

## What is a crossbreeding

If there is not enough variation in the pedigree of the breed to breed the factors that affect a dog's well-being in dogs of its own breed, crossbreeding can aim to increase diversity and health.

NOTE. However, crossbreeding does not mean the production of unregistered mixed-breed puppies, but a long-term, carefully considered project approved by the Kennel Club with extensively health-tested dogs.

The aim of this project is to launch a French Bulldog cross breeding-test project to gather information on the best opportunities to implement a French Bulldog health promotion crossbreeding.

The health of French Bulldogs is primarily affected by the extreme appearance of the breed, especially the short snout and corkscrew tail are associated with skeletal deformities.

French Bulldogs also have quite a variety of immunological problems, such as atopic skin and allergies. In addition to this, problems during birth are typical for the breed. Increasing hereditary variability through crossbreeding could also improve the vitality of the breed, although this goal requires a larger project than this test cross breeding project.

The population of French Bulldogs worldwide is very big, but the potential for influencing change throughout the breed (worldwide) is limited. The aim of this project is primarily to gather information about the opportunities brought by the crossbreed, to arouse both the Finnish and international French Bulldog community to cooperate, and to change attitudes towards crossbreeding projects. At present, the ideal of a purebred dog is cherished quite strictly, and those in favor of crossbreeds are in the minority. However, every effort must be made to promote the health of the breed.

Although many French Bulldog individuals live their lives actively, without symptomatically, health problems; problems that occur due to the structure of the breed are common and cannot be addressed effectively and quickly enough by more traditional means alone (such as the Pevisa program). Therefore animal welfare is a strong reason for crossbreeding.

The law for Animal welfare is being reformed in Finland and it is expected that the breeding of brachycephalic dogs will be addressed. In September, the Finnish Food Authority (fi. ruokavirasto) announced that it would introduce criteria for dogs to decide whether breeding meets the requirements of our animal welfare legislation. The criteria includes, for example, rules regarding the shape of an exaggerated short skull and skeletal growth disorders. A study commissioned by the Natural Resources Center of Finland (Luke) in collaboration with the Ministry of Agriculture and

Forestry (MMM) and the Finnish Food Authority (ruokavirasto) to reduce health problems in brachycephalic breeds suggests cross-breeding (Mäki and Kempe 2020, 7, 61).

Problems with dog breeding have also been noticed within the Kennel Club (Kennelliito). Harri Lehtonen, Chairman of the Board of SKL, stated in the Koiramme (eng. our dogs) magazine 7-8 / 2020 that crossing breeds is still needed to save problematic breeds.

Also around the world, the health problems of French Bulldogs and other short-nosed dogs speak for themselves. In the Netherlands, renewed legislation came into force in May 2020, setting strict boundary conditions for the breeding of short-nosed dogs.

The purpose of this project is to provide information to better prepare for future reformations.

Although Finnish educational work is small on a global scale, we have the know-how, competence and courage to be pioneers; our project is an example for that!

### What is missing from the breed and why do crossbreeding

#### In General

The aim is to reduce the health problems caused by exaggerated appearance. The primary practical goal is to improve the health of the breed by introducing dogs into the population with the normal form of the DVL2 gene. Although there is a commercial test for genetic mutation, it is initially worthwhile to use spinal health progress as a criterion. In addition, a key goal is to reduce respiratory syndrome (BOAS) due to brachycephaly. Progress can be measured through a walking test and upper airway narrowing studies, as well as by monitoring the development of the craniofacial ratio (CFR) in dogs. The goal is a French Bulldog who does not suffer from structural health problems and who lives a long life without skin or eye problems that make everyday life difficult.

#### What breed to choose for cross breeding?

In the first step, several breeds are selected as cross-breeding partners in order to consider which breed or breeds would be best to implement a larger-scale cross-breed.

