Changes of semimajor axes of giant planets, which took place 4 billion years ago and evolved the Solar System towards its present state, affected various populations of minor Solar-System bodies. One of these populations was a group of dynamically stable asteroids in the 2:1 mean-motion resonance with Jupiter which reside in two islands of the phase space, denoted A and B, and exhibit lifetimes comparable to the age of the Solar System. The origin of stable asteroids has not been explained so far. Our main goal is to create a viable hypothesis of their origin.

We update the resonant population and its physical properties on the basis of up-to-date observational data. Using an *N*-body model with seven giant planets and the Yarkovsky effect included, we demonstrate that the depletion of island A is faster compared to island B. We then investigate: (i) survivability of primordial resonant asteroids and (ii) capture of the population during planetary migration, using a recently described scenario with an escaping fifth giant planet and a jumping-Jupiter instability. We employ simulations with prescribed migration, smooth late migration and we statistically evaluate the results using dynamical maps. We also model collisions during the last 4 billion years. We conclude that the long-lived group was created by a capture from a part of hypothetical outer main-belt family during Jupiter's jump.