

## **Planned Breeding**

by Lloyd Brackett

*Lloyd Brackett set amazing records within his personal arena. In only 12 years, during a time when dog shows were very few and far between, he produced his own family of dogs and finished more than 90 AKC champions. His dogs well known for their type, soundness and temperament, proving out the soundness of his breeding practices. Let those who want to dispute his theories show us first what they have accomplished which gives them the right to speak on the subject.*

Whenever two or three dog fanciers get together there is almost sure to be talk about line breeding. The term may be used without any one of them having a real understanding of what it means. There seems to be much confusion, even in the minds of experienced dog breeders, about the actual meaning of the terms inbreeding and line breeding and how to differentiate between them. The prime purpose of this article will therefore be to try to explain, as simply as possible, these two methods of breeding, as well as why they are used and what should be expected from them. In covering these types of breeding, the subject of out-crossing must of necessity enter the picture. We should know exactly what we mean when we talk of inbreeding, line breeding and out-crossing. Few breeders have a clear conception of just where one leaves off and the other begins.

Prior to supplying a greater definitiveness as to what is meant by the above systems of breeding, the following short explanations are given. In the broadest sense they contain the gist of the whole subject.

Line breeding is mating animals who are closely related to the same ancestor, preferably one whose type it is desired to obtain in the resultant progeny. In other words, it is accomplished by using for parents, dogs who are closely related to that ancestor, but are little, if at all, related to each other through any other ancestors. They are, in effect, bred in line to that common ancestor. When a breeder says his dog is line bred, one immediately questions "Line bred to what?" As we shall see later, the answer to that question enables us to somewhat evaluate the wisdom of having used this type of breeding in that instance.

Inbreeding implies a much closer relationship between the mating pair than does line breeding. Instead of involving second, third or more distant generations, it is generally understood to have to do with only four relationships-son to mother, father to daughter, brother to sister, half-brother to half-sister (both having the same sire and different dams, or the same dam and different sires). It should be remembered that when mating the progeny of two litters each having the same parents (from repeated matings for instance), one is mating full blood brothers and sisters. That too is inbreeding.

### **Family Breeding**

There is no complete concurrence of opinion among breeders as to where line breeding takes over from inbreeding, since the former is only a modification of the latter. We find that both terms are rather loosely used, that there are several intermediate relationships which are labelled inbreeding by some, line breeding by others. It is difficult to make any incontrovertible definition of the two terms, if indeed not impossible.

It would be only confusing if we took up here what some breeders consider to be inbreeding, others line breeding, such as the mating of a dog to a half-brother or half-sister of one parent. There are several other such closely involved relationship matings upon which there are similar differences of opinion. However, in the broadest and most commonly accepted meanings of line breeding and inbreeding, explanations have been given above.

The reader should understand that there is an area of breeding between interrelated animals which is not entirely covered by the terms "inbreeding" and "line breeding" as defined here. For this type of breeding I have for years used the term "family breeding", which, to the best of my knowledge, I myself originated. Since "family breeding" is simply an extension of both inbreeding and line breeding, what I have to say about these will apply in some measure, of course, to family breeding.

### **Why Inbred or Line bred?**

While it is important to understand that there are some differences in the selection of the mating dogs when using the systems of inbreeding and line breeding, it is of far greater value to know why these types of breeding are so often employed; why they are used by almost all successful breeders of any variety of livestock and what the results are likely to be, both good and bad. We shall pursue that subject now.

The purpose of both line breeding and inbreeding is to bring about breed improvement to get the best that is possible out of ones matings and to upgrade his stock. Experience has shown that if more than mere multiplication is to be had, and any rear and lasting results toward breed improvement are to be obtained, a breeder must use a system of line breeding, which not only combines animals very similar in their characteristics but narrows the pedigree to a few closely related lines of descent. This "purifies" the pedigree rapidly and enables a breeder to control, to some degree, all characteristics. It discourages variability and reduces it to a minimum.