## Criteria set for the breeds to be selected

### Health

- not a carrier of the DVL2 gene variant. The gene form occurs e.g. staffordshire bull terriers as well as american staffordshire bull terriers, therefore these breeds should be tested for this DVL2 gene if a partner was selected. However, back health could also be used as a criteria in choosing a partner. The intersection partner must have back images.
- For retrogens of the FGF4 gene, which causes chondrodystrophy and thus predisposes to septal degeneration, the breeds in which these gene forms occur must be genetically tested.
  - 18-FGF4RG causes chondrodysplasia on chromosome 18,
  - 12-FGF4RG causes chondrodystrophy and septal degeneration on chromosome 12, (Brown et al. 2017, <https://www.pnas.org/content/114/43/11476>)
- The skeletal health of selected breeds should be known over several generations, if possible, and individuals selected for crossbreeding should be screened for the most common diseases, such as patellar lysis, hip arthritis, and hereditary eye diseases.
- Target breeding programs can be used for breed selection if they are sufficiently comprehensive in terms of breed health.

### Character

- The French Bulldog is by definition a “sociable, lively and playful companion dog”. Maintaining positive traits is very important and the breed chosen must be a human-loving breed that is stress-free and adapts to the urban environment. Tenderness, alertness, sharpness, and outright aggression are undesirable characteristics.
- The results of the character tests as well as the breeding target programs can be used in the selection of the breed, if they are sufficiently comprehensive in terms of the nature of the breed.

### Looks

- In the first generation, the crossbreed will probably change the appearance of dogs quite significantly. In the testproject, it would be a good idea to use several different breeds as a crossbreeding partner, so that the first generation can show what kind of changes in appearance are likely. The aim is to restore appearance in a controlled way in crossbreeds, however, so that any health benefits achieved by crossbreeds are preserved.
- The breed to be selected must be the right size partner for the small breed. The selection must also take into account the need for easy reproduction, i.e. attention must be paid to the physiological characteristics of the male and female which may affect the success of birth.

- **Fur/coat:** The short-haired coat of French Bulldogs is easy to care for, which is one factor behind the breed's popularity. However, short hair is the dominant feature, i.e. hair length is corrected in backcrosses.

The selection of crossbreeding partners will make use of the above criteria and will select males for French Bulldog bitches, which are suitable cross breeding partners, especially in terms of health and character: individuals who have been studied to be healthy, long living and have a nice character. In appearance, the breeds are not exaggerated and are suitable for crossbreeding in terms of size and coat.

Which individuals are selected?

The choice of dogs to be used for breeding is influenced by the duration of the permitting process and the time of obtaining the permit.

The project is currently still in the process.

Questions and answers:

How are crossbreeds selected?

The breeds have not yet been finally selected, but we have found a few potentially suitable breeds. The starting point is health: the breed must be as healthy as the breed can be and the breed must not have similar health problems as the French Bulldogs. The character should suit the companion dog. In terms of appearance, the most important is the size suitable for a French Bulldog. The choice of breed should not be based on the appearance.

Why are the suggested breeds so different compared to the French Bulldog?

The choice of breed should not be based on the appearance. In crossbreeds of other breeds, it has been seen that the phenotype, i.e. appearance, is restored in backcrossing. Even large differences in appearance are not an obstacle. The most important thing is the health, temperament, and avoidance of the current health problems of the French Bulldogs.

How are crossbreed puppies registered?

The first crossbreed litter, i.e. the so-called f1-generation litter, is registered in the Finnish Kennel Club's EJ or so called no-breeding register. As the offspring grow, they are health checked and assessed to see if they have met the objectives of the crossbreeding plans. Individuals found to be suitable can then be transferred to the ER register, the Special Register, and these dogs may be used for French Bulldogs registered for crossbreeding. This next generation is called the f2 generation. Their offspring are initially registered again in the EJ register, from where they can be transferred to the ER register again after evaluation. This will be repeated until dogs

deemed fit and tested healthy in the f4 generation can finally be officially registered as French Bulldogs in the fci register.

The Finnish Kennel Club has also planned to make a separate crossbreed register, in which f-generation dogs would initially be registered instead of the EJ register.

Why do you want to produce mixed breed dogs?

Our crossbreeding project aims at an official crossbreeding with the permission of the Kennel Club (see more at

[https://www.kennelliitto.fi/sites/default/files/media/roturisteytysohje\\_o.pdf](https://www.kennelliitto.fi/sites/default/files/media/roturisteytysohje_o.pdf)).

