

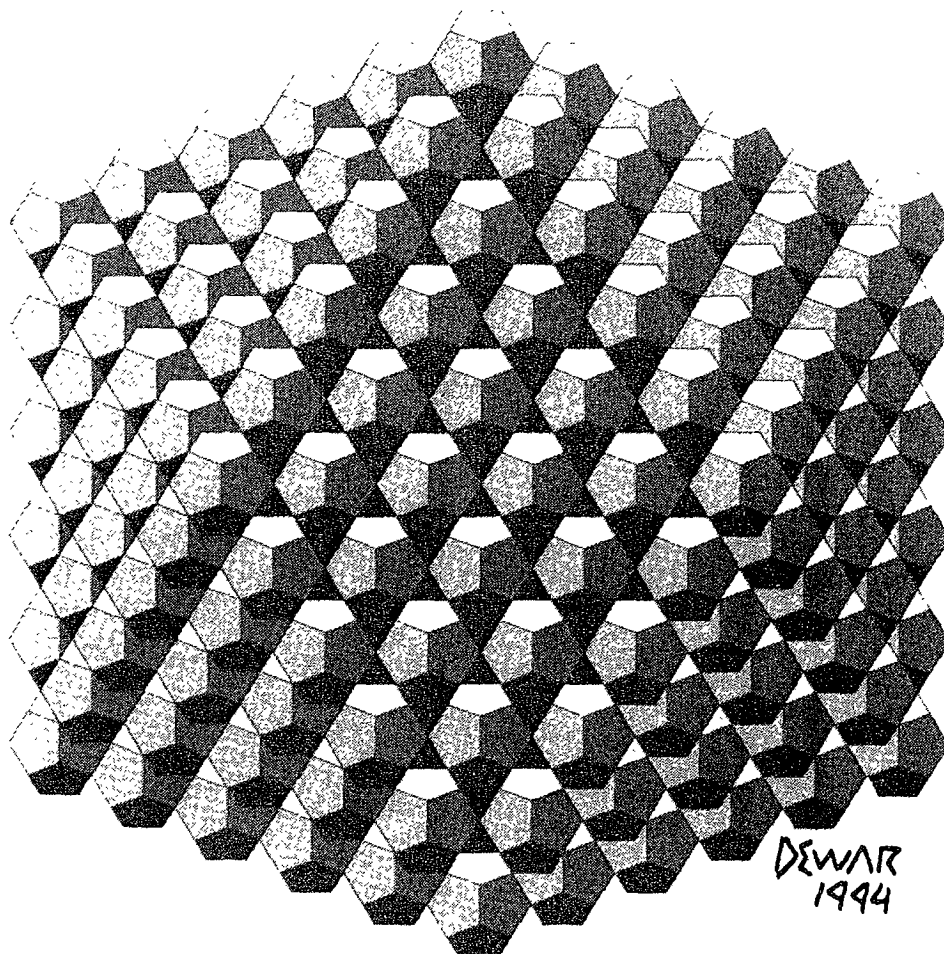
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**THE BAND DESIGN IN THE CERAMIC OF CENTRAL REGION OF PANAMA.**

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**1. Introduction.**

Some researchers of Social Sciences do not show much interest in Mathematics; and some so called pure mathematician does not believe in the social research, because it does not have the rigor of the mathematical proof. This research is an example when *Mathematics collaborates with a Social Science, Archaeology*. When these cases occur those that work with it, call it Ethnomathematics.

**2.- Antecedent.**

The first researches in this field studied those cultures that have evidences of specific work with Mathematics. Lettered or quasi lettered cultures, such as Egyptians of classic period, Aztecs, and naturally, the Moorish art, Speicer [6], Müller [5]. The points of view have changed; and it permitted include research in different cultures, "marginal cultures", Ascher [1]; within this group are the aborigine cultures of this part of the world. One of this cultures is those who here serve of example, the Central Region of Panama (CRP).

**3.- The Mathematical tool.**

**3.1 The Seven band design.** Here, the branch of Mathematics that will be used is Symmetry. Those symmetries that have only one independent translation. The results are the **band design groups**. The valid movements to generate these designs are. (a) an independent translation, (b) horizontal reflection, (c) vertical reflection,

(d) one half round, and (e) glides reflection, and all the valid combinations, in this way are obtained the seven bands Design. These combinations exhaust the possibilities, but the demonstration is out of reach of this dissertation.

