Not all of the types of symmetry enumerated in this table are available as types of crystal symmetry, for the law of rational indices limits the acceptable axes of symmetry to those of the orders 2, 3, 4, 6. With this limitation the table furnishes the 32 types of crystal symmetry, 11 from each of the first two columns and 10 from the third.

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HORNER'S METHOD OF APPROXIMATION ANTICIPATED BY RUFFINI.

BY PROFESSOR FLORIAN CAJORI.

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BEFORE the nineteenth century no simple elementary practical process was known of computing the coefficients of an equation whose roots are less by a given constant than the roots of a given affected numerical equation $f(x) = 0$. Such a process was invented in the early part of the last century and is contained in the so-called "Horner's method of approximation."

The history of Horner's method, as developed in England, has been traced in detail by Augustus De Morgan.* He quotes extensively from original sources and shows that, of English rivals (among whom were Theophilus Holdred, Peter Nicholson, and Henry Atkinson), none except perhaps Nicholson advanced methods of approximation that equalled Horner's, and none was entitled to priority over Horner. It is well-known that the popularization of Horner's process of approximation in England was due to De Morgan and J. R. Young. Except for the efforts of these men, Horner's paper of 1819 in the *Philosophical Transactions* might have been lost sight of and forgotten. De Morgan was an enthusiast on Horner's method. He taught it with great zeal; he made sport of Cambridge tutors who were not familiar with it;† the preparation of his historical tract, alluded to above, was evidently a labor

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* *Companion to the* [*British*] *Almanac for 1839*, Art. "Notices of the progress of the problem of evolution," pp. 34–52.

† A. De Morgan, A Budget of Paradoxes, London, 1872, pp. 292, 375.