Litters are registered like other purebred dogs, so they are technically representative of their breed, not mixed breeds.

Why a crossbreeding? Isn't Pevisa enough?

Pevisa and other official health research as well as other responsible education are a very important part of promoting breed health in addition to crossbreeding. As such, however, they are not enough to change the situation fast enough, if at all. The French Bulldog is one of the breeds in which all known mutations affecting the shape of the skull are present. In addition to this, the official back x-rays reveal that there are not enough healthy-backed individuals within the breed to heal the entire breed. Thus, hereditary progress cannot be achieved through traditional breeding, even if health could be promoted in individual combinations. The test project does not force any breeder to join, but each breeder can continue their own work as before. All work for health is important!

\*PEVISA=perinnöllisten vikojen ja sairauksien vastustamisohjelma=a program to combat hereditary defects and diseases

Is it possible that foreign breeding cooperations will stop when such plans become public?

We believe that in many countries there are some who think differently. We hope that Finns will be seen as pioneers with whom it is good to cooperate for the health of the breed.

Are the Kennel Club, the Finnish French Bulldog Association and the Finnish Association For Small Dogs involved in the project?

The Kennel Club's Breeding Science Committee is aware of our pilot project and has commented on the plans. We have also met with representatives of JTT, SRBY and SKKY in October 2020 and all these parties know about our plans. We have

submitted a proposal for the project to SRBY's annual meeting on March 03/21, after which it will be clear whether the association is also involved in a more official role. We hope for the widest possible cooperation with all parties, and we have also been in contact with the breed's homeland in accordance with the advice received at the meeting mentioned above.

Who is producing the crossbreed litter?

The crossbreed litter (s) can be done by a breeder or breeders who have joined us and are serious and passionate about the issue. Each crossbreed litter is the breeder's own and ultimate responsibility and the decision-making also belongs to him. The breeder should be able to commit to the project for several generations and do follow-up reports, health examinations, and also withstand adversity.

Who pays the costs?

The litters are done by the breeders involved in the project, at their own expense. We hope to get financial help for health research, for example from the University of Helsinki's Veterinary Medicine Fund or other foundations. You can also apply for funding from the Kennel Club for breeding inspections and health examinations of crossbreed puppies, for example.

Is it intended to change the appearance of the French Bulldog permanently?

Since the health problems of French Bulldogs are related to the extremes of its appearance, it is clear that the appearance of the breed needs to change.

Backcrossing aims at a controlled restoration of appearance, however, under healthy conditions.

How do I get involved?

Send an e-mail to [roturisteytys@gmail.com](mailto:roturisteytys@gmail.com) or visit the FB website at <https://www.facebook.com/groups/445132822763628> and let us know your intentions.

What breeds have been considered for the project?

We are currently thinking about potential breeds for the project. The task is not easy, but we have narrowed down a few seemingly suitable breeds, which we will now explore in more detail.

The criteria are, in particular, the health status of the crossbreed (a breed that is as healthy as possible, which does not have the same problems as the French Bulldogs). The size of the partners must also be suitable for French Bulldogs and by nature the breed must also be suitable as a partner for the companion dog breed. The breeds on

this page are only ideas for possible breeds for the cross breeding project with the French Bulldog, no final decision has been made yet.

It should be mentioned that the dog should not be a carrier of the DVL2 gene variant. The breeding partner must also have back x-ray images. Back health is used as one of the important criteria in choosing a partner.

For retrogens of the FGF4 gene, which causes chondrodystrophy and therefore predisposes to septal degeneration, the breeds in which these gene forms are present must be genetically tested.

All possible combinations will be carefully reviewed with the Kennel Club's Breeding Scientific Committee and the necessary health examinations will be performed on the partner candidates before final decisions are made.

If you wish, you can still suggest a breed that you think might be worth considering. You can send the proposal by e-mail to [roturisteytys@gmail.com](mailto:roturisteytys@gmail.com) or suggest it on Facebook in the French Bulldog Breeding Project group.

