts (Munsell® Color Company Inc., Baltimore, MD.) are a series of color standards produced exclusively for describing soil color. The Soil Color Charts are designed for use with large soil samples or field specimens. The soil sample size encountered in forensic case work is generally limited, for this reason a simple mount was constructed to accommodate small soil samples and facilitate the use of the Munsell Soil Color Charts.

#### Method and Materials

Standard photographic mat boards, 0.054 inch (1.37 mm) thick (black/white), are cut into 10.0 by 5.0 cm sections. Then 1.0 cm diameter holes, representing the number of samples to be mounted, are punched through the mat board sections.

Clear adhesive lifters (Kinderprint® Inc., Martinez, CA.) are cut into 6 cm wide strips and trimmed to the size of the mat board sections. The protective backing is removed and the lifter strip is placed, adhesive side up, onto a smooth flat surface. A mat board section, with holes, is placed onto the adhesive surface of the lifter and firmly attached.

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The holes in the soil sample card (mat board section with adhesive lifter) form cells into which individual soil samples are introduced and secured (Fig. 1).

Soil samples may be prepared by any of a variety of techniques for introduction into the cells. Detailed procedures for preparing soil samples for color designation and comparison appear in the literature [2-7, 9]. The authors prefer to dry the soil sample first, and then isolate the 150 (or 100) mesh sieve fraction. Generally, 10 to 15 mg of the soil sample fraction will be sufficient to fill a cell.

The soil fraction is placed into a sample cell and evenly distributed. Slight pressure is applied directly downward onto the sample to ensure the adhesion of the sample to the mount. The procedure is repeated if additional soil samples are to be mounted. It is important to note that care must be exercised, to prevent the cross contamination of soil samples, when mounting more than one sample on a soil sample card.

When the desired number of soil samples have been mounted, the soil sample card is used in conjunction with the Munsell Soil Color Charts. The Munsell color system describes colors with three variables. These variables are hue, value, and chroma. The Munsell Soil Color Charts is a book with a series of pages or charts with standard color chips. The color chips on each chart are of constant hue, their value and chroma are varied vertically and horizontally respectively (Fig. 1). In addition, associated with the standard color chips are a series of holes in the chart through which samples are viewed. The prepared soil sample card is placed behind a Soil Color Chart and positioned for

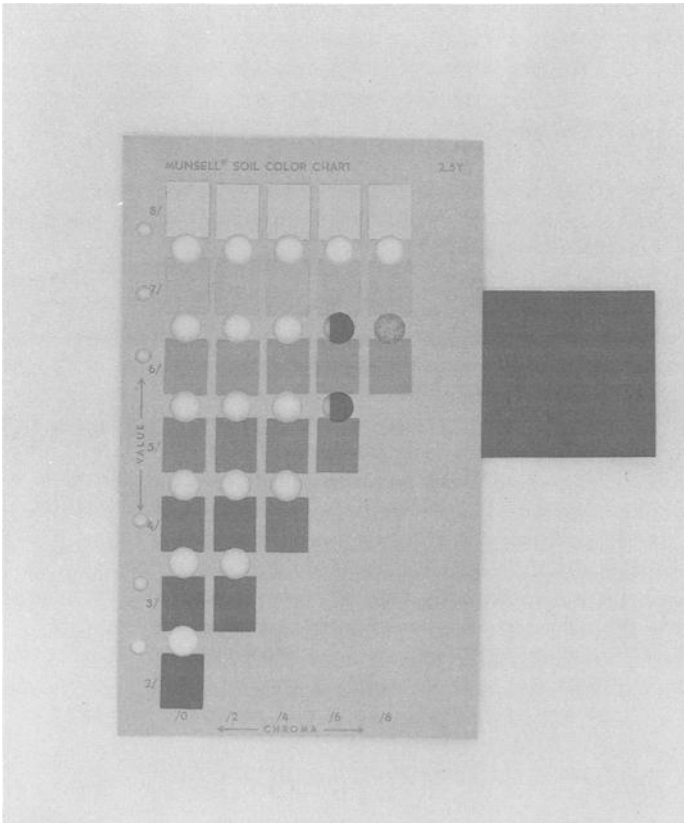


FIG. 1—A soil sample card (right), and a Munsell® Soil Color Chart (left).