### **Advantages of**

The results obtained by this system of breeding can more certainly be predicted than the average breeder realizes. Few indeed are the dog fanciers who do more than mate bitch to dog HOPING for results that is no scientific reason to expect. When by good fortune one or two above average offspring do appear, they have nothing behind them upon which to base an expectation that they will pass on their desirable traits. On the other hand, when such superior offspring are produced by line breeding, and improvement is shown, it is backed up by the most powerful hereditary influence obtainable because of the simplicity and strength of the ancestry. If the SELECTION of this ancestry has been good, the "pulls" are all in the same direction. The records of all breeds show the pronounced salutary results that have come from judicious line breeding.

### **Disadvantages of**

Selection by pedigrees alone, without consideration being given to the physical traits of the mating pair, is the chief danger in this system of breeding. The writer can state in the following few words the most important counsel to those who would attempt Line breeding: Physical compensation is the foundation rock upon which all enduring worth must be built.

A line bred pedigree is valuable or dangerous in exact proportion as the individuals have been selected. Line breeding does not replace selection but, on the contrary, demands the most discriminating choosing within the line.

If the breeder selects by pedigree, and without consideration to physical compensation, undoubtedly dogs with notable faults will result, and thus line breeding will insure failure quicker and more certainly than will any other known system of breeding - No other breeding plan has ever brought about the good results of line breeding, and no other system will ever be so powerful in the production of consistently good animals, and this with the greatest certainty year after year.

The principal requirement is not to abandon individual selection. A pedigree is a guarantee of bloodlines, a record of the blood of ancestors within which breeding operations and selection may, with confidence, be confined.

The word "confined" is used advisedly for, after line breeding has been practiced for a few generations, the end result is the development of what is in effect a pure breed-a breed within a breed, so to speak. When that has occurred, any attempt to introduce "cold" blood (that of unrelated dogs of other strains) is likely to result in the penalties of hybridization.

The departure from line breeding is a kind of "crossing" in a small degree, for when the blood of line bred animals becomes intensified they assume all the attributes of a distinct strain, which in truth they are, and they will likely behave as such for a long time.

In saying that line bred dogs tend to become like purebreds, or strains within their breeds, and that their progeny from a union with unrelated animals are like hybrids, I do not mean that such breedings should never be made, or that the results would be like breeding into an entirely different breed of dogs.

While in some strains of animals, line breeding and inbreeding have been intensified to a point where a herd or flock would be practically a breed of their own, I do not personally know of such a family in any breed of dogs today.

However, there have been strains developed in some breeds to a point where their blood has become so dominant that it will not yield for several generations to any noticeable blending when out crossed, the characteristics of the inbred or line bred parent always showing up. This is, of course, to be expected.

In the dog game those who criticize the system of line breeding far outnumber its proponents. This is true for several reasons. There is a continual influx of beginners in breeding dogs, people who have never before mated one animal to another or made any study of the subject. In their ignorance they believe that mating two dogs with "pedigrees", especially if both are winners, or better yet, "Champions", is all there is to it.

Then, there are a multitude of breeders who refuse to take the time to make any study of genetics, who want only to breed dogs to sell and make money, and these have no interest in breed improvement through years of planned effort. Again, we have the many hit-or-miss breeders who hope for the good luck which sometimes strikes novices who by sheer accident come up with a real "topper" or two. In listing the opponents of closed-up breeding, one should not fail to mention owners of stud dogs, hungry for stud fees.

Fortunately there are in almost all breeds of dogs a very few fanciers intent upon consistently producing dogs superior to the average of the breed. Many of these know that the quickest and most certain way to do this is by line breeding.

### **Inbreeding**

Because line breeding is more generally practiced than is inbreeding, I have dwelt more on the former so far in this article. The difference in the degree of relationship of mating pairs, as generally accepted by breeders, was explained, however. It might be well now to go more fully into the subject of inbreeding.

This is "breeding in and in" and is line breeding carried to its limits. It possesses all the advantages and disadvantages of line breeding to their utmost attainable degree. Breeding a daughter to her sire gives rise to offspring three-fourths of whose bloodlines are those of the sire, a practice which, if continued, would soon result in progeny with but one line of ancestry, practically eliminating the blood of the original dam. This form of breeding is practiced when it is desired to secure all that is possible of the blood of the sire.

