
Behaviour of Dogs and Effect of Genes into their Behaviour

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Abstract

Different animal behaviour are important in the assesment of their needs. In human life compare to the other animals dogs are very close to human and share their life. The first domesticated animal was dog. Today the dogs are admire for their special ability such as guarding, fighting, hunting, as pets or companian animal. In total there are over 200 dog breeds according to AKC. All of them is a member of one of 7 groups or another group known as "miscellaneous". Genetically, dogs can be classified in four clusters. The genetics and learning have form together behaviour. Different behaviours heredity has been determined. For example; it is believed that the neurotransmitters have an role in aggression. But most of the scientist agreed that the breed differences have an role in behavioural differences as well. The researchers summarized that; some genomic regions have linked to phenotypic variation reasoned from huge reduction in genetic variation or population differentiation in dogs. They also indicated that the reduced haplotype diversity within the genome in dog breeds are the result of both genetic drift and selection. Because the behavioural characteristics are heritable can be effected by breeding purpose. Comparison of the these allele frequencies among the breed groups showed a decreasing or increasing sense in the number of repeats; determining the highest genetic diversity within the ancient breeds and the lowest for the most recent mountain breeds, indicating canine domestication period between ancient and recent breed.

Key Words: Behaviour, Dog, Welfare, Gene and Domestication.

Introduction:

Because the domestic animals surrounding environment designed by human, their behavioural needs will think about by human as well. It was reported that the amendment of their environment resulted with animal welfare which is important not only ethical issue also important economic basement as well. Environmental therapy will effect animals behaviour with exhibiting more normal activities rather than anormal behaviour. Different researchers indicated that; environmental enhancement have an positive effect on behaviour and welfare; causing to much improvement in vital mechanism such as better feed consumption.

Normal behaviours are sign of animal welfare. But normal behaviour are not enought for the signal of welfare. Because the quality and quantity of normal behaviours are also important for the welfare (Tölü et al., 2016).

Different animal behaviour are important in the assesment of their needs. In human life compare to the other animals dogs are very close to human and share their life. In modern countries they live together and important to understand the dogs behaviour. To understand dogs behaviour are important for the dog itself, the owner and the whole community as well. Because the behavioural characteristics are heritable and can be effected by breeding purpose. The first domesticated animal was dog. It was reported that the dogs were present in

the Far East and in Europe about 15,000 years ago, but doesn't know exactly when and where this domestication occurred. The closest animal to dog is grey wolf. It is believed that the domestication affected behaviour and created some changes towards human.

There are 19 recognized genome regions which include genes related to brain function, used in domestication studies. Today the dogs are admired for their special abilities such as guarding, fighting, hunting, as pets or companion animals.

The dogs classification made according to American Kennel Club (AKC):

In total there are over 200 dog breeds according to AKC. All of them are a member of one of 7 groups or another group known as "miscellaneous". This classification was made on the basis of their originated breeds and their breeding aims. (American Kennel Club, 2017).

1-Sporting Group: This group includes dogs bred for helping to human in fowling. Such as; American Water Spaniel, Cocker Spaniel, Pointer, Golden Retriever etc.

2-Hound Group: These groups of dogs are good at hunting or chasing with their visual and smelling advantages. Such as; Afghan Hound, Bloodhound, Whippet etc.

3-Working Group: These groups of dogs were bred for different aims like herding, protection or carry of packs. Such as; Siberian Husky, St Bernard, Rottweiler, Newfoundland etc.

4-Terrier Group: These groups of dogs were bred for hunting of harmful animals (like rodents). Such as; Bull Terrier (English), Australian Terrier, Scottish Terrier, Irish Terrier etc.

5-Toy Group: Toy groups of dogs were bred for playfulness and friendship with human. Such as; Chihuahua, Miniature Pinscher etc.

6-Non-Sporting: This group includes dogs that are not included in other groups or bred for other purposes. Such as; Chow Chow, Dalmatian, Boston Terrier, Poodle etc.

7-Herding Group: This group of dogs were bred for work together with farm animals. Such as; Belgian Malinois, German Shepherd Dog, Border Collie etc.

Miscellaneous Class: This class of breeds are not classified exactly. The American Kennel Club is working on their official classification currently. These groups of dogs can join into competition and win prizes. Such as; Anatolian Shepherd, Havanese, Australian Kelpie, Lowchen, Italian Spinone.

