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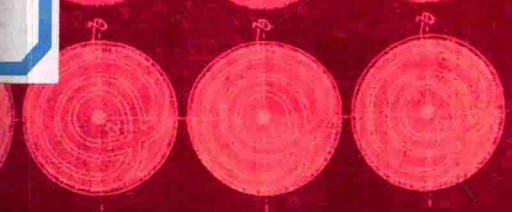
# DYEING AND SCREEN-PRINTING ON TEXTILES

Joanna Kinnersly-Taylor



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2ND EDITION, REVISED AND UPDATED

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FRONT COVER ILLUSTRATION: Taken from *Cam Grid 2*, Joanna Kinnersly-Taylor, 2004.

FRONTISPIECE: Joanna Kinnersly-Taylor (UK), *The Shape of Things*, 2009. screen-printed with reactive dyes and discharge on Irish linen 133 x.260 cm (52 x 102 in) PHOTO: Electric Egg Ltd

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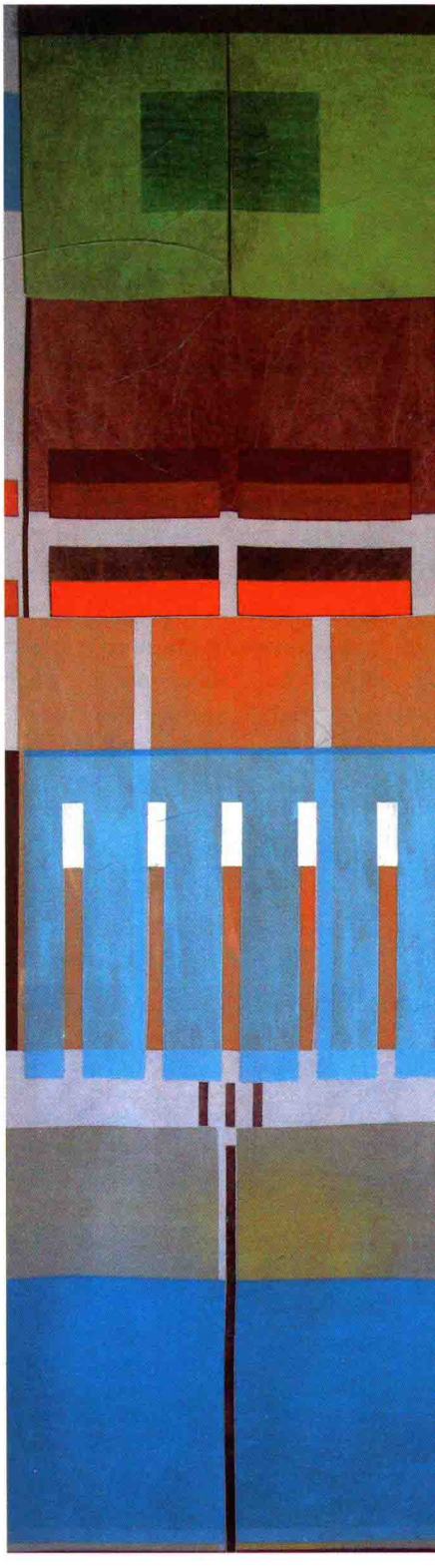

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Unless otherwise stated, all photographs, other that artists' work, by Ruth Clark.