On the other hand, when a dam is bred to her son or sons successively, it increases the blood of the dam. This form is practiced when it is the dam's bloodlines one desires to preserve and intensify. Either system can, of course, be approximated by the use of a granddaughter or grandson.

The breeding together of brother and sister is inbreeding which preserves the bloodlines from both sire and dam in equal proportions.

It is inferior to either of the others as a means of strengthening previously existing bloodlines, but it is freely employed when the combination of sire and dam (of the brother and sister) has proved exceptionally successful, virtually setting a new type.

It has all the dangers of the other two types of inbreeding, and in a greater degree because we have no knowledge of what the new combination will produce, whereas in strengthening the proportion of one line of ancestry over another, whether it be that of the sire or the dam, we are dealing with previously existing bloodlines known to be harmonious.

### **Advantages of Inbreeding**

As previously stated, it is line breeding earned to its highest degree. When superior animals are used, it is the most powerful and sure way known of making the most of their excellence and perpetuating it. It is the method by which the highest possible percentage of the blood of an exceptional dog, or of a particularly fortunate "nick", can be kept, fused into, and finally made to influence an entire line of descent.

If continued, the outside blood disappears and the pedigree is quickly loaded to an almost unlimited extent by the blood of a single animal, or two at the most. In practice it is usually that of a sire. Inbreeding is not so much a matter of originating excellence as of holding and making the greatest use of it when it appears.

A large proportion of prepotent sires have been inbred or at least closely line bred. An inbred dog is, of course, enormously more prepotent than one who has outcross breeding. Its half of the ancestry having

a great deal of identical blood is almost certain to dominate the offspring when mated to one of the opposite sex having an "open" pedigree.

(An "open" pedigree is one in which there does not appear the name of any one dog more than once in perhaps several generations.) Inbreeding is therefore recognized as the most influential of all breeding plans or systems, supplying the simplest of all pedigrees—an advantage when we recognize the laws of inheritance. It is all that line breeding is and more.

When using either system it must again be cautioned that careful SELECTION must continually be made, both as to physical compensation and vigor and fertility. In conclusion on the matter of the advantages of inbreeding, I will repeat: No other method of breeding equals this for intensifying bloodlines, making the best use of exceptional individuals, and in building a strain within a breed.

### **Disadvantages of Inbreeding**

Although the doubling up and intensifying of characteristics by this method of breeding insures results that are more probable than possible and, if continued long enough, are a certainty, it works the same for one trait as another, both good and bad. It affects all characteristics of the animals involved.

That is why, unless a breeder knows a good individual of his breed when he sees one, or possesses the right stock to start with, inbreeding can bring disaster. On the other hand, when the opposite is true, the most strikingly successful results can be obtained. Examples of success are many, but so can one name many failures amongst those who have dropped out of the "game" and whose "strains" vanished or are disappearing.

### **Inbreeding Not Necessarily Disastrous**

Undeniably, no form of breeding has so many who decry it, most of them entirely ignorant on the subject. They claim it causes lack of vigor, size and fertility, and a multitude of such instances could certainly be listed. However, if what has been written here, and been proven by innumerable tests and examples, has any meaning at all, it is that ANY characteristic can be bred up or down, strengthened or weakened, by this method of breeding.

Some of what we know about the results of inbreeding in animals comes from the scattered and irregularly reported experiences of breeders. It is difficult to be at all sure that the evidence against inbreeding came from using animals who were typical of their breed and should have been inbred upon at the outset.

There is also the question of whether one hears of the usual effects of such breedings or only of the exceptionally bad ones. Anything undesirable which does appear is apt to be blamed on inbreeding, in spite of the fact that equally bad results often occur when no inbreeding has been done. There is usually no way of making comparisons, that is, with non-inbred animals kept under the same conditions, fed and reared in the same way.

Since it is universally agreed by all breeders and geneticists that ANY characteristic can be bred up or down, strengthened or weakened, by inbreeding (providing rigid selection is followed), why then this claim that it will bring about a loss of size, vigor and fertility? Are there some inherent traits, which come from close breeding, or is it merely that lack of vigor and fertility are commonly possessed characteristics and frequently show up?

