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A METHOD FOR MAKING CUSTOMIZED, THICK LABELS FOR MICROSCOPE SLIDES.

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ABSTRACT

This paper describes a technique for creating customized, thick (≈ 1 mm) slide labels, and fastening them permanently to slides so they can be stored vertically by stacking or horizontally like cards in a file without putting pressure on the coverslip. After 20 years, thick labels created by this technique have shown no sign of degradation; labels fastened to slides with silicone caulking have remained securely attached. A storage system, using insect drawer sized trays that hold large numbers of thick labelled slides, is shown. The use of thick labels and such a storage system simplifies the curation of large numbers of slides.

Long term storage and handling of large numbers of microscope slides can be a problem. The most widely used method involves boxes with slotted guides that hold, maximally, 100 slides per box. These boxes are expensive, and curating slides held in this manner is time consuming, demanding repeated handling of individual slides. Large cases with aluminum trays are also available, but again, are expensive, and curation entails the shifting of many slides individually. Far more compact storage and ease of curation can be achieved by stacking slides vertically or on edge like cards in a file; however, under such conditions it is necessary to protect the coverslips from pressure. This can be achieved in stacked or card filed systems by using thick slide labels. The many advantages of using thick labels are discussed by Heikenheimo (1988). Problems associated with thick labels have been the high cost of printing on thick card stock and finding an appropriate glue to attach the thick labels to the slides. The following technique, used and tested over the past 20 years, produces customized thick labels inexpensively and securely fastens them to the slide.

Creating custom labels using personal computers. User-friendly word processing programs and today's high quality laser printers (600 dpi) make it easy and inexpensive to make customized labels printed in clear, readable text down to 4 pt type. Computer programs are also available that will create labels using information stored in a data base. I have not used the latter, so cannot comment on their ability to produce customized labels. Customizing may be done by using italics for generic and specific names, using different fonts and sizes for different lines, and including a unique identifier for each label/slide. Within these restrictions, the height of 2.5 cm (the width

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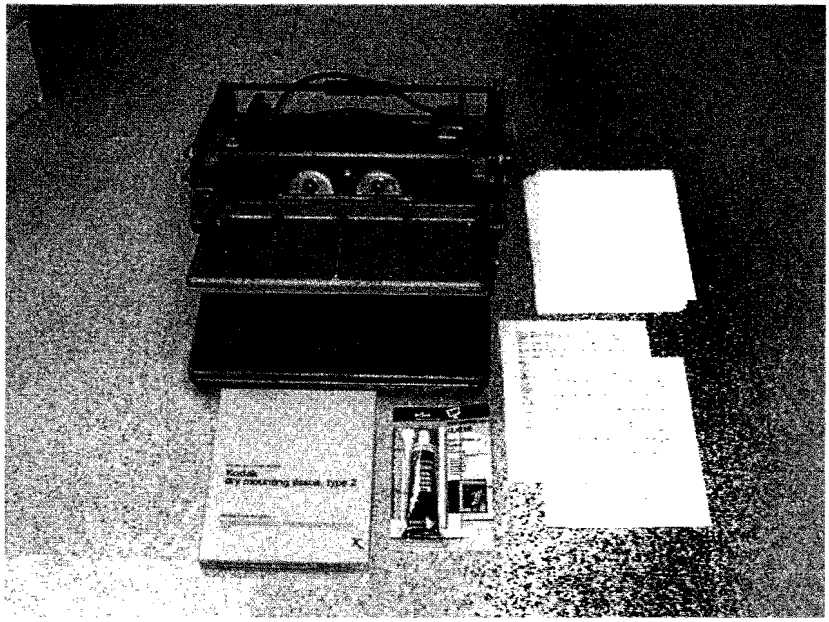

Figure 1. Equipment and supplies for making thick slide labels. Clockwise from top left, a dry mount press, four-ply bristol board cut into page-sized pieces, laser-printed pages of labels, silicone caulking/glue, dry mount tissue.

of a microscope slide) and width of each label, modifications can be made line by line. I have arbitrarily set the label width at 2 cm. This allows each label to be set in several millimeters from the end of the slide, so that if necessary they will fit into regular slotted slide boxes, without interfering with the coverslip. Labels are made in rows rather than columns, which makes it very easy to set label width using tabs. The entry for each line on the first label, plus the tab, can be copied and pasted to complete the line. Each row contains 8 labels and nine 2.3 cm rows of labels on each standard, letter-sized page (Figure 1). Most programs allow the creation of a special page format that can be saved and recalled so that it is unnecessary to reset tabs or select the preferred font for each new page. Once in rows, individual lines are copied and incorporated into new labels, and an entire row of labels can easily be copied and repeated. Another capability of computer word processing programs is the search and replace function. This function will work a row at a time or on any selected set of rows. Once rows of labels are formatted, it is easy to change any of the information using the replace function. Fonts can be selected for clarity, such as the ability to separate between a capital I and a small l (as in Illinois) or for personal preferrence. Font sizes between 4 and 7pt. are used in labels and it is difficult to read such small type sizes on a standard computer screen. Most word processing programs have a zoom control that allows one to work at a higher or lower magnification. Working at 200 or even 150 percent of normal makes it possible to work with 4 to 7 pt. type easily.