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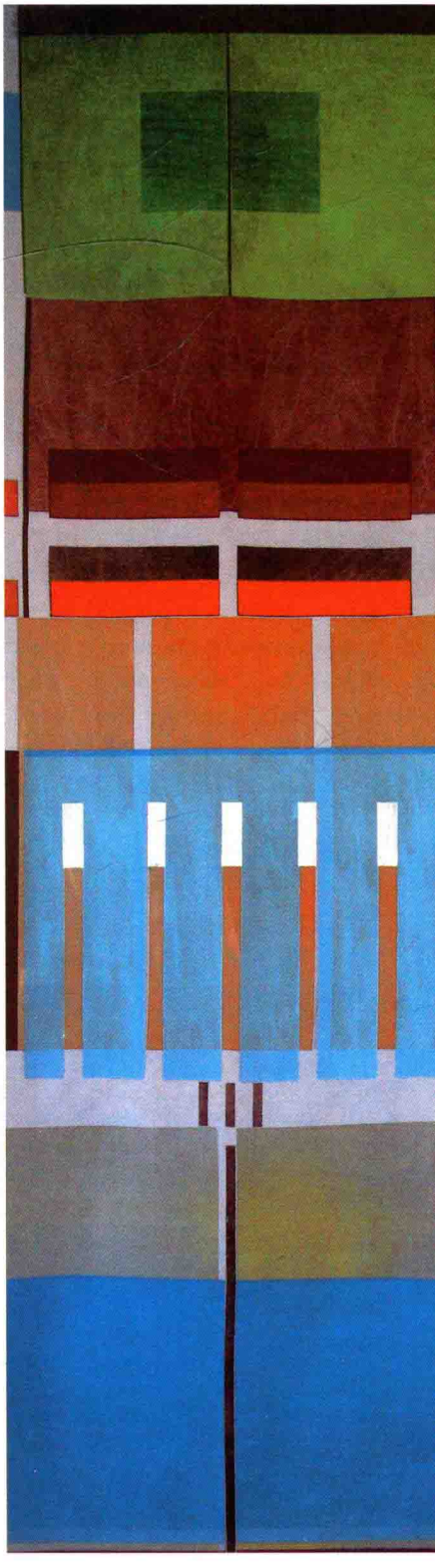

# Acknowledgements

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In memory of my father John Douglas Mackenzie Gordon.

# Introduction

*Dyeing and Screen-Printing on Textiles* is designed to be a user-friendly, informative and inspiring book for the professional textile artist/designer and student alike. It covers many of the key processes used in creating dyed and screen-printed fabrics using a wide range of synthetic dyes for all types of cloth.

With a clear and practical step-by-step approach the reader is guided through every stage of the process from cloth preparation and dyeing, to printing and fixation. Recipes are given for using reactive, direct, vat, acid, disperse and pigment dyes, as well as discharge, devoré, crimping and resist pastes. Heat press processes include transfer printing and application of flock and foil, while the most up to date technology – digital printing– is also covered.

Joanna Kinnersly-Taylor (UK), from *'Perpetual Mapping'* series, Danish Cultural Institute, Edinburgh, 2011. Dyed, screen-printed and painted with reactive dyes and discharge on wool.
PHOTO: Ruth Clark

The screen-printing process is discussed in detail, and covers areas such as designing and printing a repeat, choosing screens, screen mesh and squeegees, types of stencil and coating, exposing and reclaiming screens. Methods of fixation include instructions on how to make a simple steamer for steaming long lengths of cloth. Advice is also given on equipment needed when setting up a studio.

Alongside this, illustrations of stunning work both by leading textile artists and designers, as well as recent graduates, demonstrate the wide range of textile applications today. This broad spectrum includes large-scale publicly commissioned wall-hangings, one-off gallery pieces, furnishing fabrics and interior accessories, fashion and costume.

I would like to emphasise that as printed textile production is such a vast subject and because there are variations in almost every recipe and process, many down to personal preference and experience, therefore there are not always hard and fast rules. It is with this is mind that I hope the reader will use this book both as a trusted ally in the studio on a day-to-day basis, as well as an inspiring springboard from which to develop further individual exploration.

This second edition has been fully revised and updated to reflect changes in practice; it also includes new charts for easy reference when following recipes. In addition, it features new images of work by practitioners, emphasising its contemporary nature and ongoing relevance in the printing studio.

Joanna Kinnersly-Taylor 2011

# 1 Good practice in the studio

The health and safety of the textile printer in the studio cannot be stressed enough. For advice on relevant regulatory and legislative requirements, contact the Health and Safety Executive (see address list). They produce an extensive range of information which provides vital information on, for example, the safe storage, handling and disposal of toxic substances, personal protective equipment including masks, goggles etc. and appropriate fire extinguishers for different types of fire.