Many think it is the latter. There are so many examples of great vigor and fertility in inbred individuals, and of family lines, and even in whole species of plants and animals, as to obviate all fear of inevitable weaknesses from close breeding, but it doesn't take much investigation to indicate to us that there is lurking weakness and infertility everywhere. It is particularly evident in humans and in domesticated animals.

A large number of animals, and an apparently larger number of plants, are relatively weak and easily succumb to disease. In nature the strongest live and beget offspring, whereas the weaklings die. In breeding animals we are liable to select largely for show or utility type, yes, even for color, ignoring, or trusting to luck, as to vigor and fertility. Is it any wonder then that these traits have crept upon us until they of ten present a strong argument against inbreeding, although they also appear amongst entirely outcross bred dogs?

When we SELECT for vigor and fertility, as well as for other attributes, there will be less talk about the evils of inbreeding. In the meantime we shall hear about it mostly where vitality and fertility were low in the stock inbred upon. Because both of these are requisites - one to insure life and the other for reproduction-they should be possessed in a high degree by the dogs one intends to inbreed upon.

Charles Darwin learned from hundreds of experimental tests with both plant and animal life that crossbreeding, or "out crossing" as we speak of it in dog breeding, often increases vigor and fertility. He also found that this was not true in all individuals, or in all species, even those most sensitive to inbreeding.

His experiments showed that sometimes the opposite (weakness and infertility) occurred and he could not solve the mystery of the cause. Much of this "mystery" for which no explanation could then be offered has been largely dispelled by modern knowledge of heredity. It would necessitate writing at great length were I to describe even a few of his, and many other scientists', experiments, as well as involve us in complicated scientific terms.

This I will refrain from doing, to keep my treatise as understandable as possible to the average reader, since I am not writing for experienced dog breeders or students of genetics. For them this article is elementary, with nothing supplied that they do not already know.

### **Recapitulation**

To those for whom it is written, however, a summation of the total effects of inbreeding, and to a modified degree that of line breeding, follows.

All characteristics both good and bad exist in various degrees in different dogs. One wishes in his matings to secure and retain the desirable characteristics, and it is easily demonstrable that this can best be accomplished by inbreeding and, to a lesser degree, by line breeding. It is also easy to show that, by using the same methods of breeding, the lowest intensity of undesirable characteristics is attainable. Results are entirely dependent upon SELECTION, remembering that "Physical compensation is the foundation rock upon which all enduring worth must be built."

### **Part II**

In this article it is my intention to supplement and elaborate upon the subjects of inbreeding, line breeding and out crossing, which I discussed in the July issue. I endeavored in that instalment to explain the simplest meaning, as most commonly accepted, of inbreeding and line breeding.

It also contained some categorical statements regarding the results to be achieved, and the dangers involved, in using either system or a combination of both.

Therefore, in order to make what follows understandable and of more value to new readers who may not have seen the first article, it might be well for me to give the following recapitulation.

I concluded my July article with the following: "I am not writing for experienced dog breeders or students of genetics. For them this article is elementary, with nothing supplied that they do not already know. To those for whom it is written, however, a summation of the total effects of inbreeding, and to a modified degree that of line breeding, follows.

All characteristics both good and bad exist in various degrees in different dogs. One wishes in his matings to secure and retain the desirable characteristics, and it is easily demonstrable that this can best be accomplished by inbreeding and, to a lesser degree, by line breeding.

It is also easy to show that, by using the same methods of breeding, the lowest intensity of undesirable characteristics is attainable.

Results are entirely dependent upon selection, remembering that physical compensation is the foundation rock upon which all enduring worth must be built.

It would seem that the italicized lines above could be easily understood by everybody and would need no explanation. Since writing it, however, a reader has questioned me as to its meaning. In brief, it is an abjuration against selecting a mating pair by pedigrees alone and emphasizes the importance of considering as a mate for any dog one that is right where the other is faulty. The word "physical" is stressed because any dog, which is not mentally sound, should not be used as a breeder. In the event that such a one IS bred, however, the same rule holds true.

As just one example of many that could be used to illustrate the meaning of "physical compensation": Where the Standard of a breed calls for a well laid back shoulder blade, one should not breed a bitch with a "steep", "short", or "pushed forward" shoulder blade to a stud having any of the same shortcomings.