Picture

(<https://retrieverman.net/2012/07/11/classifying-the-rottweiler/>)

The genetics and learning have formed together behaviour. Different behaviours hereditary has been determined. For example; it is believed that the neurotransmitters have a role in aggression. However the gene that is responsible for aggression is not fully determined. But most of the scientists agreed that the breed differences have a role in behavioural differences as well. Genetically, dogs can be classified in four clusters. The most distinct ones are the Asian breeds: Chow, Akita, and sled dogs, such as the Husky. The second cluster formed with the guard dogs, mastiffs, bull dog, boxer and Bernese mountain dog. The third cluster includes herding breeds, the collie, and Shetland sheepdog, and some of the sight hounds, like the greyhound. The last cluster comprises the modern hunting breeds including gun dogs, hounds,

and terriers (Parker and Ostrander., 2005).

Picture

(Vaysse et al., 2011).

More than 170,000 SNPs were genotyped from 46 diverse dog breeds and wolves using the Canine HD array. Neighbor-joining tree formed from raw genetic distances showing relationships between samples. (Vaysse et al., 2011).

The common dog behaviours are: Aggression; barking; destructive chewing; food guarding; howling; mounting and masturbation; mouthing, nipping and play biting in adult dog; mouthing, nipping and play biting in puppies; separation anxiety; whinning.

Aggression: is the most common behaviour and can be problematic. The aggression can be classified as; Territorial Aggression, Protective Aggression, Possessive Aggression, Fear Aggression, Defensive Aggression, Social Aggression, Frustration-Elicited Aggression, Redirected Aggression, Pain-Elicited Aggression, Sex-Related Aggression, Predatory Aggression.

Barking: is a kind of of vocal communication form for dogs. The barking can be classified as; Territorial Barking, Alarm Barking, Attention-Seeking Barking, Greeting Barking, Compulsive Barking, Socially Facilitated Barking, Frustration-Induced Barking, Illness or Injury or Separation-Anxiety Barking.

Destructive chewing reasons are; Separation Anxiety, Fabric Sucking and Hunger.

Food guarding: Guarding possessions from humans or other animals is normal behavior for dogs. Some guard stolen items, such as food wrappers from the trash can or socks. Some dogs only guard chew bones or toys. Many dogs guard food.

Howling is another form of vocal communication used by dogs. Dogs howl to take attention, to make contact with others and to announce I am here. Some dogs also howl in response to high-pitched sounds, like emergency vehicle sirens or musical instruments.

Mounting, thrusting (humping) and masturbation are normal behaviors exhibited by most dogs. The reasons of this behaviour are; Sexual Behavior, Play Behaviour, Response to Stress or Excitement, Compulsive Disorders or Social Behaviour.

Most mouthing is normal dog behavior. But some dogs bite out of fear or frustration, which means there is a problem with aggression. It's sometimes difficult to tell the difference between normal play mouthing and with a familiar aggressive behavior.

Puppies spend a great deal of time playing, chewing and investigating objects. All of these normal activities involve puppies using their mouths and their teeth. When puppies play with people, they often bite, chew and mouth on people's hands and clothing. This kind of behavior may seem cute when your puppy is small, but when is getting bigger then it can be a problem.

Common Symptoms of Separation Anxiety are; Urinating and Defecating, Barking and Howling, Chewing, Digging and Destruction, Escaping, Pacing, Change of Guardian or Family and Coprophagia.

Whining is a kind of canine vocal communication. The reasons are; Appeasement Behavior, Greeting Behavior, Seeking Attention, Injury or Medical Condition and Anxiety. (<https://www.aspc.org/pet-care/dog-care/common-dog-behavior-issues>).

The problematic dog behaviours are: Biting; bad breath; circling; digging; eating poop; head pressing; panting; sitting on your feet or between your legs; scooting; urinating; yawning and anxiety.

Biting: This usually happens while playing, aiming communication. Dogs bite out of anxiety, fear, or aggression.

Anxiety: The dog may become fearful when left alone.

Yawning: you might think he needs some sleep, a dog yawn doesn't usually mean he's tired. He may be interested in napping, but he could also be showing a sign of fear or stress.

Urinating: If the dogs suddenly begin urinating this indicate that something may be wrong. It can be a sign of such as urinary tract, bladder, or kidney infection. In an older dog, it may even be a sign of dementia as well.