Breeds considered:

Icelandic Sheepdog

Manchester Terrier

Beagle

Shiba

Danish-Swedish farm dog

Border Terrier

Icelandic Sheepdog

Health

According to the Icelandic Sheepdog Breeding Target Program (JTO), "The Icelandic Sheepdog is a healthy breed that usually lives long lives.

Most Icelandic sheepdogs live to be 14-15 years old and even 20 years is not uncommon. One of the most common inherited defects / diseases in Icelandic sheepdogs is hip dysplasia. Reproduction is possible under normal circumstances, usually males mate without help and most females give birth themselves. "

In the breed presentation of the Icelandic Dogs-Islandshundarna ry's website, the most common hereditary defects in Icelandic sheepdogs are hip defects, hereditary eye diseases are cataracts and distichiasis are occasional, while testicular defects and tooth defects are quite common. The breed also has some rare diseases, such as kidney failure.

The hips, eyes and knees of Icelandic sheep dogs are examined in the PEVISA program.

During the last 15 years (2005-2020) the hips have been examined in 61% of Finnish Icelandic sheepdogs with the following results: A 45%, B 30%, C 18%, D 6%, E1%.

Thus, in terms of hips, finding a healthy Icelandic sheepdog as a crossbreeding partner does not pose major problems. Similarly, for patellar luxation, there are many dogs studied as healthy (54% studied, of which 0: 94%, 1: 4%, 2: 1%; 3-4: 0%).

There are fewer statistics for the back: for spondylosis, only 3% of Finnish Icelandic sheepdogs have been examined, all with a score of 0. The back does not appear in the cause of death statistics in particular: of all those reported (117), only one is reported to have died of spinal disease. Otherwise, the back examinations of recent years say the following

2019: 23 dogs examined, five of them LTV1 result, otherwise (SP, VA) healthy

2018: 7 dogs studied, one LTV1 result

2020: 10 dogs studied, LTV1 x 3, otherwise healthy.

There are no IDD results in Icelandic sheepdogs at all. Any partner used for crossbreeding must be dorsal and only those who have been studied to be in good health may be used as partners.

## Size

The breed definition states that the ideal height is 42 cm (females) and 46 cm. (males). Weight approx. 9.1-14kg, is about the size range of French Bulldogs.

## Character

The character and purpose are described as follows: “an obstructive and agile shepherd dog working through barking. Very useful when herding or driving cattle in pastures, mountains or searching for lost sheep. Very alert in nature and always welcomes guests without being aggressive. The hunting drive is not intense. Happy, friendly, curious, playful and fearless.” The website of the Icelandic Sheepdog Association mentions the breed as an excellent family dog.

Grounds for selection: A long-lived breed with minor and manageable health problems. The health problems are not similar to those of French Bulldogs.

Appearance exaggerated and size suitable, although a little bigger. Character suitable for a companion dog.

## Sources:

- <https://islanninkoirat.fi/islanninlammask.../rotumaaritelma/>
- <https://islanninkoirat.fi/.../islanninlammaskoirien-terveys/>
- JTO: <https://islanninkoirat.fi/.../jto...>
- Koiranet: <https://jalostus.kennelliitto.fi/frmEtusivu.aspx?R=289>



Behind the project:

Experts

Anu Lappalainen

ELT, docent, specialist for diseases in small pets / University of Helsinki, Faculty of Veterinary Medicine

Katariina Mäki

Breeding expert in the Finnish Kennel Club. Katariina Mäki has been awarded, together with researcher Riitta Kemppe, the Animal Welfare of the Year Award for her dog breeding study, which presented the boundaries and means of intervening in breeding in violation of the Animal Welfare Act.

Katariina's area of expertise at the Kennel Club includes breeding strategy, breeding indices, DogWellNet, short-nosed breed health, heart disease and neurological diseases.

I have been interested in dog breeding and well-being professionally since 1997, when I started my master's degree in hip and elbow defects in rottweilers and gave my first lecture about dog breeding. I did my dissertation on the heredity and breeding of dogs' hip and elbow joints and inbreeding (<https://helda.helsinki.fi/handle/10138/20742>), Katariina says.