While briefly on this subject, I should mention that failure to practice "physical compensation" is perhaps the most common mistake made by the average dog breeder. In my own particular breed the German Shepherd Dog, we see it constantly the mating, for instance, of terrier fronted dogs to others similarly built and especially of soft-backed dogs to others also possessing faulty top lines. So, when considering inbreeding or line breeding, and presenting the advantages, I cannot over-stress the necessity of first considering physical compensation if one expects to obtain enduring worth, for it is the foundation rock, rather than the pedigrees alone.

In these articles I shall at time seem repetitious, perhaps bringing up the same point several times. When that occurs it is because I may either want to restate something so it will be remembered, supply added emphasis or clarity some point presently being touched upon.

### **How To Do Inbreeding**

As I have tried to explain, the first prerequisite for inbreeding is to start with superior animals. It should NEVER be inaugurated by ANY breeder possessing mediocre breeding stock.

An explanation of this requirement should be made because many of my readers will immediately conclude that the advantages of this system of breeding cannot be for them . . . they may not possess, nor can they afford to buy, or perhaps find available, superior breeding stock.

While any one or all of the above hindrances may be present, they can eventually still do that type of breeding. It will simply necessitate a few more years of effort before they can properly start either inbreeding or line breeding.

Possessing only a rather mediocre bitch, they can "breed up" through using a stud whose structure bears a strong resemblance to the breed Standard's requirements. Then, on the resultant bitch progeny, or on a selected number from that litter, they should return to the sire's side of the litter for following matings. I shall go further into that later.

If one grades relentlessly and discards all untypical specimens from his breeding use, inbreeding can be practiced with considerable impunity. On the other hand, if a breeder finds himself in possession of a small amount of very superior blood, and is wondering how to use it, and decides to "breed out" or, as it is commonly termed, do complete out-crossing, he will lose his type by dissipation. It is only because complete outcrosses are all but impossible to make, within most breeds, (and this bold assertion will be examined in a later article) that the matings which are termed, and believed to be, outcrosses succeed in producing typical stock, if they do succeed.

When a breeder experiences a great variance in the type of dogs he is producing, and can only occasionally come up with a really good one, and that more often than not by sheer luck . . . when the percentage of those good ones compared to his total production is disappointingly low . . . his only course which promises anything fruitful is inbreeding.

It puts his breeders to the severest possible test, of course, and the hazard is admittedly great, but the possible results are phenomenal. By inbreeding he learns where his stock has dominant and recessive traits, and what they are, both good and bad. The really sincere breeder should always be ready to accept whatever hazard is involved thus to obtain the necessary information for success in the future.

If, to learn with what he is working in the matter of inherited traits, both dominant and recessive, he decides to do inbreeding and bring to the surface more or less hidden characteristics, the best way is to go "whole hog". Many fanciers, fearing the consequences, proceed gingerly, breeding a little more closely with each successive trial. This, if not successful, is discouraging, may cause abandonment of the whole plan, is sure to accumulate numbers of undesirable individuals, and consumes valuable time.

### **Breeding From the Best Without Regard to Bloodlines**

I have reference here to the practice of selecting and breeding from the best individuals but without regard to bloodlines. It is probable that, given enough time, a fancier might come up with quite a percentage of good dogs, especially if he confined himself to a rather limited area wherein his selections came originally from related foundation stock. But in actual practice the breeder following this method succeeds in producing nothing of note, and breeds a jumble of different types.

It is the system usually followed by beginners and those whose main purpose is to breed puppies they can sell on the basis of quoting some "big" names and the greatest number of "champions" in the pedigree.



If and when such breeders turn into fanciers whose main objective is to become pre-eminent by building a strain of superior animals within the breed, they go at once into some form of inbreeding or line breeding and this of necessity if they are to succeed.

The system of breeding one follows, in other words, depends upon the result to be accomplished. If the purpose is breed improvement, then inbreeding and line breeding will be found most effective.

### **Personal Experience in Support of Theory**

While writing these articles, the thought constantly comes to my mind that, considering the very few breeders who have any breeding plan, and thus the many who are likely to challenge my statements, I should explain the basis for my breeding advice.