Scooting: it means there's something irritating your dog's anus. The reasons for that allergies or it can be a worms as well.

Sitting on your feet or between your legs: This is mostly a sign of anxiety or nervousness.

Panting: Dogs try to decrease their body heat from their mouths. But sometimes panting comes from dogs' pain. It has to be careful with its pain and temperature.

Head pressing: is a common sign of numerous serious problems, such as toxic poisoning or brain disease.

Eating poop: Dogs eat feces for many reasons; such as their fear.

Digging: Dogs dig for many reasons: like to track animals, to escape, to make a cool spot to lie, or to hide something.

Circling: If the dog continuously in circling situation, this can be with some health issue; such as idiopathic vestibular syndrome, poisoning or a brain tumor.

Bad breath: If there is any changing in dog's breath may be reasoned from gastrointestinal tract, liver, or kidney problem. (<https://www.hillspet.com/dog-care/behavior-appearance/types-of-common-dog-behavior>).



https://www.doglistener.co.uk/language/language_canine.shtml

The dogs role in society are hunting and Flushing ability, Service and Assistance Work, Therapy Work, Search and Rescue, Herding, Sled Dogs, Mascots and entertainment, Guarding/Watchdog, Racing, Detection Dogs, Carting and Rat Extermination.

Different measurement methods are present; the Herding Trait Characterisation (HTC) was a noncompetitive method, which is not using anymore. Based on; how dogs expressed a number of traits accepted important for herding ability.

The second one; is English Setter field trial (ES FT). In tis method; the hunting traits measured. The English Setter is a pointing dog and used mainly for hunting grouse.

The third one is the Swedish Armed Forces temperament test (SAF TT). It is a test battery including 12 standardized subtests. In the score sheet the “behavioural ratings” (BR), and the “subjective ratings” (SR) are seen, and evaluation based on the judge’s observations and their objectivity in rating of displayed behaviour in subtest.

The fourt one is the Dog Mentality Assessment (DMA) and an extended version of the Canine Behavioral Assessment and Research Questionnaire (C-BARQ) test. The DMA test was based on ten standardized subtests. In score sheet 5-step scales for 33 behavioural reactions are evaluated. The C-BARQ test contained 80 questions. In the questions, the dog owner come a cross to rate their dog’s typical behaviour on the basis of the frequency of certain behaviours (Never – Seldom – Sometimes – Usually – Always) or the intensity of the behaviour in precise situations (e.g., “No aggression: No visible signs of aggressive behaviours” to “Serious aggression: Snaps, bites or attempts to bite (Arvelius, 2014).

In the evaluation of dogs for determination of their breed aim the Volhard Puppy Aptitude Test, or PAT can be used. PAT based on ten test with a scoring system from 1-6. Each test is scored separately, and interpreted according to its own criterias.

The tests are respectively:

1. Social Attraction - degree of social attraction, dependence or confidence.
2. Following – degree of ---- a person.
3. Restraint - degree of dominant or submissive tendency.
4. Social Dominance - degree of acceptance of social dominance.
5. Elevation - degree of accepting dominance with no control.
6. Retrieving - degree of willingness to do something for you.
7. Touch Sensitivity - degree of sensitivity to touch.
8. Sound Sensitivity - degree of sensitivity to sound.
9. Sight Sensitivity - degree of response to a moving object.
10. Stability - degree of startle response to a strange object.

Test	Response	Score
SOCIAL ATTRACTION	Came readily, tail up, jumped, bit at hands and pawed, licked at hands Came readily, tail up and tail down Came hesitantly, tail down and Didn't come at all.	1 and 2 3 and 4 5 and 6
FOLLOWING	Followed readily, tail up, got underfoot, bit at feet Followed readily, tail up and tail down Followed hesitantly, tail down and Did not follow or went away	1 and 2 3 and 4 5 and 6
RESTRAINT	Struggled fiercely, flailed, bit and flailed Settled, struggled, with some eye contact and Struggled, then settled No struggle and No struggle, strained to avoid eye contact	1 and 2 3 and 4 5 and 6
SOCIAL DOMINANCE	Jumped, pawed, bit, growled and Jumped, pawed Cuddled up to tester and tried to lick face and Squirmed, licked at hands Rolled over, licked at hands and Went away and stayed away	1 and 2 3 and 4 5 and 6
ELEVATION DOMINANCE	Struggled fiercely, tried to bite and Struggled fiercely Struggled, settled, struggled, settled and No struggle, relaxed No struggle, body stiff and No struggle, froze	1 and 2 3 and 4 5 and 6

