FIGURE 2.4 Scheme for the assignment of the symbolic point group notation on the basis of the symmetry content of a crystal. See Exercise 3 for further discussion of this symmetry notation. (By permission of B. M. Loeffler, Colorado College, Colorado Springs, Colorado.)

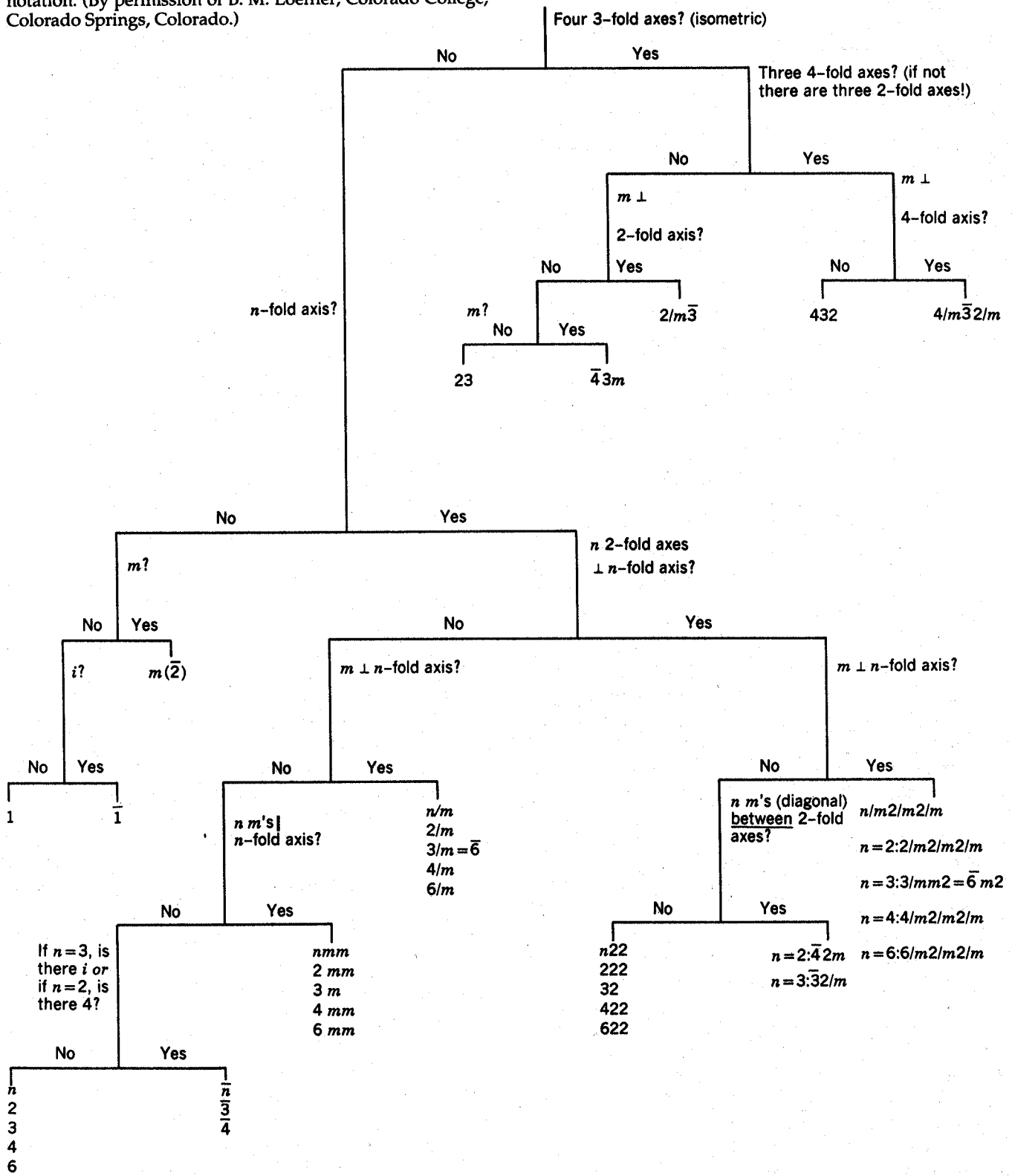

TABLE 2.2 The 32 Crystal Classes and Their Symmetry

Crystal System	*Crystal Class*	*Symmetry Content*
Triclinic	1	none
	$\bar{1}$	i
Monoclinic	2	$1A_2$
	m	$1m$
	$2/m$	$i, 1A_2, 1m$
Orthorhombic	222	$3A_2$
	$mm2$	$1A_2, 2m$
	$2/m2/m2/m$	$i, 3A_2, 3m$
Tetragonal	4	$1A_4$
	$\bar{4}$	$1\bar{A}_4$
	$4/m$	$i, 1A_4, m$
	422	$1A_4\ 4A_2$
	$4mm$	$1A_4, 4m$
	$\bar{4}\,2m$	$1\bar{A}_4, 2A_2, 2m$
	$4/m2/m2/m$	$i, 1A_4, 4A_2, 5m$

TABLE 2.2 (continued)

Crystal System	*Crystal Class*	*Symmetry Content*
Hexagonal[a]	3	$1A_3$
	$\bar{3}$	$1\bar{A}_3(= i + 1A_3)$
	32	$1A_3, 3A_2$
	$3m$	$1A_3, 3m$
	$\bar{3}\,2/m$	$1\bar{A}_3, 3A_2, 3m$ $(1\bar{A}_3 = i + A_3)$
	6	$1A_6$
	$\bar{6}$	$1\bar{A}_6(= 1A_3 + m)$
	$6/m$	$i, 1A_6, 1m$
	622	$1A_6, 6A_2$
	$6mm$	$1A_6, 6m$
	$\bar{6}m2$	$1\bar{A}_6, 3A_2, 3m$ $(1\bar{A}_6 = 1A_3 + m)$
	$6/m2/m2/m$	$i, 1A_6, 6A_2, 7m$
Isometric	23	$3A_2, 4A_3$
	$2/m\ \bar{3}$	$3A_2, 3m, 4\bar{A}_3$ $(1\bar{A}_3 = 1A_3 + i)$
	432	$3A_4, 4A_3, 6m$
