

Symmetrological review of the ornamental patterns of the Chiprovtsi hand-woven carpets**Radostina Atanassova, Rossitsa Vassileva***Geological Institute, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria*

Abstract. Especially suitable for the study of 2-dimensional symmetry, antisymmetry and colored symmetry is the large number of geometric patterns executed in textile. The tradition of carpet-making in Chiprovtsi, NW Bulgaria is selected for inscription on the Representative List of the Intangible Cultural Heritage of humanity in 2014 by UNESCO. The town of Chiprovtsi is rich in history and was also famous all over the Balkan Peninsula for its goldsmiths. The earliest information about Chiprovtsi carpets dates back from the 17th century. The hand-woven technique, preserving the ancient way of weaving, is used to produce two-sided flat carpets and nowadays. The present investigation arose from a desire to clarify contradictory statements regarding the decorative ornaments which are to be found on the carpeting from different regions in Bulgaria and in the Chiprovtsi carpets particularly.

It is well known that there are 17 classes of symmetry groups of planar ornaments which repeat in at least two nonparallel directions; these are known as crystallographic plane groups. When each set is denoted by a color, the geometrical pattern becomes a color pattern (Senechal, 1975). In this respect, preliminary analysis can be made on symmetry patterns (Shubnikov and Koptsik, 2004).

Characteristic for the composition of the oldest carpets is a rim orbiting a square or rectangular field consisting of one or more strips. The traditional carpet ornamentations of the Chiprovtsi region are symmetrically organized with highly stylizing geometric forms. The first ornamental shape which is determined by the technique of weaving is a triangle (Stankov, 1964). In different models were documented several typical ornaments with specific names as “kanatitsa”, “makaz”, “kamulka”, “karakachka”, etc. According to the symmetry elements and operations in different ornaments are recognized $p1$, pm , cm , pmm , $p4$, $p4mm$ and other plane groups arrangements. From each uncolored group of symmetry several colored groups can be derived if different choices of color-changing symmetry operators are made. In such manner some late models, from ornamental period, have received and formed an exceptionally rich decorated style.

Twinning phenomenon, as in crystalline nature, was not failed to be recognized from the Chiprovtsi masters and the beauty of the principle was used in the model composing. It applied in majority with an ornamental match of two or several patterns. Adding of black-and-white (anti-) symmetry to the $p4mm$ plane group led to the design expressivity of the oldest carpet example, exposed nowadays in the museum of Chiprovtsi town.

The Arabic geometrical art with its preponderance of hexagonal or trigonal patterns stands unique in the history of ornamental art, while the two-dimensional geometrical patterns of antique Greece and Rome in the great majority were based on orthogonal axial systems (Makovicky and Makovicky, 1977). The rhombohedric-like motifs in Chiprovtsi models known from older carpets apparently borrowed its decorative form from the Orient. It is obvious also from semantic point of view that some of the ornaments have foreign origin, such as “makaz” from Arabic and others.

The most distinctive feature of the Chiprovtsi carpets can be mentioned as use of the simplified triangular forms and the stylized models. In addition, the most popular motif “kanatitsa” is regularly used in internal and external architectural decoration of different parts of local public and private buildings