RETRIEVING	<p>Chased object, picked it up and ran away and stood over it and did not return</p> <p>Chased object, picked it up and returned with it to tester and returned without it to tester</p> <p>Started to chase object, lost interest and Does not chase object</p>	<p>1 and 2</p> <p>3 and 4</p> <p>5 and 6</p>
TOUCH SENSITIVITY	<p>8-10 count before response and 6-8 count before response</p> <p>5-6 count before response and 3-5 count before response</p> <p>2-3 count before response and 1-2 count before response</p>	<p>1 and 2</p> <p>3 and 4</p> <p>5 and 6</p>
SOUND SENSITIVITY	<p>Listened, located sound and ran toward it barking and walked slowly toward it</p> <p>Listened, located sound and showed curiosity</p> <p>Cringed, backed off and hid behind tester and Ignored sound and showed no curiosity</p>	<p>1 and 2</p> <p>3 and 4</p> <p>5 and 6</p>
SIGHT SENSITIVITY	<p>Looked, attacked and bit object and put feet on object and put mouth on it</p> <p>Looked with curiosity and attempted to investigate, tail up and tail down</p> <p>Ran away or hid behind tester and Hid behind tester</p>	<p>1 and 2</p> <p>3 and 4</p> <p>5 and 6</p>
STABILITY	<p>Looked and ran to the umbrella, mouthing or biting it and walked to the umbrella, smelling it cautiously</p> <p>Looked and went to investigate and Sat and looked, but did not move toward the umbrella</p> <p>Showed little or no interest and Ran away from the umbrella</p>	<p>1 and 2</p> <p>3 and 4</p> <p>5 and 6</p>

The scores are interpreted as follows:

Mostly 1's - : Strong desire to be pack leader and to be aggressive to people and other dogs and will bite. Not good with children.

Mostly 2's - : Also has leadership aspirations. May be hard to manage and has the capacity to bite

Mostly 3's : Can be a high-energy dog and may need lots of exercise. Good with people and other animals

Mostly 4's : The kind of dog that makes the perfect pet. Best choice for the first time owner. Easy to train, and rather quiet.

Mostly 5's : Fearful, shy and needs special handling. Will run away at the slightest stress in its life. Best for a quiet, elderly couple .

Mostly 6's : So independent that he doesn't need you or other people . Doesn't care if he is trained or not - A great guard dog for gas stations!

For that first time, wonderfully easy to train, potential star, look for a puppy that scores with mostly 4's and 3's. (<http://www.volhard.com/pages/pat.php>).

Literature Summary:

The first and fully completed study of breed differences in canine behavior was carried out by Scott and Fuller at Jackson Laboratory in Maine in 1974. In this study; five dog breeds (cocker spaniels, wire haired fox terriers, basenjis, Shetland sheepdogs, and beagles) were examined for their ability to learn three types of responsibility: forced training, problem solving and reward training. According to findings, the cocker spaniels got first degree with correct performance in all three types of duties. This result indicated that the ability of taught to cockers formed from the selection within the breed. Basenjis fought for not excepting the leash; Shetland sheepdogs meddled with the trainer; Beagles stayed in protest position. According to all findings the researcher indicated that there is a breed differences on the basis of performance evidence (Haupt, 2007).

The genes related to a lot of obsessive compulsive problems were identified from different breeds were determined. For example; the flank sucking trait' responsible gene in Doberman Pinschers was defined. Aggression is the most problematic canine trait, and as a reason of that; the differencess between aggressive and non-aggressive dogs' neurotransmitters and their receptors were detected. The genes of dopamine, serotonin, and glutamate receptors related to aggressive behavior in English Cocker Spaniels were put forward. Also dopamine transporter gene linked to impulsive behavior in Malinois also specified (Rigterink and Haupt, 2014).

