Inheritance

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Inheritance, what we receive from our ancestors and what we hand on to our offspring is without doubt the most vital question in building up a nation. While environments such as food, climate, housing, etc., play their part and have an influence on the development of national life and the social activities such as occupation, education, exercise, etc., set their mark on the life of the community and rightly occupy the thoughts of our leading men, which involve innumerable Acts of Parliament, it seems strange and incomprehensible that the all important question of inheritance, what a nation is and what it will be, has been entirely ignored from a public standpoint and treated as a fatalism, the same attitude that was taken through the dark ages towards the ravages made by diseases and pestilence.

But I wish to speak tonight on Inheritance with regard to breeding animals. Far back in the remote ages, when the world was on the border line of savagery and barbarism, the breeding of animals was the sole industry of the world. It far antidates any attempts of the mechanical industries. Yet while there has been a steady progress, through the centuries, of our knowledge as applied to machines, which has today reached a very great magnitude and complexity, it seems incredible that those superstitions which bewildered the shepherds of Asia in the bygone ages, over fifty centuries ago, have persisted through the innumerable intervening decades and it was only during the last century, through the conscientious and thorough efforts of a few English live stock breeders that any marked progress was achieved in the breeding of domestic animals. This progress, slight as it may have been, has had a marked and immediate effect and has given to the English the enviable and undisputable reputation of being the world's leading live stock breeders, and for a century all the nations of the world have looked to England for their foundation stock of pure bred domestic animals.

Principles Not Understood

However appalling may have been the lack of knowledge with regard to the breeding of domestic animals and of inheritance as a whole by the general public there has been a still more appalling ignorance amongst scientists regarding the fundamental principles of inheritance. While superstitions may have biased and hindered live stock breeders and while myths and old women's fables may have bewildered the general public, to a much greater extent scientists have been befogged and bamboozled by ridiculous postulates and useless assumptions, and for the time past the question of inheritance has been the toy of superstitions, myths and fables that have left the whole question in a state of chaos. It was not until the world unearthed in 1900 the treaties of Johan Mendel, a treatise that had been published in 1866, that anything was definitely known regarding the laws of inheritance. The brilliant experimental work of Mendel and the still more brilliant deductions from his experiments, stand alone in the scientific field of genetics, and practically all the improvement that has taken place this century in the breeding of plants, flowers, cereals, poultry and different branches of live stock has been due to the far reaching importance of the work of Mendel. Like many other great men, that had clear vision, and unerring conceptions, the last twenty years of his life were spent in misery and in a disgusting turmoil, due to the petty tyranny of an ignorant factor and environment, which converted a man of a most amiable disposition into a disgruntled misfit.

Sir William Bateson of Cambridge University has the honour of recognizing the far reaching importance of Mendel's work and also for a series of noteworthy experiments in which he confirmed and extended Mendel's discoveries.

Cellular Structure

Before Mendel's work can be appreciated something must be known regarding the structure of the individual cells, of the body. The body as is well known is made up of individual cells, each cell containing a small nucleus. When these nuclei are stained and examined under a microscope, it is found that they contain a given number of small particles, which exist in pairs. The number of particles that are observed in the nuclei are the same for the cells of the same animal. These small particles contained in the nuclei are known as chromozones and it is believed that they carry the various individual inherent factors that pass from the parents to the offspring. In the human body, each nucleus contains forty-eight chromozones or twenty-four pairs; in cattle the number is thirty-eight, or nineteen pairs; in cats and dogs, thirty-six, or eighteen pairs; in bees, sixteen. The interesting and striking part regarding these chromozones is the fact that in the reproductive cell, both of the male and the female, there is only one half the number of chromozones that are present in all the other cells of the body. That is to say that the reproductive cell, both of the male and the female, is only one half a cell, but when the male and female cell fuse together, they make one complete cell from which all the other cells of the body are formed.

If we accept the chromozone theory of inheritance, then we must assume that those traits inherited by the offsprings from the parents pass to the succeeding generations in pairs, one from the one parent and the other from the other parent. With regard to the colour of the human eye, one inherited factor may be blue coming from the father and the other brown or some other colour from the mother; the same with the colour of the hair, one from one parent and the other from the other parent, the two functioning independently, but each contributing a part whether it becomes obvious in that particular offspring or otherwise, but when the body of the particular individual forms a reproductive cell, only one of the inherited traits passes into the individual reproductive cell. That was a point that Mendel was able to demonstrate. With regard to the colour of the eyes, if the individual inherited blue from the father and brown from the mother, each individual reproductive cell would contain either blue or brown, but it would never be a mixture of the two. It would be either one or the other, and the blue that passed to the succeeding generation was unpolluted and was not in any way altered by having functioned wth the brown in that generation.