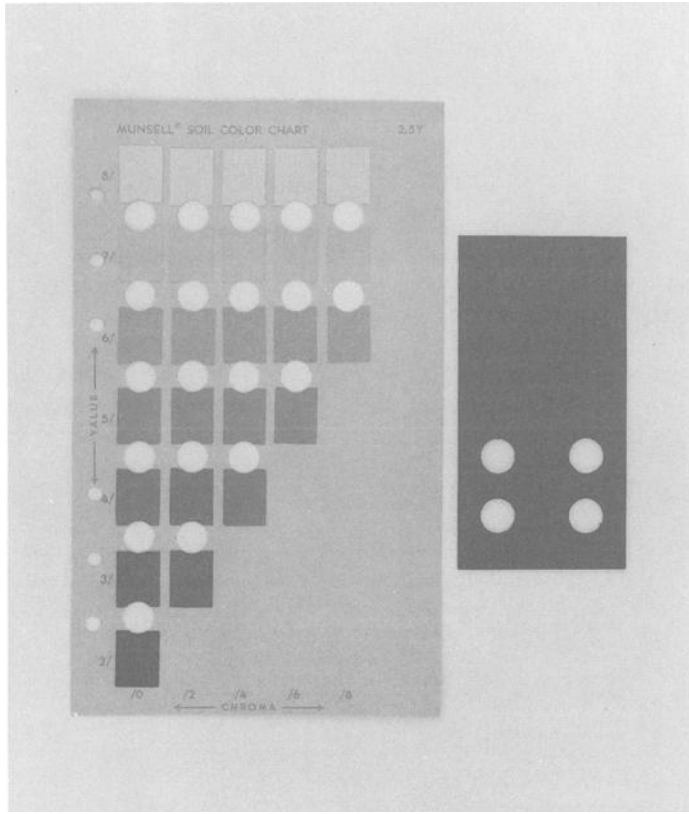


FIG. 2—Soil sample card, with soil sample, positioned behind a Munsell® Soil Color Chart for viewing.

soil sample viewing (Fig. 2). Soil samples and the soil color charts are normally viewed with natural daylight illumination. The soil color is compared and designated using the directions included with the Munsell Soil Color Charts.

When the designation and comparison of color is complete the top exposed surface of the mount may be covered with an additional piece of clear adhesive lifter. This preserves the integrity of the sample(s) and allows for permanent storage or courtroom display of the mount (Fig. 3).

### Results and Discussion

The aid described in this paper facilitates ascribing color to forensic soil samples. The mount can be completed in a few minutes and is simple to utilize with the Munsell Soil Color Charts. The 1.0 cm sample cell diameter compliments the sample viewing holes in the Munsell Soil Color Charts, while the quantity of soil sample required to fill a sample cell is not prohibitive. Soil samples can be easily removed from the mount if additional analyses are required.

When extremely small soil samples are recovered or received for analysis, the size of the sample cell can be reduced by preparing soil sample cards with smaller diameter holes. However, because a portion of the soil sample card will be visible through the sample viewing hole of the Soil Color Chart, the color of the mat board section must be

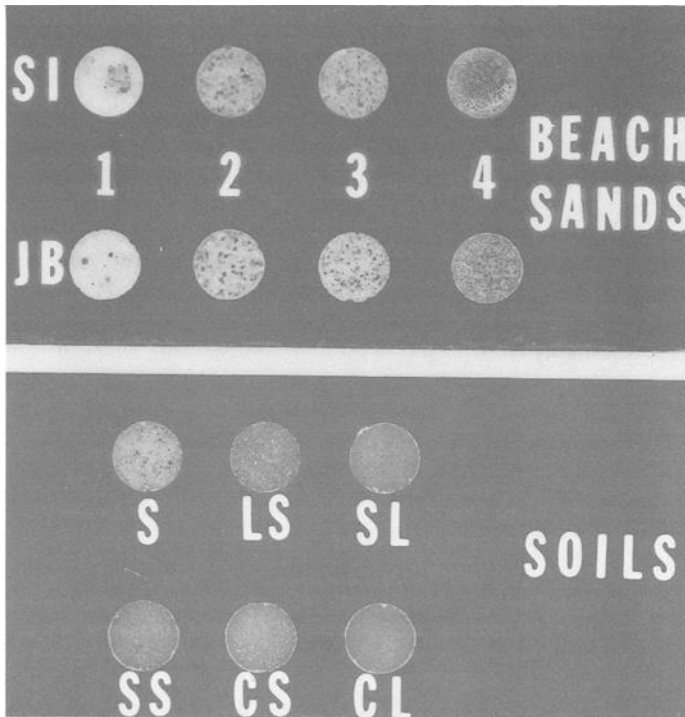


FIG. 3—Soil and beach sand samples permanently mounted on separate soil sample cards.

selectively chosen if the attribute of value is to be accurately recorded. In addition, the use of clear adhesive lifters permits backgrounds of different contrast to be placed behind the soil sample card. This can be useful in discriminating between and designating the color of certain soil samples.

A series of soil samples mounted on a soil sample card can be evaluated quickly and simply. There is ample space on the soil sample card for eight 1.0 cm diameter sample cells and pertinent case information. The small size of the soil sample card permits the mount to become a permanent part of the case file. With simple precautions, questioned and known samples can be mounted side by side for comparison or courtroom display. One of the authors (NP) has routinely used this mount for casework.

### Conclusion

An aid for the designation and comparison of color in forensic soil samples has been described. The materials are inexpensive and mounts are simple to prepare. Once prepared, soil color can be rapidly compared and described using the Munsell color system. Samples can be readily recovered from the mount for additional analyses or the mount can be used for permanent storage. The soil mounts are also attractive and suitable for courtroom display.

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