It follows from an observation of A. Coble in 1919 that the automorphism group of an unnodal Enriques surface contains the 2-congruence subgroup of the Weyl group of the $E_{10}$-lattice. In this talk, I will explain how much bigger the automorphism group of an unnodal Enriques surface can be. Furthermore, I will determine the automorphism group of a generic Enriques surface in arbitrary characteristic (under the additional assumption that the Enriques surface is ordinary if the characteristic is 2), improving the corresponding result of W. Barth and C. Peters for very general Enriques surfaces over the complex numbers.