**Always** wear a good quality dust and/or fume mask and rubber gloves when weighing out all dry ingredients, mixing pastes, stirring dye-baths (particularly those exposed to heat), and heat-proof gloves

The dye mixing bench in the author's studio. Note the three different types of weighing scales.
*Left to right:* basic for weighing larger quantities of ingredients; the economical 'triple beam balance' weighing from 10th of a gram to 2.61kg, and a set of precision scales which weigh from 100th of a gram to 1.5kg.

and fume mask when removing cloth from the steamer (especially fabric printed with discharge). Goggles are another essential and these **must** be worn for mixing hazardous chemicals and to protect the eyes from fumes from the steamer (e.g. discharge) or spray from the screen-wash when stripping screens. Open windows as much as possible to ensure good ventilation when carrying out these procedures.

Should you experience any allergic reaction to dyes or chemicals, seek prompt medical advice; be especially vigilant during pregnancy. In case of accidents, have a first aid box complete with eyewash, to hand. Keep food and drink away from chemicals and the printing area in general.

Keeping the studio clean and tidy ensures high standards of workmanship and efficiency. Wash out utensils and containers immediately after use. Keep work surfaces and scales clean and dry, free of dye or print paste so that work does not get spoiled.

Always use a clean, dry spoon when measuring out dyes to avoid contamination and reseal dye containers properly to maximise life span of the contents. Write the date of purchase on any ingredients and dyestuffs, as some have a short shelf-life. Likewise, always label your mixed pastes with the date they were made.

Store screens safely where they will not get damaged, and either hang squeegees by the handle or store upside down on a shelf, so that the blade does not get distorted. Always wash screens and squeegees immediately after use; pigment can be particularly difficult to remove if left to harden and will block screen mesh.

The print table should be treated with care and cleaned regularly, as a build-up of print pastes, discharge, table gum and masking or parcel tape can spoil the next piece of work, as well as creating an uneven surface. Use hot soapy water and a slightly abrasive cloth or sponge, then wipe over with a clean, damp cloth to remove suds. Pigment should always be wiped off immediately before it hardens. Always take care when ironing down cloth and never pin directly into the table surface.

If possible, have extra electrical sockets positioned where you need them most in your studio to avoid lots of trailing electrical leads when using fan heaters, irons etc.