Mendel's Experiments

Mendel did most of his outstanding work with sweet peas, using different pairs of individutl inherent traits, tallness and dwarfness, smooth and haired stems, plain and hooded flowers, white and purple, etc., etc. In his experiments he was able to demonstrate that when he crossed a tall sweet pea with a dwarf sweet pea, that in the first generation each and every one of the offspring was a cross between a tall and a dwarf. When two of these crosses were bred together, he was able to show that they produced approximately 25 per cent. pure tall, 50 per cent. crosses and 25 per cent. pure dwarfs. The tall sweet peas from those crosses behaved the same as tall sweet peas that had been bred pure for generations. The dwarfs also behaved as dwarfs that had been bred pure for generations. He obtained the same uniform results with regard to the other traits of smooth and haired stems, plain and hooded flowers, white and different colours. It has been known as a guiding principle in connection with all natural phenomena that like begets like, horses produce horses and cows produce cows.. What Mendel demonstrated was; that in the body the individual traits, while they were functioning with other individual traits, that like produced like, that the individual unit produced only the same kind of unit in equal quantities. That is to say that if you took one flower that was a cross between a white and a purple and bred it to another flower that was a cross between a white and purple, two such flowers would have inherited with regard to the colour phase four inherent factors from their parents, two purple and two white and according to probabilities, if like produced like in equal quantities, then in every hundred flowers there would be one hundred purple factors and one hundredwhite and in every hundred there would be 25 pure purple, 50 crosses between purple and white and 25 pure white. If you place in a bag one hundred purple marbles and one hundred white marbles, mix them up and draw them out in pairs, you would find when you come to count the pairs that you will have 25 pairs of purple marbles, 50 pairs of purple and white and 25 pairs of white or a very near that percentage. The more often the experiment is repeated and the average taken of the whole, the nearer you would approach the above percentage. That is to say that with one hundred purple marbles and one hundred white marbles mixed together in a bag there is an even chance that you pick out either a purple marble or a white marble. If by chance the first happened to be a purple marble, then it is an even chance that you will pick out to make the pair a white marble or a purple marble. The chances are even. On the next draw you may pick out a white and it is an even chance that the next marble you pick out will be either a purple marble or a white marble, so that in every four draws the chances are that you will get one pair of purple marbles, one pair of purple and white and one pair white and purple and one pair of white, making 25 per cent. of the pure of the one side, 50 per cent. crosses and 25 per cent. pure on the other side. This is known as Mendel's law and has been found to hold true with hundreds and hundreds of experiments that have been carried out since Mendel's work became known.

Inheritance In Foxes

There is no doubt that that same law holds true with regard to a cross between a red and a silver fox. All the offsprings of the first generation would be crosses between a red and a silver. If two of those crosses should be mated together, on the average the offspring would be 25 per cent. pure silver, 50 per cent. crosses and 25 per cent. pure red. The silvers would breed true as silvers that had been bred true for a large number of generations and the red would breed true the same. Mendel's breeding results were not very simple to interpret, in fact it was only a master mind who could have been able to see through the results, because in the majority of the cases, the crosses looked and had the same appearance as a pure bred. Mendel only established that they were crosses by breeding from them and demonstrating, because of the offspring they produced that they were actual crosses. When Mendel bred tall sweet peas to dwarf sweet peas all the offspring looked like tall sweet peas. He had to carry out breeding results to demonstrate that they were a cross between a tall and a dwarf sweet pea, the same with the purple and white. All the offspring of the first generation were purple and it took long experimental work to demonstrate that these were crosses. Mendel designated the tallness in sweet peas as a dominant factor and dwarfness as a recessive, the purple as dominant and the white recessive. With foxes the red is dominant and silver recessive. Therefore, in a cross between a silver and a red all the offsprings would be red and would sell simply as red fox pelts. In this case there is not the same extent of dominance as found with a great number of the crosses in both animal and plant life and it is fairly easy to recognize a cross red fox although the pelt would sell as a red fox pelt.

