ON THE HISTORY AND ARRANGEMENT OF THE CLASSES OF CRYSTAL SYMMETRY

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In most of the contemporary crystallographic works the 32 symmetry classes are usually arranged in a tabular manner fitting the crystal systems and type of symmetry. From a historical point of view it is interesting to trace the main trends of their arrangement.

The 32 crystallographic point groups have been described by Frankenheim in 1826 (Burckhardt, 1984) and confirmed partly or fully later on independently by Hessel, Bravais, Möbius, Gadolin, Curie, Fedorov, Minnegerode, Schoenflies and Wulff. The first table of the classes of crystal symmetry is considered to be that of Tschermak in 1905, accepted by Becke in 1926 and other authors (Yushkin et al., 1987).

A tabular arrangement, as a sequence only of the crystal systems has been suggested by Gadolin in 1867 and by Fedorov in 1891. The combination of crystal systems with type of symmetry arranged in a tabular way has been applied by Schoenflies (1891) and later in a supplement of the Russian translation of Groth (1897). This procedure branched in the next years through using both sequence of crystal systems and type of symmetry. Still later differentiation followed chronologicaly. Trends in Figure 1 show symmetrical branching according to the crystal systems (A - triclinic, M - monoclinic, O - orthorhombic, T - trigonal, Q - tetragonal, H - hexagonal and C - cubic). On the left hand side there are A → C transitions and on the right hand side C → A transitions with an exception in the center. It is obvious that the A → C transition has been prefered by most crystallographers. In this branch an interesting diversion has been suggested by Shubnikov et al. (1940), viz. cubic system vertical fitting the columns of types of symmetry.

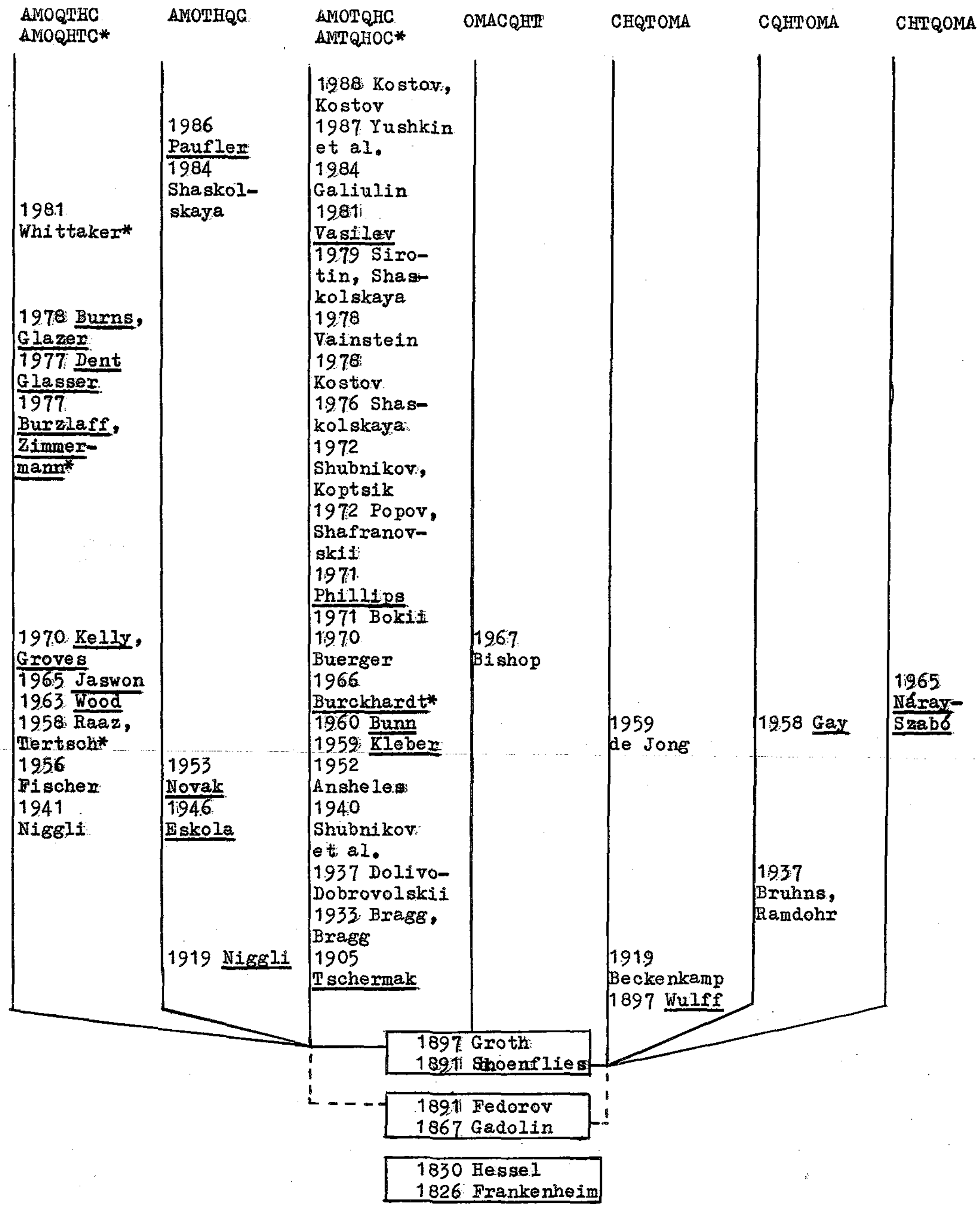

Fig. 1. Trends of the sequences according to crystal systems.