**3.2. The recognition algorithm.** This band design, in mathematical notation, corresponds to seven groups of Symmetry completely different. An algorithm allows recognize the symmetry group into a decorative field; such as the pre-Columbian decorated pottery sample. They recognize, in the whole design, the basic elements and identify only one symmetry group, reminded identified it in a unique way. One of this algorithm appears in Wahsburn and Crowe, table 4.1 [7].

#### **4. The Central Region of Panama.**

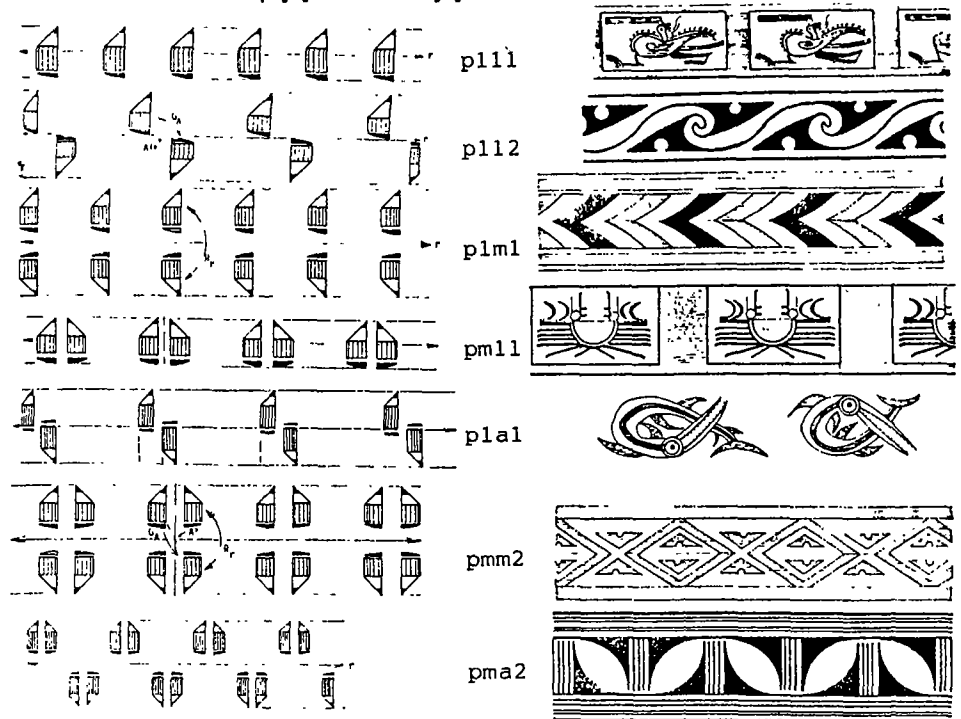
**4.1. The borders.** The cultural borders for the CRP are: West, Tabasara river basin and from here to Caribbean coast; East, from Punta Chame, Pacific Ocean, to Atlantic Ocean, in straight line [2].

**4.2. The ceramics associated with the cultural evidences.** The ceramic traditions that correspond to this region are: (1) plastic, molding and pilling, (b) bichrome; (3) polychrome of three colors, and (4) polychrome of four colors. The ordain of apparition are the following: Early (IIIA) and Later (IIIB) formative; Bichrome (IV); Transitional (IV-V); Conte Style (V); Baroque (VI); and, Before contact (VII) ceramic.

#### **5.- Classification of ceramics of the Central Region of Panama.**

**5.1. The position of the decorative fields.** The decorative field that presents the pottery pieces was selected as design of bands when was located in any one of the following positions. (a) The rims of low depth plates, when this has continuous aspect; (b) decorative band around of globular vessel, and (c) lineal trace in the

centered plane of a plate. The following are examples of design that appear in these pieces of work and each of them shows one of the seven symmetry groups, some-one taken from Lothrop [4] and Ichon [3].



**5.2. Results.** Five hundred forty-nine decorative fields were identified in the given sample. The information of the symmetry group that are present in decorative field was collected in a table of double entrance; columns are the different groups of symmetry and rows, the stylistic periods. This information was analyzed using the  $X^2$  proof, with 5% of significance level. The results of this test support previous results about the stylistic change existing between the different periods. That is, when change the ceramic style between periods then also occurs statistical differences in the predominate of a particular symmetry group in the decorative field. This analysis corroborates the before classification.

## 6. Conclusion.

The recognition of the linear symmetry groups was applied to pre-Columbian pottery of CRP and the results are equivalent to the existent and divulged classification. That was an application; Mathematics as tool collaborates with Archaeology, as I said at the beginning of this paper.

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