In September, the Finnish Food Authority announced that it would introduce criteria for dogs to assess whether breeding meets the requirements of our animal welfare law. The criteria relate, for example, to the shape of an exaggerated short skull and to skeletal growth disorders. The French Bulldog is one of the breeds in which all known mutations affect the shape of the skull (SMOC2, BMP3, DVL2, FGF4). This means that there do not seem to be enough dogs inside the breed whose characteristics meet the breeding requirements of our Animal Welfare law. In addition, there are spinal changes and disc degeneration in the breed. Back disease was the cause of death for every sixth Finnish French Bulldog in 2010-2019 (Kennel Club breeding information system). The average lifespan of these dogs was five years. Interstitial degeneration is associated with the FGF4 retrogene on chromosome 12. The prevalence of this retrogene in the 2019 study of Batcher et al. Was 94%, which means that it occurs practically in every bulldog. Due to these mutations that adversely affect the welfare of dogs, crossbreeding with dogs of other breeds is

required for breeding the French Bulldog. This project is a great opportunity to find out what kind of crosses can be used to continue breeding in our country.

Saija Tenhunen

I am currently working with Nordic dairy cows. My field of work is inbreeding management in our dairy cow populations and also inbreeding research. I have a Masters degree: Agronomist and processing of livestock genetics (agronomist). The topic close to my heart is mainly the breeding of animals of small populations and crossbreeding as one tool to solve this problem. The dog breed I have had has long been Akita, which also led to my current career path. The breed has several autoimmune diseases, one reason for that is the narrow hereditary variability and high inbreeding in the population.

The French Bulldog is not so familiar to me as a breed, but I support every crossbreeding project in dogs.

At least I am in favor of cross breeding and the reasons for the need for the project are very clear. A single non removable mutation in a population is sufficient to justify the need for crossbreeding. The breed has several problems and little variation. Some can be made better by refining, but it would require several generations of long-term work. It is also necessary to consider how this also affects the quality of life of dogs before breeding can be improved.

## Breeders

The

Kennel Ajwande, Niina Parviainen

Kennel Blessed Beast's, Meiju Kangaskorte

I work as an administrator in dog shows and study the Vocational Qualification in Animal Care, from which I will graduate in spring 2021, I sell animal insurance for my work. I did the "breeder's basic course" in January 2017, I got the kennel name in June 2017 and I went to the "breeder graduate course" in autumn 2019. I breed Bullmastiffs and Central Asian dogs, I do not know yet will I ever breed French bulldogs due to their current health status.

Sure, I also have French Bulldogs, but my first French Bulldog has shown several skin symptoms and an allergy test showed it to be multi-allergic and does not only suffer from atopy. Unfortunately, skin problems are very typical of the breed. We also have a second Frenchie who is co-owned with a French bulldog breeder. The mother of this naturally born male has so far the only spine of French Bulldogs described as completely healthy in Finland.

However, despite his many problems, the French Bulldog is an absolutely wonderful breed and I want to believe that the breed still has a good chance to become healthier. I hope that the health of this breed can be improved by all means and that natural birth will no longer be rare in French Bulldogs.

Kennel Catastrofico, Satu Isoräsy

I got my kennelname in 2008. I was interested in livestock guardian dogs and Spanish mastiffs at that time. Along with the breed, I got to experience the work of the breeding committee, and its government, as well as the problems of breeds with a small population. My first French Bulldog litter was born in 2011. The breed as a whole convinced me to join.

In my childhood home, I got to know five different dog breeds over the years. My father raised hunting dogs, which certainly influenced my interest.

I got my first dog when I was about 10 years old. In adulthood I bought my first dog for myself about 20 years ago. I have owned livestock guardian dogs and frenchies in addition to hunting dogs (eg. Basset Gascon, and German Hunting Terrier). We currently have a Grand Gascon Saintongeois, a Petit Brabancon and two retired French Bulldogs.

I joined the project because over the years I saw extensive breeding problems (back, breathing and childbirth, bones, mating, allergies, etc.) and I hope that this might lead to, that one day, we will be able to see better results in several of those problematic areas.