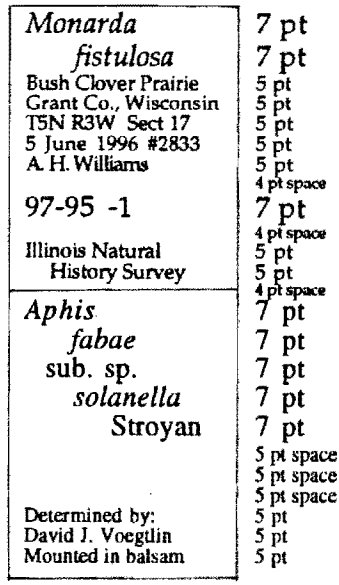

Figure 2. Two labels with point size of each line and space indicated. Top label provides collection data and unique slide number, bottom label determination and indication of mounting medium used. Lines drawn around the labels indicate where cuts would be made. They do not indicate line borders around each label.

Figure 2 shows a pair of labels along with the size of each line and space. This arrangement will vary with the amount of information you choose to put on the label and the infomation that you choose to emphasize. A 4 pt. space between rows of labels provides enough room to cut between the rows and leave sufficient area above the top and below the bottom line. After some experimentation with your program and font, the number, and font size of lines that will complete a label to your satisfaction can be easily determined. Pages of labels are printed on acid-free, 100% rag paper.

Attaching pages of labels to thick card stock. The secret to making thick labels is in the attachment of the high quality paper to card stock. This is easily done using Kodak Dry Mount Tissue®—a sheet of glue that is a solid at room temperature but melts under heat. The fusion of label pages to card stock is accomplished by placing a sheet of Dry Mount Tissue® between the two and heating to 100–110° C (210—230° F) for approximately a minute. Heating this sandwich of cardstock, Dry Mount Tissue® and labels is most easily done using a dry mount press (Figure 1), but can also be done with a household iron. In both cases, it is useful to place a larger sheet of paper over the sandwich when heating it. The glue sheets are 20.3 cm × 25.4 cm (8 × 10 inches), and if aligned properly, none will protrude outside of the sandwich. When this cools, the label page and cardstock are inseparable and labels can be cut using a good quality paper cutter. Card stock is available in a variety of thicknesses, finish quality, and price. Four-ply bristol board is of appropri-

ate thickness and commonly available in art supply stores. It comes in sheets 55.9 cm × 76.2 cm (22 × 30 inches), providing six 21.6 × 27.9 cm (8.5 × 11 inch) pieces. With four-ply bristol board, the total thickness of finished labels is approximately 0.75 mm. This has proven to be thick enough to prevent adjacent slides from contacting the coverslip, except in a few cases where very large specimens have been mounted.

Attaching labels to slides. Many different glues have been tested for their ability to permanently hold thick labels to the glass slide. The best "glue" I have found is not a glue at all, but pure silicone caulking, a widely available product used around bathtubs and showers. Pure silicone caulking comes in variously sized tubes from a variety of manufacturers and is available in most hardware stores. Smaller tubes are more expensive, but most come with a cap to prevent the silicone that remains in the tube from firming up once the tube is opened. More recently, a pure silicone product has become available and is actually called a "household adhesive and seal." To fasten the label to the slide place a small bit of caulking on the slide and press the label down. Once the label is pressed onto the slide, no additional pressure is needed and the label will be immovable in about an hour. Labels are placed on the slide about 2–3 mm in from each end, making it possible to place these slides in standard slide boxes.

Cost of label production. Cost of this process is shown below. Dry mount tissue is available in 100–sheet boxes. Large sheets of 4 ply bristol board (55.8 × 76.2 cm) cost approximately $2.50 each and can be cut into 6 standard letter-size pieces.

21.6 × 27.9 cm sheet 4 ply bristol board	$ 0.45
20.3 × 25.4 cm sheet dry mount tissue	0.25
21.6 × 27.9 cm sheet acid free label paper	0.11
Total	$ 0.81/page

Each page has 9 rows of 8 labels, or 72 labels. Altogether a materials cost of slightly more than 1¢/label. This of course does not include the time it takes to prepare the labels on the computer, dry mount them to card stock, cut them, and glue them to the slides. The cost of the caulking also varies; however, even a small tube will last for a long time if kept tightly capped.