In another study; excitability, activity and exploration behavior of puppies in a novel open-field were searched in a total of 204 two-month-old German shepherd dog, labrador retriever or English springer spaniel puppies. In the monoamine oxidase B gene (MAOB), the polymorphisms were determined by PCR-RFLP. It was found that the genotype and allele frequencies of the polymorphisms were significantly different between three breeds ($P < 0.01$) according to statistic analysis. The results indicated that MAOB gene polymorphisms had a significant effect on squares crossed, walking time, lying time, the times of standing up against walls ($P < 0.01$ or $P < 0.05$) and were related with the times of posture change ($P=0.064$) and especially the TT genotype has an very important influence in these traits as well (Li et al., 2006).

According to another study; it was found that there was a short form of the dopamine D4 receptor in the golden retriever known as gentle breed of dog; on the other hand more

aggressive, Shiba, has the long form but this result came from the genetic differences between an Asian and an Anglo-American breed rather than connection to the behaviour (Parker et al., 2006).

In another study; the canine monoamine oxidase type A (MAOA) and type B (MAOB) genes full-length nucleotide sequences of cDNA were determined. It was obtained that the MAOA mRNA was expressed widely in different parts of the canine brain, on the other hand the MAOB mRNA was appear only in specific brain regions, such as the hippocampus, hypothalamus, brain stem and olfactory bulb according to Northern blot analyses. These findings indicated that MAOA and MAOB mRNAs' expression models particular to subtype in canine brain (Hashizume et al. 2003).

Different study; were designed to determine original alleles in operationally important regions of the canine MAOA gene, and to search whether has changed of these polymorphisms' frequencies between five breed groups (ancient, herding, mastiff, modern European, and mountain). In the study, fifty dogs from these five breed groups were sequenced. Totaly eleven polymorphisms were obtained. Seven of them were single nucleotide polymorphisms (SNPs; two exonic, two intronic and three in the promoter), the other four of them were repeat intronic variations. The exonic and the promoter regions were obtained as highly conserved, in contrast to this, the most polymorphic loci were repeat regions of introns 1, 2 (7 alleles) and 10 (3 alleles). Comparison of the these allele frequencies among the breed groups showed a decreasing or increasing sense in the number of repeats; determining the highest genetic diversity within the ancient breeds and the lowest for the most recent mountain breeds, indicating canine domestication period between ancient and recent breed. Also the major allele of wolves, was found rare in the dog; which is a specific promoter SNP (-212A > G). They found that dogs present significant variation in specific intronic regions of the MAOA gene, whereas the coding and promoter regions are highly conserved. Also a significant genetic differences were seen between breed groups. (Sacco et al., 2017).

It was determined that 90% of Golden retrievers, known as more friendly, had the T allele within the MAOB gene, in contrast to this the more aggressive and excitable Schnauzers had less than 90% by Hashizume (Hashizume et al., 2005).

In other study; a single nucleotide polymorphism (T199C) situated on the canine monoamine oxidase B gene' assumed third exon, which generate an amino acid substitution from cysteine to arginine was determined. They searched the allelic frequencies in five dog breeds (Golden retriever, Labrador retriever, miniature schnauzer, Maltese and Shiba) and obtained significant variation between them (Ogata et al., 2006).

In different study; it was aimed to determine the region, subject to selection, from 509 dogs representing 46 diverse breeds with using multiple test statistics based on high-density genotyping array including >170,000 equally spaced SNPs. 44 genomic regions were identified with significant differences between several breeds, indicating genetic variation of these regions related to several phenotypic traits variation, between breeds. Based on this findings the researchers summarized that; some genomic regions have linked to phenotypic variation reasoned from huge reduction in genetic variation or population differentiation in dogs. They also indicated that the reduced haplotype diversity within the genome in dog breeds are the result of both genetic drift and selection (Vaysse et al., 2011).

In different study; canine aggression was searched with using 50 aggressive and 81 non-aggressive dogs. The researchers analyzed 62 single nucleotide polymorphisms (SNPs)

,placed close to 16 neurotransmitter-related genes. Allelic associations were determined for DRD1, HTR1D, HTR2C and SLC6A1. The haplotypes of risk or protectivity, related to aggressive behaviour were determined on 2-5 SNPs and their frequency varied from 4.4 (HTR2C) to 9.0 (SLC6A1) in aggressive dogs. A risk haplotype placed in the neurotransmitter receptor gene HTR1D. But they were not determined the specific haplotypes related to inheritance of aggression (Våge et al., 2010).