There appears to be a great deal of confusion in the minds of the general public regarding the transmission of inherent characters and characters that have been acquired during the lifetime of the individual. Some people claim that the dwindling of the little toe, that is so very common, is due to the fact that for generations people have been wearing shoes. But the same dwindling of the toe that is seen in this country is quite as common among African tribes, who have never worn shoes, and also it has been observed to occur just as much with Egyptian mummies.

The feet of Chinese women have been crowded into small shoes for generations, yet the formation of the feet of Chinese children is quite as normal as with children of other races.

The tails of sheep and fox terriers, in many cases, have been docked for countless generations, yet as far as can be observed, there are no abnormalities in the tails of these animals.. Jewish males have been circumcised for countless generations, yet the foreskin of a Jewish male child is quite as normal as that of a Gentile.

Experiments have been carried out docking the tails of mice for thirty and forty generations, but it has not produced the slightest abnormality in the succeeding generations.

Experimental Work

A great amount of experimental work has been done to ascertain if mutilations to the parents affect the offspring, but up to the present time all the bona fide evidence has been entirely negative. They do not appear in any way to affect the offspring. The same would appear to hold true with regard to silver foxes. The three-legged Oulton female fox has won the reputation of producing one of the best lines of silver foxes.

Only a few years ago physicians stated that tuberculosis was an inherited trait, and it was considered as a severe blot to have consumption in the family. But the evidence shows that this is a case of infection. Children being continually in contact with tubercular parents catch the germ which produces the disease. Undoubtedly there are some people who are more susceptible to tuberculosis than others. Many authorities state that people with dark sallow complexions are very liable to become consumptive. All the evidence that has been obtained up to the present time would indicate that when a disease is known to be produced by bacteria, like tuberculosis, it is not transmitted by inheritance from one generation to another, but when it is transmitted it is a case of the parent infecting the child after birth.

There are many diseases that are acquired during the lifetime of the individual, which are transmitted from the parent to the offspring before birth. The goitre comes under this category. A mother who may have acquired goitre during her lifetime, especially if there should be a large number of children, is very liable to transmit the goitrous condition to the youngest members of her family, but this is a prenatal influence, due to malnutrition, and should not be confused with an inherited trait. It can be remedied by proper dieting.

Prenatal Influence

With foxes, probably a samson condition comes under this category. While the samson condition may have been acquired during the lifetime of the parents, evidence would indicate that there are conditions set up in the body, which may give rise to a severe disturbance in the general metabolism of the body, and when such an animal becomes pregnant, it will lead to a severe malnutrition, exerting a prenatal influence on the development of the offspring, so that they will be very liable to be samsons. In some cases, a brown shade might come under this category. On the other hand, there are foxes who are more suspectible to showing brown shade than other foxes, due to the fact that they have not inherited a strong inherent trait to produce a sufficient amount of the black pigment, and therefore, due to irregularities in their diet, or in their management, they would be more susceptible to showing brown shade than foxes who had inherited from their parents a strong inherent trait to produce large quantities of the black pigment. Still, evidence would indicate that the brown shade exerts a prenatal influence on the development of the offspring, because it has given rise to a severe disturbance in the metabolism of the body, leading to a malnutrition, which would have a prenatal influence upon the development of the offspring, produced from such foxes.

Rickets in foxes might also come under this category. When a fox has acquired rickets during its lifetime, in the great majority of cases, it undermines the development of the foxes so that they are worthless for breeding purposes, and it can readily be seen that rickets might give rise to grave disturbances in the body which might have a prenatal influence on any offspring produced from such foxes.

The fear that wild animals show of human beings has very often been designated as an inherent trait that has passed through countless generations, but experiments would indicate that it was a character that was acquired after the birth of the animal. Explorers have noted that when they have visited uninhabited islands in the Pacific, that the wild animals did not have any fear of them until they had been on the islands for some time. Many fox breeders appear to be imbued with the idea that foxes have an inherent fear of their caretakers. My own observations would lead me to believe that it was an acquired character, caused by improper ranch management, and if fox pups were reared properly, they would be easier to control and would have no fear of those who were feeding and caring for them.

In conclusion whether you are dealing with inherited traits or characters acquired during the lifetime, the same principle holds true and fox breeders should rigidly carry out selection and elimination with their breeders.