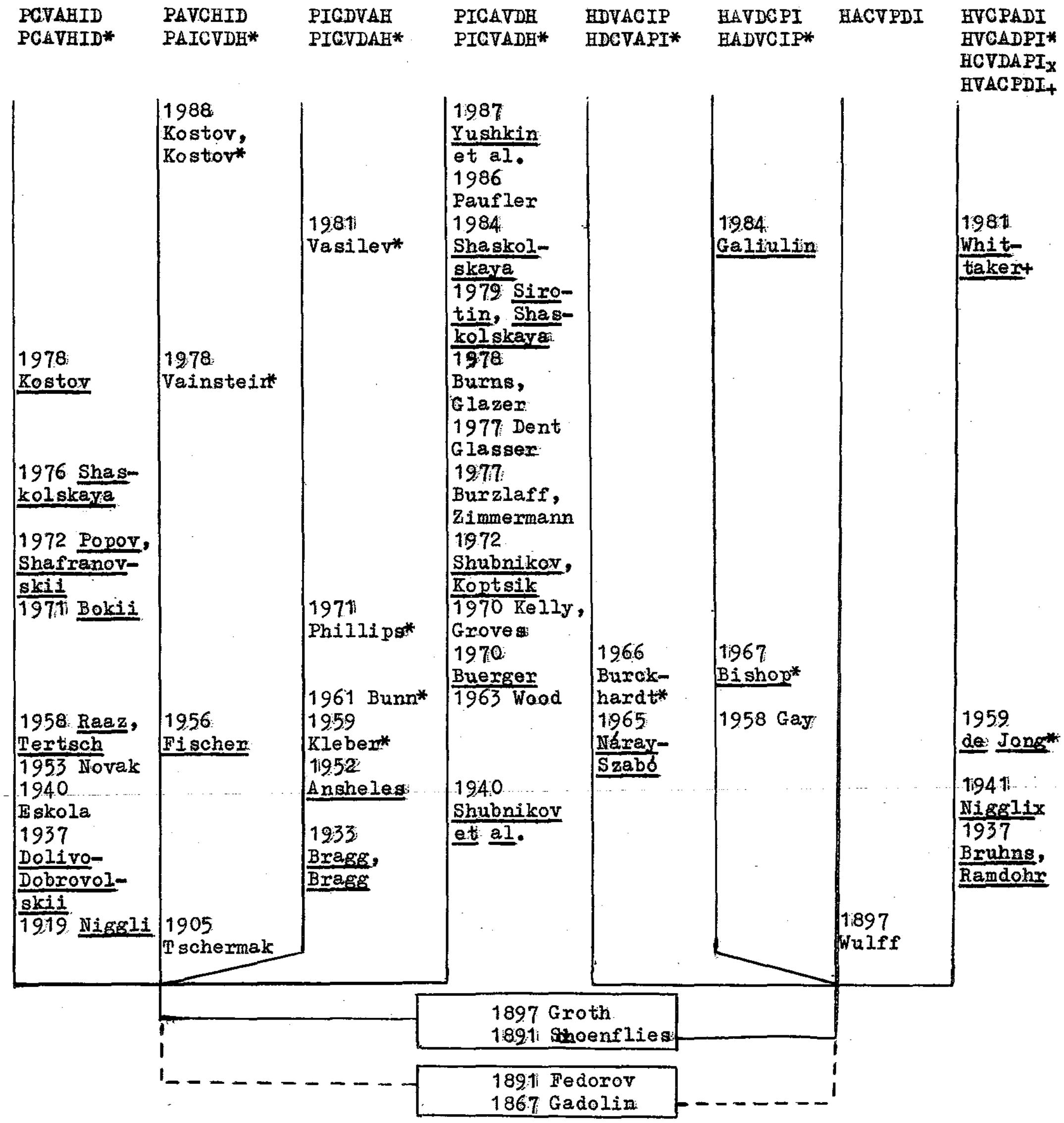

Fig. 2. Trends of the sequences according to type of symmetry.

The trends in Figure 2 show similar symmetrical branching along four lines each of the two sets according to the type of symmetry (P - polar, A - axial, I - inverse-primitive, C - central, V - planar, D - inverse-planar and H - planar-axial). The sequence in the tetragonal system has mainly been used. On the left hand side are the P → other transitions and on the right hand side the H → other transitions. The variety of arrangements in this case is greater, but most authors prefer the P → other transition type.

In both figures along each separate line underlined are the authors who use vertical and not horizontal manner of presentation. Asterixes mark small variations in the arrangement.

Crystallography is a fundamental science and the table of alignement of the crystal systems and symmetries like the Periodic Table of Mendeleev has its logical meaning and significance. Further development of this table including icosahedral, formal pentagonal and infinite groups of symmetry has also been made (Kostov, Kostov, 1988).

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