The domesticated dogs are one of the most suitable animals for study of behavioural genetics such as; behavioural differences between breeds and population. In one study; more than 10.000 German shepherd dogs and Rotweiler breeds dogs were searched for determination of genetics behaviour and their inheritance and correlation. In the result of this study; total 16 behavioural traits were searched and their inheritance structure were found similar in both breeds. Also more than %50 of genetic differences were originated from one main joint component in both breeds. It was found that the only aggressivity was inherited independently. In the result; the bravery and embaressment traits are the result of genetics and the hereditary was found approximately 0,25 in both breeds respectively. (Saetre et al., 2006).

The behavioral traits' selection is very important for breeding programs. But sometimes selection may not generate the breeders expectations and may not be enough alone. Because the most behavior is complex and include dual effect of the expression of many genes and the influence of environmental factors as well. Actually, most behavior is a form of both hereditary (nature) and handling (nurture); which meand both genes and environment together affect behavior. Because of this; effective and successfull selection needs understanding of the roles of genes and environment together for desired behavior (Beuchat, 2016).

In another study; They indicated that all members of *Canis familiaris*, stand for as a closed breeding populations and described with high levels of genetic homogeneity. Because of these features; the domestic dog breeds are ideal candidates for genetic studies related to morphology, disease susceptibility, and behavior. Breeds are mostly characterized with dual effect of their specialized morphological and behavioral traits. Connatural dog behavior is breed specific and will continue even there is not training or motivation. Because of this, herding, tracking, pointing, hunting, and similar behaviours are partly probably to be controlled, at the genetic level. They indicate that the small numbers of genes control important morphologic phenotypes on the basis of canine genetics studies. The phenotypic radiation of the dog has been occured by the effect of restricted gene flow and generations of enormous artificial selection, carried out during generations. With The effect of these factors more than 350 breeds of dog recognized worldwide with a high level of diversity among them (Spady and Ostrander, 2008).

In the course of domestication period, dogs were selected for their convenience for different purposes, concluding with a variety of behavioral characteristics. Specificaly, the ancient group of breeds whom is genetically closer to wolves may represent different behavioral characteristics, compare to other breed groups. In relation to this reality; another study based on the questionnaire assesment of dog behavior to determine whether behavioral characteristics of dogs were different between genetically classified breed groups. For this aim; the Canine Behavioral Assessment and Research Questionnaire (C-BARQ), was used, and breed group differences of dogs from the United States (n = 10,389) and the Japan (n = 2,951) were analyzed. According to the results; they thought that the behaviors assessed by C-BARQ were affected by hormonal status, genetic origins, and environmental factors,

such as country. Ancient dogs and spitz breed group presented low attachment and conserved behavior according to cluster analysis. The authors believe that the domestication process occurred in two-stage, the selection for low aggressive-fearful tendencies in ancestral wolves toward humans, occurred in first stage. However; the selection for pro-sociality (attention-seeking and attachment) took place later, most probably relation to the development of more specialized working roles. This feature have an important role in differentiation of the ancient group from other breed groups; most probably from modern European origins, and therefor, this comeup a possible an ancestral trait. (Tonoike et al., 2015).

Conclusion:

Understanding of the dogs behaviour is important for their convenience and to plan breeding strategy for different aims. Because the genetics and learning have form together dogs behaviour. The researchers indicated that breed differences have an role in behavioural differences as well. it is believed that the neurotransmitters have an role in aggression. According to all findings the researcher indicated that there is a breed differences on the basis of performance evidence. The researchers summarized that; some genomic regions have linked to phenotypic variation reasoned from huge reduction in genetic variation or population differentiation in dogs. They also indicated that the reduced haplotype diversity within the genome in dog breeds are the result of both genetic drift and selection. There are 19 recognized genome region which includes genes related to brain function, used in domestication studies. Today the dogs are admire for their special ability such as guarding, fighting, hunting, as pets or companian animal. To understand dogs behaviour are important for the dog itself, the owner and the whole community as well. Because the behavioural characteristics are heritable and can be effected by breeding purpose. It was found that the highest genetic diversity within the ancient breeds and the lowest for the most recent mountain breeds, indicating canine domestication period between ancient and recent breed according to reserach related to allele frequencies between the breed groups. Specifically, the ancient group of breeds whom is genetically closer to wolves may represent different behavioral characteristics, compare to other breed groups, especially from modern European origins, and therefor, this pro-sociality (attention-seeking and attachment) comeup a possible an ancestral trait from the wolves.

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