Longevity of the labels. Before this process was adopted, a career photographer was consulted as to the longevity of the dry mount process. He stated that he knew of pictures that had been dry mounted and were still solidly attached and unaffected by the dry mount after 30 years. The Bristol board is not acid-free, although that quality is available at approximately 3–4 times the cost of regular Bristol board. It is probably not necessary to have acid free Bristol board as the dry mount tissue separates the acid-free paper from the Bristol board. Whether the dry mount tissue will eventually have an affect on the acid-free paper I do not know, but I have labels made with this process in the late 1970s that are still in excellent condition.

Silicone caulking has proved very effective as a label cement. Labels attached with this material for over 20 years are still held tightly. Some brands of pure silicone caulking now come with a 50 year warranty, implying excellent longevity for this use. The caulking never really hardens, so if the label must be removed for any reason, it is relatively easy to remove it by using a razor blade to cut through the thin layer of caulking. Most silicone caulkings give off volatiles when curing and carry warning labels on the tube to keep them from contact with eyes. This may be of concern for some users; however, I have not found the odor overwhelming or in any way troublesome. The quantity used is small and most is not exposed to the air, but sandwiched be-

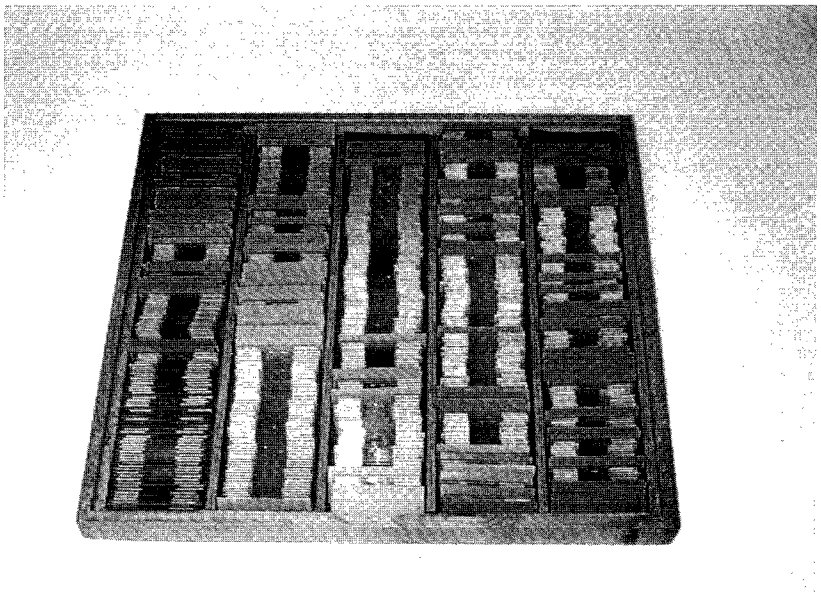

Figure 3. Tray with a capacity of over 900 slides, built to fit into a cabinet for Cornell insect drawers.

tween a thick label and glass which minimizes the immediate release of volatiles. As the manufacturers advise, however, it is best to use this in an area of good ventilation.

Some concern exists that laser-printed labels are susceptible to the rubbing that occurs on slides stored in a card file manner. This varies with the quality of the ink in the laser writer, the heat with which the print is fused to the paper, and is easily tested by rubbing a printed page taken from your printer. I have seen some laser-printed type that rubs off quite easily, while others remain firmly attached and show no degradation from rubbing. It is important to use high quality cartridges in your printer. There is some indication that heating laser printed sheets increases the durability of the printing. It is possible that the heating to fuse the paper and Bristol board aids in fixing the print to the paper. Laser-printed labels are soluble in organic solvents such as ethyl acetate (Sims and Venable 1992), but it is unlikely that most microscope slides would be exposed to such chemicals. If laser-printed labels are perceived to be a problem, custom offset-printed labels can be made and attached to cardstock.

Storage systems for slides with thick labels. Large numbers of slides can be stored in drawers as shown in Figure 3. This one holds over 900 slides. Unfortunately such drawers cannot be purchased and must be custom made. This homemade drawer was constructed with the dimensions of a standard insect drawer that allows slides to be held in regular museum storage cabinets. The exchange of slides within and between drawers is easy. Slides are kept vertical in each row by pieces of packing foam that are cut

slightly longer than the width of the row. Heikenheimo (1988) diagrams two additional storage systems for slides with thick labels. One of these was described and used by Hille Ris Lambers (1950), who stored over 60,000 slides in a very small area.

If you already have a large collection of slides in boxes with regular labels, it is possible to integrate them into such a storage system without making a thick label for each. Slides without thick labels can be kept in transparent plastic sleeves. These are available from plastics manufacturers at a reasonable cost, but will probably have to be ordered in a minimum of several thousand. These plastic covers will limit pressure on the coverslip.

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