

# PRINCIPLES

## OF THE

### SOLUTION OF EQUATIONS OF THE HIGHER DEGREES,

#### WITH APPLICATIONS.

BY GEORGE PAXTON YOUNG,  
*Toronto, Canada.*

#### CONTENTS.

1. Conception of a simple state to which every algebraical expression can be reduced. §6.

2. The unequal particular cognate forms of the generic expression under which a given simplified expression falls are the roots of a rational irreducible equation; and each of the unequal particular cognate forms occurs the same number of times in the series of the cognate forms. §9, 17.

3. Determination of the form which a rational function of the primitive  $n^{\text{th}}$  root of unity  $\omega_1$  and of other primitive roots of unity must have, in order that the substitution of any one of certain primitive  $n$  roots of unity,  $\omega_1, \omega_2, \omega_3$ , etc., for  $\omega_1$  in the given function may leave the value of the function unaltered. Relation that must subsist among the roots  $\omega_1, \omega_2$ , etc., that satisfy such a condition. §20.

4. If a simplified expression which is the root of a rational irreducible equation of the  $N^{\text{th}}$  degree involve a surd of the highest rank (§3) not a root of unity, whose index is  $\frac{1}{m}$ , the denominator of the index being a prime number,  $N$  is a multiple of  $m$ . But if the simplified root involve no surds that are not roots of unity, and if one of the surds involved in it be the primitive  $n^{\text{th}}$  root of unity,  $N$  is a multiple of a measure of  $n - 1$ . §28.

5. Two classes of solvable equations. §30.

6. The simplified root  $r_1$  of a rational irreducible equation  $F(x) = 0$  of the  $m^{\text{th}}$  degree,  $m$  prime, which can be solved in algebraical functions, is of the form