To any reader of scientific literature pertaining to animal breeding, or to a student of genetics, no justification is needed, although I doubt that such persons will do more than scan these articles, which are intentionally devoid of scientific terminology with all its references to genes, chromosomes, phenotype, genotype, zygote, homozygous, heterozygous, etc., etc.

If I find it necessary, later on, to use these terms, or any of the many others, I shall try to define them so they will not be confusing to those in the "beginners' class" of breeders.

As I have previously stated, at the request of The Editor I am writing non-scientifically. Never-the-less there should be more than my personal opinions or beliefs and ideas presented, if credence is to be given the many arbitrary statements I make.

Otherwise I would be taking upon myself a greater responsibility to the fancy than any conscientious person would care to assume. It seems advisable, therefore, that I should give something of the background upon which my statements and declarations are based.

During my more than 48 years of dog breeding, I have read and studied every book on animal breeding I could lay hand to. Many of them are in my permanent library and are being referred to constantly as I write, to make certain my memory serves me correctly. It is worthwhile to read theories but a more dependable knowledge comes through testing them one's self to determine whether they are right or wrong, and in what degree. This I have done.

As I am writing for an all-breed magazine and know that these articles will be read by breeders and fanciers of various breeds, rather than by those of German Shepherd Dogs alone, with which breed I have done most of my experimenting, I have thus far refrained from interjecting any reference to personal experience.

From all I have learned through study, however, I would say that whatever is applicable to one breed of dog is equally so to another, as it is to practically all other varieties in the animal kingdom. Therefore, in writing of the one breed with which I have worked in the main, this should be understood and considered.

It seems to me that the story of my own testing of breeding systems, and relating some of the results, might be of interest to my readers and perhaps be of assistance and an incentive to them in their own breeding programs.

A presentation of some of the results, prior to telling how they were achieved, may be sufficiently impressive to warrant increased interest in finding out how they were accomplished. The "how" will therefore be given later.

As unimportant to the purpose of these articles, I shall omit the details of how I obtained my first German Shepherd Dog in 1911 and started breeding them in 1912. My bitch was one of the first of this breed in America and was brought over in the womb of her dam. Comparatively speaking, the breed was in its infancy even in Germany, the land of its inception.

To the best of my knowledge there are no others in this country who started with the breed in those early days, bred them as long as I did, and have retained their interest even unto this day. Isn't it claimed that five years is about the lifespan of the average breeder who gets into the game, and continues his interest in breeding dogs?

After a great many more than five, during which time my hobby consisted of breeding dogs just for the fun of it and, when luck was with me, making a little profit occasionally, my objective changed. For one thing, the popularity of the breed as it became better known in this country, had caused thousands to start breeding it.

There was a saturated market of pups for pets, as often happens when any breed achieves great popularity. During the depression of the early thirties I bred only a litter or two a year and found I had the time as well as the inclination to study a bit about how to breed better dogs. I shall skip some intervening years until about 1940, at which time I announced my intention to establish a strain within the breed.

In my SHEPHERD DOG REVIEW ad, I stated it would be built on three great imported males of that time, and named them, giving my reasons for the incorporation of each one in my breeding program.

Their names and close blood relationship will be given later when I explain, HOW the following results were achieved. It is my purpose to limit a listing of these results to no more than enough to show that the "proof of the pudding is in the eating thereof", and that I have tested the theories about which I write.

Before setting forth some of the results of my breeding plan, perhaps I should explain that I no longer have ANY connection, either in an active or advisory capacity, with any kennel, and this has been true for several years. I therefore, have no self-serving motive in writing of my achievements.

In the early forties, I made some incest breedings for educational purposes-to ascertain the dominant and recessive characteristics of the individuals being used in my breeding program. The first dogs of the strain I was then starting began to be shown in competition in 1945. During the next fourteen years more than 90 homebred champions were finished by customers and ourselves, here and abroad. I am told that this is a world record for any breeder, in a lifetime of breeding and showing. I emphasize "homebred" above because the total does not include the probably larger number of those finished who were sired by our studs, or from matings made by customers of bitches bought from us and thereafter bred to our studs.