	$\bar{4}\,3m$	$3\bar{A}_4, 4A_3, 6m$
	$4/m\bar{3}2/m$	$3A_4, 4\bar{A}_3, 6A_2, 9m$ $(1\bar{A}_3 = 1A_3 + i)$

[a]In this table all crystal classes (point groups) beginning with 6, $\bar{6}$, 3, and $\bar{3}$ are grouped in the hexagonal system. In earlier editions of the *Manual of Mineralogy* the hexagonal system was divided into the hexagonal and the rhombohedral divisions. The use of these two subdivisions, as based on the presence of 6 or $\bar{6}$ versus 3 or $\bar{3}$ axes in the morphological symmetry of a crystal, results in confusion when subsequent X-ray investigations show a specific crystal with, for example, 32 symmetry to be based on a hexagonal lattice. This is the case in low quartz, which allows morphological symmetry 32 but is based on a primitive hexagonal lattice, resulting in a space group $P3_12$ (or $P3_22$).

The hexagonal system can, however, be divided on whether the lattice symmetry is hexagonal ($6/m2/m2/m$) or rhombohedral ($32/m$). This results in the following groupings.

Hexagonal (hexagonal lattice division)			*Rhombohedral (rhombohedral lattice division)*
$6/m2/m2/m$			$\bar{3}\,2/m$
$\bar{6}m2$		$\bar{3}\,2/m$	$3m$
$6m$		$3m$	$3\,2$
$6\,2\,2$	and	$3\,2$	$\bar{3}$
$\bar{6}/m$		$\bar{3}$	3
6		3	
6			

SOURCE: From *Manual of Mineralogy*, 21st ed., p. 39.