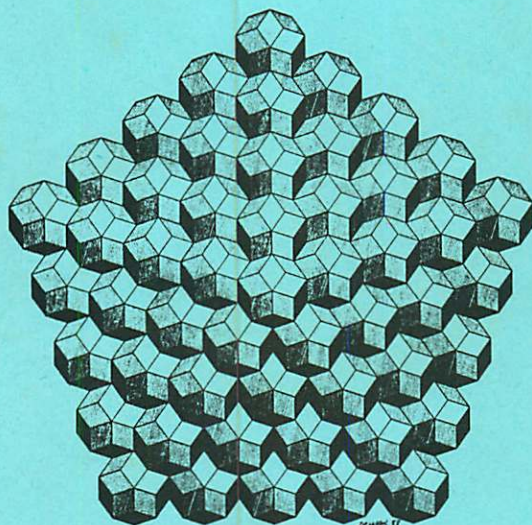


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Abstracts

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Symmetry and Tradition of Javanese Batik Patterns

by

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Batik is an ancient technique of decorating textiles by a resist dyeing procedure. It was wide spread over Asia, Africa and Europe; such relics were found along the so-called "silk route" from China to Minor Asia.

Today it is difficult to decide, where this technique really came from, because textiles are not resistant against climatic influences. However, it may be stated that on Java, the main island of the Republic of Indonesia, batik was developed to a higher standard than anywhere else. From there batik was spread over the world at the turn of this century, when modern dyestuffs already allowed easier processings. At that time European artists discovered the technique of creating new patterns for furnishing fabrics but they rarely obtained the perfection of the Javanese prototype.

The old vegetable dyestuffs such as "indigo", "alizarin"-varieties and bark solutions from native trees have to undergo protracted dyeing and fixation procedures to combine with the fibres. It is not possible to paint or print with those dyes on fabrics directly, because they will penetrate the material without a boundary, never giving a sharp line; pigment paints will impair the flexibility of the fabrics, because they are only glued on to the surface. Thus, in the past the resist method was the only possible way to get distinct patterns.

For batik, which is a Javanese word for "drawing with wax", hot mixtures of wax and resin are used to reserve parts of the fabric from the dye solutions. An original batik is the result of the sequences of various waxing and dyeing operations.



Fig. 1
Applying the wax resist

In old times the waxing was exclusively done by hand using a waxfilled pen only. For a good batik the resist has to be applied on both sides of the fabric. This time-consuming work is generally done by women. It may take weeks or even months to finish a single "kain", which means a cloth of about 1 m x 2.5 m cotton weaving, and which is part of the

formal dress for men and women of contemporary Indonesia. Before the next dyeing more resist is applied to save the newly dyed parts of the pattern. After a final boiling to remove the resists a traditional Javanese batik appears in the following colours: darkblue/brown/white and black; the latter as a product of blue and brown. Resist drawings of the different waxing steps can give the impression of a many-coloured cloth.

The mixtures of resists for the different steps were kept secret by the families as well as particular ingredients and circumstances of the dyeing operations.

Batik is a real popular art in Indonesia, but the most interesting patterns are found among the traditional cloths with high symbolic content from Central Java. The symbols and/o their situation to each other were regarded as protection against evil influences.

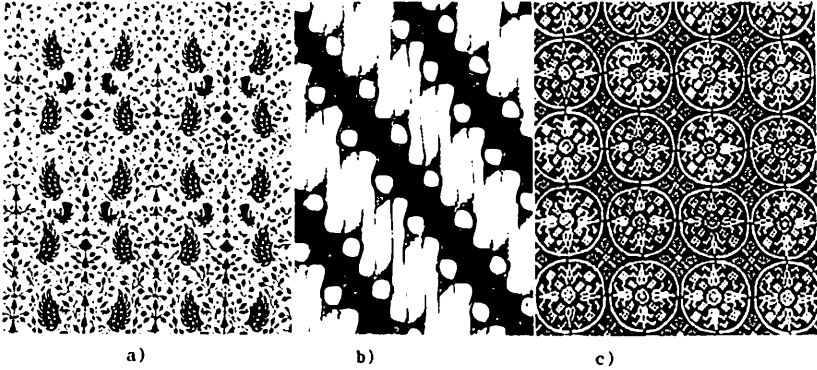


Fig. 2: Representative Javanese batik patterns
 a) "semen", type b in fig. 4; b) "parang rusak";
 c) "jelamprang"-variety

Most symbols in batik patterns are of pre-Islamic origin. Colonial settlers from India had brought Hinduism to Java since 100 AD. Several powerful Hindu-Javanese empires had been established in the Indonesian archipelago until the 16th century, when the last principality of Java had been converted to Islam. Contrary to other countries the Islamization of Indonesia went on gradually without open confrontation. This fact may explain why so many pre-Islamic (and even pre-Hindu) remains could survive and mix with the imported cultural value of Islam. (compare Wagner (1959), p. 146).

A comparative inspection of many old and new batiks from various Javanese provinces lead to the finding that there are relations between symmetry elements (see Fig. 3) and symbolism as well as tradition. A few types of the 17 plane symmetry groups (see Hahn, (1987)), are preferably present in batik patterns, while others are missed completely.