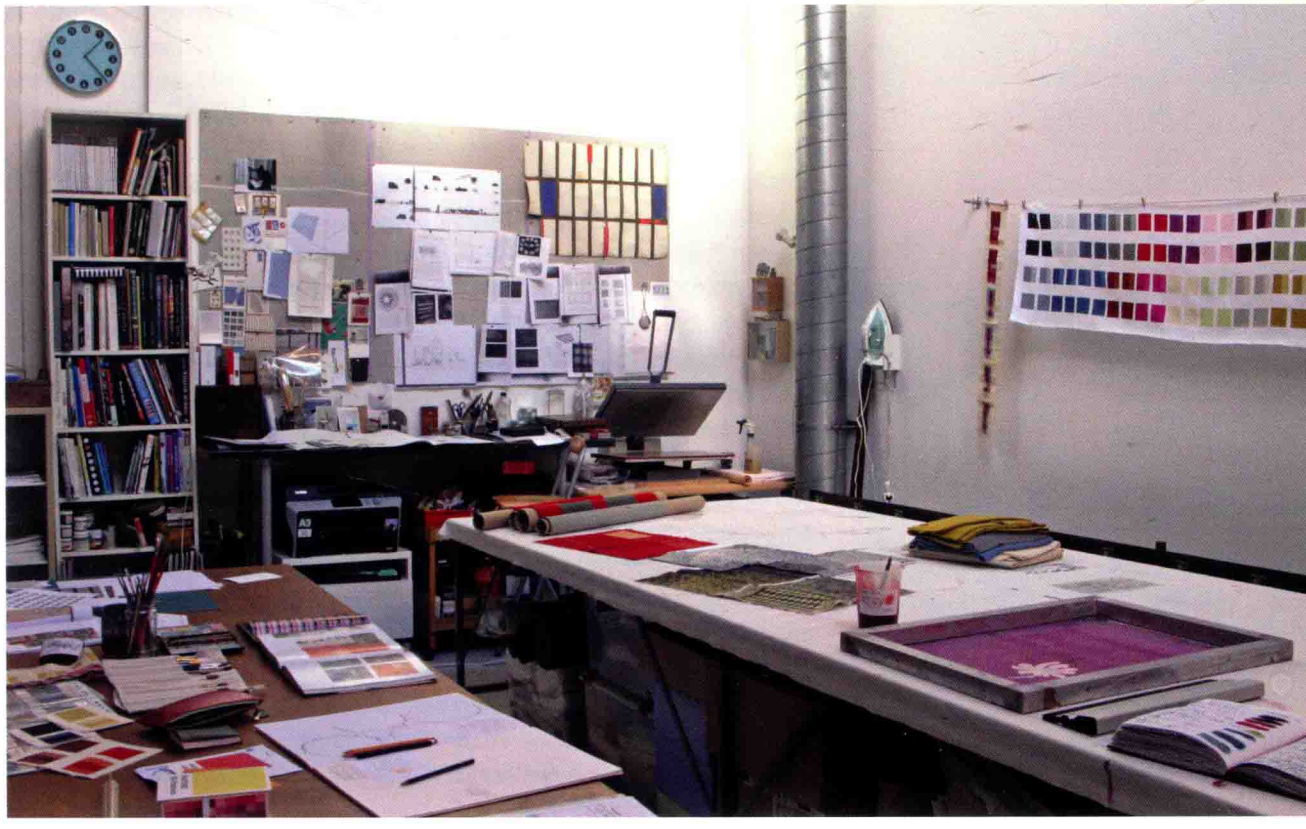
All old print pastes should be disposed of safely – do not just pour down the sink. Specialist chemical disposal companies will take away toxic waste, but this can be expensive. The best thing is to only mix as much paste as you need. If you do have any small amounts left over, these can be printed off onto newspaper, allowed to dry and then disposed of.

# 2 Setting up a studio

## EQUIPMENT AND MACHINERY

When you first set up your studio, the list of equipment you need to get started can seem overwhelming. Try not to be too daunted; once you have the basics you can build up other items gradually. If possible rent the use of expensive equipment such as an exposure unit, baker or heat press, from your local college or art school. Alternatively, if you are sharing studio space with others, perhaps the cost of a major item can be shared.

Studio layout is very important and it is worth spending some time working this out on paper first. Measure all your equipment and



View of the author's studio within the 'WASPS' artists' studio complex in Glasgow, Scotland. PHOTO: Joanna Kinnersly-Taylor

furniture, drawing flat shapes to scale on card and cutting them out. You can then place these on a scale plan (1:20 is a good size), re-arranging items until you have an efficient working space. Position all the water-related equipment in the same area: wash-out, sinks, washing machine etc., with a dye bench nearby. Keep the print table well away from any water, but make sure you have an easy access route to carry screens from the table to the wash-out. The steamer should be near a source of ventilation and a metal cupboard is useful for safe storage of any hazardous or flammable chemicals.

The following outlines the essentials you will need and how you can improvise if on a limited budget.

## EXPOSURE UNIT

A professional exposure unit comprises both an ultra violet (UV) light source and a vacuum frame. In an all-in-one unit, the light source sits underneath thick glass, with the screen positioned horizontally on top. A hinged lid made from rubber is closed down over the screen, and a vacuum pump expels air, sucking the rubber down tightly over the surface of the screen, ensuring excellent contact is made between the screen mesh and the positive. In a vertical unit, once the rubber is holding the screen tightly in place, the frame is tilted through 90° and exposed to UV light housed in a separate unit. The light source may be positioned about 1–2m (3–6½ft) from the screen, depending on the strength of light, size of vacuum frame and space available.

