

***Lepus* × *Oryctolagus cuniculus* hybrids: incompatibilities of behavioral and molecular nature**

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Abstract. The present paper is a literature investigation on interspecific hybrids of the rabbit (*Oryctolagus cuniculus*), resulted from its crosses with related species. Hybrids between species which are distant from phylogenetic point of view, especially intergeneric hybrids, when they can occur, are generally sterile animals. They cannot produce offspring. There is the hypothesis among the rabbit breeders that the Belgian Giant Rabbit is the result of ancestral mating of domestic rabbits (*O. cuniculus*) with the European hare, *Lepus europaeus*. Despite the frequent myths spread by rabbit breeders, genus *Lepus* is unlikely to produce fertile hybrids with genus *Oryctolagus*. Therefore, this hypothetical hybrid is less likely to be the true origin of the Giant Belgian Rabbit breed.

Key Words: *Lepus*, *Oryctolagus*, hare, rabbit, interspecific hybrids, myths.

Introduction. Interspecific hybridization to animals is sometimes possible, but most of the hybrids produced are sterile. Fertile interspecific hybrids can be produced only by species which are close related phylogenetically (Franchini et al 2018; Petrescu-Mag 2018a, b; Petrescu-Mag & Oroian 2018; Oroian 2015; Oroian et al 2014; Păsărin & Petrescu-Mag 2011).

There is the hypothesis among the rabbit breeders that the Belgian Giant Rabbit (Figure 1) is the result of ancestral mating of domestic rabbits (*O. cuniculus*) with the European hare, *L. europaeus* (McCarthy 2018). We consider this hypothesis a myth because experimental studies assisted by advanced technologies have failed to obtain healthy and fertile hybrids.

Even if such hybridization was possible, the result would have been sterile hybrids, such as the zonkey or the mule, due to the phylogenetic distance between genus *Lepus* and genus *Oryctolagus*.

Let's look at what the literature says about these interspecific hybrids.



Figure 1. According to a myth, the Belgian Giant Rabbit is supposed to be the descendant of an interspecific hybrid (*L. europaeus* x *O. cuniculus*).

***Lepus americanus* (snowshoe hare) x *O. cuniculus* (European rabbit)**. The ranges of these two species of rodent did not overlap initially, but *O. cuniculus* is now feral in the range of *L. americanus*. In fact, *O. cuniculus* has spread throughout the world because of its invasive nature. On one hand, the first impediment of this type of hybridization is behavioral; on the other hand, frequent molecular disfunctions occur in egg cells and hybrid embryos. According to literature reports, high rates of fertilization occur in rabbits inseminated with hare semen, but less than 10% of hare oocytes are fertilized with rabbit semen. The fertilized ova apparently all degenerate (Chang 1965; Chang & Hancock 1967; Chang et al 1964, 1969; Allen & Short 1997; McCarthy 2018). Hybrids, once born, do not always match the mother's behavioral sequences. For instance, normally, in the case of rabbits, kits are poorly developed, naked and blind, while the hare produces kits well developed and dressed in hair. The rabbit female will look for the kits in the nest to nurse, while the hare female will not be able to feed the underdeveloped kits with rabbit characteristics. On the other side, mammalian interspecific hybrids are not always healthy.

***L. europaeus* (European hare) x *O. cuniculus* (European rabbit)**. No valid primary report of this cross seems to exist (though the literature discussing this topic is extensive) (McCarthy 2018). Castle (1925) describes successive efforts to produce this hybridization by artificial insemination that ended in failure. Incompatibilities go further, as with hybridization described above, the incompatibilities being behavioral and molecular. Sterility is, at least theoretically, a rule in these hypothetical hybrids because chromosomes cannot form bivalents during meiosis.

Conclusions. Hybrids between distant species, especially intergeneric hybrids, when they can occur, are generally sterile hybrids. Despite the frequent myths spread by rabbit breeders, genus *Lepus* is unlikely to produce fertile hybrids with genus *Oryctolagus*. Therefore, this hybrid is less likely to be the origin of the Giant Belgian Rabbit breed.

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