Kennel Front Row's, Anne Åkerblom

I have been breeding dogs since -86. I got the kennel name in 1985. I got the Vuolasvirta Award No. 379 -97. I received the Finnish Dog Breeders Award on February 24, 2007. I have done the Kennel Club breeding training 14.1.-96, and follow-up training in 2000 and 2006. I have had microchips in my dogs since 2008. I have bred and have been actively indulged in several breeds. The future of the kennel will continue in the hands of my daughter as my own strength diminishes. I'm involved in this project because I'd like French Bulldogs to be healthier in the future. By no means do I intend to make only crossbreed puppies, I intend to make only one litter, from which will then be continued to breed french bulldogs.

Kennel Keijukelmin, Minni Munne

I'm Minnie Munne. A nurse and soon to be a nursing teacher. I always think of my development and trade as an expert in the development of various projects and

initiatives. Continuous development is a way of preparing for the future. Whether it was working life, hobbies or responsible dog breeding.

I am a new breeder and we just received the first, well-balanced litter. I have been involved in dogs and horses for more than 40 years. I came across the first French Bulldog already while living in Africa, where I volunteered for R.S.P.C.A in animal welfare for two years. I was already interested in the breed back then, but I still allowed myself to wait until 2013, when I got my first French Bulldog Osmo. Osmo was an imported dog who came from Latvia. Without papers though. My understanding was not enough for the challenges of the breed at the time and so I got to experience it all on my own. Acquisition of information has been an essential part of my work and I have always tried to work within the framework of evidence-based nursing. I set out to study the health status of French Bulldogs, at a very active stage when my own late dog was suffering from severe brachycephalic syndrome, allergies, and skeletal dysfunction.

In my future breeding work, the health of the breed and taking it forward are the values and ethical foundations on which I want to base my breeding. Breeding health-tested dogs and improving the quality of life in French Bulldogs is the gem of my kennel and how I want to breed in the future. Health challenges of the breed have to be resolved and that's why I'm also interested in the cross breeding project - along with pevisa . To get a French bulldog in the future, which develops properties sufficient to cope with catastrophic health challenges that already exist. For me, the French Bulldog is a very dear breed and especially in breeding, more than just appearance should be considered.

I am volunteering in "Heinola Lake Rescuers" and I am also a member of the Board of Directors of the association. I also enjoy reading and music.

I joined the project because the appearance of the breed has led to a breed with significant health problems. The change in the muzzle has been rapid and steep. Just a few decades ago, even a French bulldog still had a nose. In the Netherlands, the law led to changes. There, the goal of breeding is that the length of the muzzle is 30 percent of the length of the skull. What is desired and in what order the change will take place is relevant. The goal is a healthy, well-boned and well-breathing individual.

**Kennel Presentime, Jukka Lohi**

**Kennel Sammakoprinssin, Jenni Nikkilä**

**Kennel Team Bullheads, Tea Mellin**

## Enthusiasts and other people

### Laura Nissin

I am a forty-something woman from Helsinki, a couple of years been a frenchie person and postdoctoral researcher from the University of Helsinki. I became a dog person in adulthood; when my life situation finally allowed me to get a dog, I ended up with a small but large-sized French Bulldog, and in 2011 I got my first Frenchie of my own, Pixie (Unikkibullan Rowena Korpinkynsi). Pixie went already over the rainbow bridge, exhausted by many diseases. Due to Pixies illness I became familiar with the Frenchies health situation in depth. I have been SRBY's Board of Directors, as well as in the breeding committee, among others. Writing about the breed in JTO, where I will prepare a report on breed health issues. I thought and hoped for a long time that the health of the breed could be promoted by means of traditional breeding alone, as long as all means were put in place. However, it is now clear that this is not enough, and that even more radical action is needed, of which cross breeding is the most significant one.

### Mirka Peränen

I have been a dog person at all times and I had a french bulldog since 2011. Frenchies are very important to me as a breed and I am involved in the project, because I think that this is the way towards a healthier French Bulldog. It is an indisputable fact that a breed needs more variation in its gene pool.

I am an expert in genetics and spend ten years as a researcher at the University of Oulu on collagen gene research. Although I do other work these days, dog genetics is close to my heart. Contribution to this project does not involve the actual breeding work, but I am involved as a private person / expert.