In all fairness, I should insert here a clarification of the use of "us" and "we" in the preceding paragraph. The kennel operation as a hobby became too large for me and I found myself forced to neglect my business.

When this happened I seriously considered liquidating my Long-Worth Kennels, especially since I had achieved my purpose of building a strain within the breed and had established a definite type with the ability to "carry on", as such closely bred (inbred and line bred) animals have the prepotency to do.

Briefly, and without further explanation I finally decided that, rather than let Long-Worth pass into oblivion, I would give it to Mrs. Virginia McCoy (now Mrs. Richard Vaughn. She had first managed the kennel operation for me and had been one of the most apt "pupils" ever to come to me to learn or just to "talk dogs".

With my championship record well on its way and using many of the original foundation stock of the strain, she augmented the number already finished for the title, and bred them independently.

Now again to some of the results, I should like to mention the Register of Merit, which will mean nothing to other than breeders of German Shepherd Dogs without my giving a short explanation. So far as I know, no such record of producing sires and dams is made except in one breed of cattle, and in our breed of dogs.

Some years ago our Parent Club started keeping such a record of producing sires, and later included bitches. Certain wins by the at major point shows, made by their progeny, award to the sires and dams a designated number of points.

When a dog has sired 5 champions. 10 progeny have made major class wins, and he has accumulated a certain number of points, he receives the honor of being rated as a Register of Merit (abbreviated ROM) sire, or dam.

Ch. Vol of Long-Worth is the highest ROM sire in the breed, with 1120 points, more than double the number (545) of the second highest rating male. whose mother, incidentally, was bred at Long-Worth and was Vol's half-sister.

Very close in number of points (493) behind the second male is Vol's son Ch. Chimney Sweep of Long-Worth, in third place. Sweep was not only sired by Vol, whose grandmother was Ch. Nyx of Long Worth. mentioned below, but his dam was a Nyx daughter. Sweep himself became the all-time greatest Group and Best in Show winner of the breed.

In fourth position is another Vol son, Ch. Jolly Arno of Edgetowne. with 468 points. Jolly Arno was an inbred grandson of Ch. Derry of Long-Worth who was the sire of Vol. and himself a ROM sire with 12 champion offspring to his credit. Ch. Derry was quite an old dog before outside breeders took any advantage of his potential (as is so often the case with great sires) and then not more than a tithe as many used him, as those who bred to Ch. Vol. It was Derry's close line' breeding, intensified in the mating that produced Vol, which made the latter the most prepotent sire in the breed's history. There are hosts of others listed in the ROM either bred at Long-Worth or carrying its blood.

These breedings will be explained in a following article so that readers with enough patience to read through the above, and what follows, presenting PROOF that the writer is not just a theorist, may learn how probably the greatest strain in any breed of dogs was built.

It is difficult to present these facts and not seem boastful, but perhaps I may be allowed a feeling of justifiable pride in announcing that not only did I breed the highest ROM sire in the breed, but also the top-rating brood bitch. Ch. Nyx of Long-Worth holds that unchallenged (to date) record.

Most interesting to students of breeding is the fact that she was the mother of Derry, the sire of Vol. Nyx has undeniably had more influence for good on the breed than any other bitch.

Bred only a very few times, she produced thirteen champions, a breed record. Her famous "D" litter, with only six of the eight ever shown, finished easily. This is an all-time record for any bitch of the breed. Incidentally, this litter was so closely line bred as to be termed inbred by some.

Also worthy of note: There were only four bitches awarded Honorary ROM titles in '59, because of their records made prior to the establishment of ROM for bitches. All of them were Long-Worth bitches, with one being one of my three foundation matrons.

Combined, they produced a total of 25 champions, with the foundation bitch being next highest in number of points to Nyx. Another of our three foundation bitches was awarded an Honorary ROM position prior to 1959 and was the dam of 8 title holders. This points out the importance of starting with good bitches, whether in building a strain or in just breeding a few good dogs.

Ch. and U.S. Grand Victor Jory of Edgetowne (litter brother of fourth position ROM sire Jolly Arno, and of Ch. Jaunty of Edgetowne) was inbred on Ch. Derry, his sire being Vol (Derry son) and his dam also having been sired by Derry. Ch. and U.S. Grand Victrix Yola of Long-Worth, perhaps the most perfect bitch I ever bred, was, but let's skip the rest.