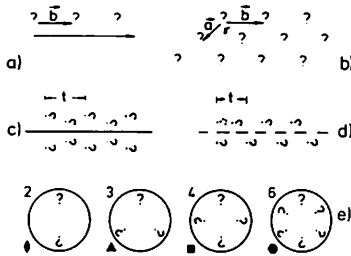


Fig. 3
 Symmetry elements in infinite plane patterns
 a) translation in one direction;
 b) translation in two directions;
 c) mirror line;
 d) glide mirror line;
 e) 2-, 3-, 4-, 6-fold rotational points

Due to the method of making the high symmetry of the infinite patterns is remarkable. Regarding handdrawn patterns containing a tiny elementary cell one may ask for the reason to do the boring work of hundred- or thousandfold repetition. It is proved that the concentration on the neat multiplication of a single motif had a meditational effect. On the other hand there

was the wish to increase the magic power of the symbols by multiplying them on the same cloth.

Since about 150 years ago sometimes the resist is applied with a block, but the tool was created after the symmetric patterns were already existing. However, this tool is interesting in another symmetry aspect. Each block without a mirror line needs an identic counterpart for the reverse side of the cloth.

Certain symmetry elements in batik patterns represent the old Asian philosophic principles "mancapat" (the Javanese version of "mandala", the compass-card) and "dualism".

"Dualism" means roughly "coexistence of opposites". In batik patterns it is expressed as dark/light, left/right and symbols for upper/lower world and good/evil in general.

Thus, the symmetry elements mirror line and two-fold rotation can represent dualism. The mirror line is an important symmetry element in "semen"-patterns, which contain Hindu symbols symmetrically arranged on a floral background. Some motifs with an own mirror line are placed along a center line, pairs of others group on both sides of this line. "Columns" of those groupings can alternate with similar ones (Fig. 4b), are just repeated themselves (Fig. 4a) or repeated after shifting within the columns (Fig. 4c). There are also a few examples of which the columns alternate in direction of "head and foot" (Fig. 4d).

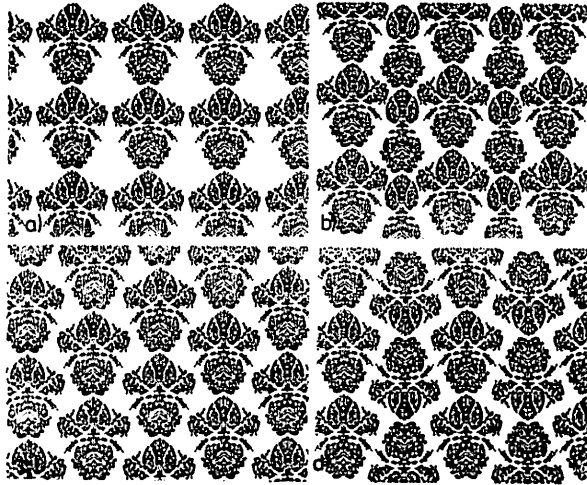


Fig. 4: Symmetry types of "semen" patterns; (schematic)

Due to International Tables, Vol. A (see Hahn (1987)) the symbols for a) and b) = pm (they only differ in size of the unit cell), for c) = cm and for d) = $p2mg$. In c) a glide mirror parallel to a mirror results in a centered unit cell, while in d) a glide mirror perpendicular to a mirror creates a two-fold rotational point.

Twofold rotation may be another example for the presence of the dualistic idea in batik patterns. In an old "semen" pattern this symmetry element $p2mg$ is part of the name: "pisang bali(k)", which means "turned banana". The most respected pattern containing two-fold rotational points is the "parang rusak" (= destroying dagger; fig. 2b), which was in some versions reserved for the

ruler only. As this ruler (after Javanese belief) is regarded as an incarnation of Batara Guru (Shiva), who signifies the union of upper and lower world, a connexion of rotational symmetry and dualism seems to be conceivable (compare Hardjonagoro (1980), p. 231).

"Mancapat" and "mancalima" (Jav. "manca" = outer, "pat" = four, "lima" = five), the Javanese versions of the cosmic model "mandala" are described in a compass-card. The four or eight directions, respectively, and the centre are dedicated to deities, colours, daytimes and all kinds of natural tendencies, of which the centre takes the highest rank always. This cosmic model played an important role for daily life during the Hindu period, but it can be regarded as pre-Hindu (see A. Veldhuisen-Djajasoebata (1980), p. 204-205). "Jelamprang" is one example for "mancapat". The interpretation ranges from "cakra", Vishnu's wheel shaped wapon to "nine wali" (nine saints, who propagated Islam in Java) according to religious context.

Countless batik patterns are based on "mancapat", which shows the symmetry of plane group $p4m$ (see Hahn (1987); Haake (1984), pp. 39-44 and (1989), but there are hardly any three- and six-fold rotational symmetries in traditional batik patterns. As these symmetries are quite common in Islamic art, the only reason for the lack might be the still existing and tolerated cultural relics of Hindu-Javanism.

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