We propose two new methods to calculate exactly the spectrum of two spin-1/2 charge carriers moving in a ferromagnetic background, at zero temperature. We find that if the spins are located on a different sublattice than that on which the fermions move, magnon-mediated effective interactions are very strong and can bind the fermions into low-energy bipolarons with triplet character. This never happens in models where spins and charge carriers share the same lattice, whether they are in the same band or in different bands. This proves that effective one-lattice models do not describe correctly the low-energy part of the two-carrier spectrum of a two-sublattice model, even though they may describe the low-energy single-carrier spectrum appropriately.