Auxiliary breeders and enthusiasts from outside the breed are also offering their help and support to the project.

### Partners

The Finnish Association for Animal Welfare  
Finnish Kennel Club

What is the current health situation of the French Bulldog?

The health of French Bulldogs is primarily affected by the extreme appearance of the breed, especially the short muzzle and skull, called brachycephaly, which causes breathing problems.

There are many skeletal deformities in the breed: almost every French Bulldog has abnormal changes in the spine. French Bulldogs also have quite a variety of immunological problems, such as atopy and allergies. In addition to this, birth problems are typical of the breed. From the beginning of 2021, the program Pevisa was started for the French Bulldogs. Pevisa prescribes mandatory health examinations for breeding dogs. The French Bulldog Pevisa includes an official veterinary eye, knee and heart examination as well as a spine examination, the X-rays of which are sent to the Kennel Club for evaluation.

Only litters that have been tested and meet the health goals can be registered in the Finnish Kennel Club.

Pevisa and cross breeding go hand in hand, supporting each other, even before Pevisa, French Bulldogs were studied relatively well, hopefully even more extensively in the future.

### Spine

Official bone scans reveal that almost all French Bulldogs have deformed vertebrae that predispose the dog to painful spine diseases. In addition to vertebral changes, the spine x-ray images of French Bulldogs show that several dogs also have calcified septum, spondylosis, and intermediate lumbar sacral vertebrae.

Spine disease were the cause of death for every sixth Finnish French Bulldog in 2010-2019.

The average lifespan of these dogs was five years.

(sources: Kennel Club Breeding Information System, French Bulldogs JTO).

According to a genetic study published in 2018, skeletal malformations are caused by a mutation in the DVL2 gene (Mansour et al. 2108 doi: [doi.org/10.1371/journal.pgen.1007850](https://doi.org/10.1371/journal.pgen.1007850)).

According to the study, all French Bulldogs are homozygous for this particular mutation the gene form obtained from both parents is the same.

This gene is also suspected to be associated with the corkscrew tail of French bulldogs. The tail is typically very short as well as stiff, and often twisted. Corkscrews can cause dermatitis and bowel problems. Ingrown tails are possible too.

An almost non-existent tail makes it difficult for the dog to communicate with other dogs as well.

Spinal disc herniation is associated with the FGF4 retrogene on chromosome 12. According to studies, the prevalence of this retrogen is 94%, that means nearly every dog of the breed has this gene (Batcher et al. 2019, doi: <https://doi.org/10.3390/genes10060435>).

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12 FGF4 retrogene causes chondrodystrophy.

Chondrodystrophy is known to be associated with spinal disc disease (IVDD), causing disc degeneration. As it decomposes, the soft core of the spacer turns into a hard calcified mass. The nucleus can rupture and bulge toward the spinal cord, causing a disc herniation with symptoms of severe pain, nervous disturbances, and even paralysis.

12 The FGF4 retrogene is currently being studied by the Finnish French Bulldog Association, so in the future we will hopefully know more about the subject.

Respiratory problems

French Bulldogs are short-nosed, so called brachycephalic breed. A very short muzzle exposes dogs to serious health problems. The most well-known of these problems are related to respiration and thermoregulation (BOAS).

Respiratory problems are caused by a soft palate that is too long and / or thick for normal oxygen supply, a trachea that is too narrow, inflamed and swollen tonsils and narrow nostrils or/and nasal crusts.

Breathing problems affect a dog's oxygen intake and it's endurance. A dog with BOAS symptoms breathes faster than other dogs and recovers more slowly. As it accelerates, its breathing rumbles, in severe cases the dog might even faint. The thermoregulation of a BOAS-symptomatic dog is also weaker than normal, making French Bulldogs more susceptible to a heat stroke than other breeds.

The short muzzle of French Bulldogs also typically includes narrow nostrils and nasal shells, which make it difficult for oxygen to be absorbed through the nose, causing the dog to squeal or throb when breathing. While sleeping, the dog may snore heavily and sleep may be intermittent, causing sleep apnea. Dogs are unable to sleep with their mouths open, so at worst, a dog cannot sleep at all without constant distress and a feeling of suffocation.