Most self-employed textile artists/designers do not have their own exposure unit, as they are very costly and can take up a lot of space, ideally requiring a dark-room environment. However, for many of us they are an essential part of the printing process and it is worth finding out if your local art school is willing to rent out this facility. Where this is not available, there are other possibilities. A small tabletop-size unit is now available (see address list on page 182) which, although still quite an expensive option, is much more viable in terms of the space needed to accommodate it. It is ideal for small sample screens. The cheaper alternative is to build a simple exposure unit yourself, using either UV, 'photoflood' bulbs (250W) or ordinary fluorescent tube lighting, inside a shallow box, not more than 30cm (11½in.) deep. The inside of the unit should be painted white to ensure good reflection of light, with the lighting tubes themselves positioned about 20–25cm (8–10in.) apart and going right to the edges of the box so that the largest screen size possible can be accommodated. The glass top should be made from 10mm (⅜in.) safety glass. To ensure that there is good contact between the positive and the screen mesh, foam is placed inside the screen, with a piece of wood the same

Exposure unit built by Timorous Beasties for their studio in Glasgow.

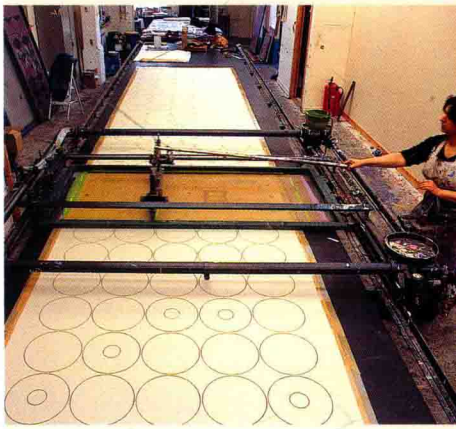
size positioned on top; heavy weights are then placed on top of this. However, without a vacuum pump, half-tone screens may be difficult to expose using this method. If using fluorescent tubes, the average exposure time may be around 15–20 minutes. The advantage of this light source is that the unit can also be used as a standard light box for painting up positives.

## PRINT TABLE

My advice here is to get the biggest you can afford and have space for. A large table allows flexibility in the kind of work you are able to produce. If you are going to be printing repeated lengths, you will need a table at least 3m (10ft) long and, if possible, about 1.55–1.8m (5–6ft) wide (to accommodate furnishing width cloth). When deciding the width of your table, bear in mind that you will need a reasonable amount of space around all sides to access the table easily with (possibly) large screens. The table also doubles up as a valuable space for laying out design work.

A print table usually consists of a metal framework with large pieces of wood screwed or bolted on top. A 6m (20ft) table may, for example, have 2 x 3m sections, over which an under-blanket is stretched. This is then covered with a layer of neoprene, a black synthetic polymer resembling rubber, which is tensioned and secured on the underside of the table, so that no moisture penetrates the blanket. Finally, a metal registration rail runs parallel to the edge of the table. This is the rail where metal 'stops' are positioned in order to register screens for a repeating length. Some tables have adjustable feet, others are bolted to the floor for extra stability. It is possible to make your own table. However, if you are primarily going to be producing repeated lengths of cloth, a more professional table with stop bar is preferable. If well looked after, your print table should last a lifetime.

When getting quotes for tables, check on how much is being charged for carriage and whether the price includes installation. A print table ideally needs to be set up professionally, although in recent years I have had to move mine twice and did manage to re-assemble it satisfactorily. Make sure the table is level and the stop bar parallel to the table, and that the neoprene is sufficiently tensioned to sit smoothly and firmly over the under-blanket. If your workspace is cold, use fan heaters to gently warm the neoprene to enable it to become more pliable and therefore easier to tension. Work outwards from the centre; heavy weights can be used to assist in 'smoothing' the neoprene covering into position. Extremes of temperature can cause incorrectly stretched neoprene to buckle.



At Double Helix's studio in Glasgow, a 10m print table incorporates a 'carriage', allowing large-scale printing to be carried out by one person.

Printing wallpaper on Timorous Beasties' 20m print table.