## Eyes

French bulldogs have a variety of eye diseases, the most common of which are the cherry eye, where the lacrimal gland slips out of the corner of the eye and that bulging gland can become irritated and swollen. Distichiasis, or lashes rubbing against the cornea of the eye. Macropblepharon, too large eyelid, which prevents the eye from adequately protecting the eye. Entropion, as a result, the dog's eyes bleed more than normal.

The short-skull is also strongly linked to ocular diseases: ocular brachycephalic syndrome (BOS). It predisposes the eyes to dryness and painful corneal ulcers. French Bulldogs have large, protruding eyes, which further increases the risk of eye damage.

The dog explores the world with its muzzle. When the muzzle is not protecting the eyes, they are more prone to damage.

## Teeth

Shortness of breath also causes dental problems: a dog's teeth do not fit in a straight line in its mouth and might grow overlapping. This can make it harder to eat and cause pain. Poorly set teeth are prone to collect bacterial colonies and cause infections. French Bulldogs also typically have an underbite, and often the front teeth tend to oscillate and fall out, especially in older dogs.

## Autoimmune diseases

French bulldogs commonly have a variety of autoimmune diseases such as atopy, allergies, stomach and intestinal problems, and other hypersensitivity and resistance problems. These can cause itching, stinging, redness and / or induration of the skin, flaking, yeast infections, hair loss, scabs, scarring, vomiting, loss of appetite, heartburn, diarrhea, flatulence, abdominal pain and other problems affecting the quality of life of the dog.

In the face, French Bulldogs typically have skin folds that can collect bacteria and cause inflammation. Large skin folds may even rub against the dog's eye.

## Mating

Most French Bulldog litters are born by c-section. Reasons for this include that a puppy's head and chest are often too big. Many breeders don't want to try natural birth due to a poor prognosis of success.

The litters are generally normal size. Bitches take good care of their puppies and milk production is sufficient.



French Bulldog males are generally motivated to mate, but a barrel-shaped chest and short limbs can make the act more difficult to succeed. Often a human must help a male to enter by supporting it, holding the bitch, and guiding the penis into the vagina. Artificial insemination is also done.

Breathing problems can also make it difficult and a poorly breathing dog may run out of fitness.

Bulldog puppies produce more puppies with a cleft palate than other breeds. Puppies suffering from hydrocephalus are also more common in bulldogs.

### Joints

Although the hip situation of the French Bulldogs is not as alarming as that of the English Bulldogs, the hip results of the officially described French Bulldogs also show some of the worst results on the scale (D-E).

However, it would be useful to have more information on the hip and elbow statistics of the breed; this could be done, for example, by adding hip and elbow examinations to the French Bulldog pevisa program, as well as encouraging dog owners to photograph their dogs.

Hip dysplasia, or hip failure, can cause a dog to have an osteoarthritis or dislocation of the hips. These include among other things pain, inability to move and jump. Moving with sore limbs can also cause the dog foot defects and thus muscle stains.

Between 2010 and 2020, 645 French bulldogs were hip-photographed.

The most common hip result was C (41%), followed by B (27%) and D (21%). A result was obtained by 7% of those described, and E by 4%.

Elbow growth failure, patellar luxation, or heart defects do not occur more in the breed than in other dog breeds, and it is not desired to add these to the breed through crossbreeds. Dogs used for crossbreeding must have skeletal images and only dogs with healthy hips may be selected for crossbreeding. The same goes for other health studies.

The French Bulldog is one of the breeds which has all known mutations affecting the shape of the skull (SMOC2, BMP3, DVL2, FGF4). Thus, it is not possible to find enough genetic variation within a breed to allow hereditary progress for these genes through traditional breeding. Indeed, cross breeding seems to be the only way to bring a healthier structure to the breed.

Cross breeding is aimed at ways to significantly reduce diseases caused by an exaggerated breed type. Increasing hereditary variability through racial crossing could also improve the vitality of the breed, although this goal requires a larger crossing project than this test project.