The portion of the record already given has perhaps become tiresome, but I did want to give enough of it to prove my points:

(1) That the systems of breeding I have been writing about CAN be used to advantage if one practices, and I am again repeating, the rule that "Physical compensation is the foundation rock upon which all enduring worth must be built";

and (2) That I am not open to the charge of "talking through my hat" in writing about animal breeding theories obtained only through "book learning".

As previously stated, I will discuss in the next installment HOW the Long-Worth strain, which made the record part of which is given above, was built. Whether there will be any further articles on breeding after that depends upon the interest evidenced in these.

### **Part III**

After relating in the second installment of these articles some of the gratifying results achieved through my own use of inbreeding. Line breeding, and "family" breeding, I stated that the "HOW" would be explained. I also mentioned an advertisement appearing about 1940 in THE SHEPHERD DOG REVIEW in which I announced by intention to build a distinctive strain within the breed using three great males. In that announcement I gave their names and the reasons each was to be utilized as a foundation head, stating that they were closely related.

#### **Building a Strain**

Up to that time my breeding operations had been of the sort practiced by the average dog fancier, fully 98% of them, I would estimate. This consisted of mating the best bitches I could get to the best available males, regardless of related bloodlines. It is true, however, that for many years I had practiced compensatory matings - using studs strong in characteristics in which the bitches needed improvement.

This was a plan, but not a breeding program such as I then inaugurated, although it produced more than the average run of good specimens which are bred by those who make only hit-or-miss matings, but still it did not give me multiple Champion litters, or establish a definite TYPE. As explained in the preceding articles, these results can be obtained ONLY by utilizing the power of inbreeding and line breeding.

Referred to hereafter by their first names only, these three foundation males were German Sieger, U.S. Ch. Pfeffer v. Bern, his half-brother (same sire) U.S. Ch. Odin v. BuseckerSchloss, and German Sieger, U.S. Ch. Arras a.d. Stadt-Verbert.

The common sire of the first two dogs was Dachs von Bern. Dachs' sire had as his paternal grandfather Ger. Sgr. Utz von HausSchutting, while his dam Vicki was sired by Utz. Now we come to Arras, the other male in the triumvirate.

His dam was the triple Siegerin (German Grand Champion) Stella von HausSchutting, claimed by the German breeders to be the greatest specimen of the breed they had ever produced. Stella's sire and dam were BOTH by Utz, making her the offspring of a half brother-sister mating. From the above we see that all three dogs stemmed closely and strongly from Utz.

In addition to being thus closely related, each dog had some compensating factors for the others. (Remember as applicable here the several times repeated principle given in the previous installments: "Physical compensation is the foundation rock upon which all enduring worth must be built".) My breeding program was predicated upon "closed-up" bloodlines, commonly designated as inbreeding and line breeding, hence the importance of that dictum.

Only in a general way are the compensating factors, which I had to consider of importance to the fanciers of other breeds. Every variety may tend to have different shortcomings at one time or another in their history.

It may be heads, or feet, or on throughout the entire category of physical structure. However, to make this clearer, I might state that some of the main shortcomings, or faults, most common in our breed at that time were soft top lines, straight (terrier-like) fore assemblies and fading pigment.

In announcing my intention to build a real strain within the breed, using these three males as the foundation stones, I wrote that I was using Pfeffer for his over-all, type, noble appearance, excellent rear angulation, and pigment.

His half-brother Odin was to be used for top line correction, ideal ribbing, perfection of gait and, in common with Pfeffer, a good shoulder assembly.

Arras was being incorporated in my projected strain to increase the strength of Odin's top line influence, as well as Pfeffer's pigment; also for his good, although small, amount of somewhat unrelated blood which brought in traits possessed by the other two which were desirable but not as strong in their dominance as I felt was needed.

### **Importance in Selection of Bitches**

Having decided upon the breeding program as has been briefly outlined, my next step, of course, was to find and obtain the necessary bitches with which to implement it. This is not an easy task at any time, or in any breed.

Owners of females of breeding age who have proven themselves, or because of type and bloodlines give promise of being worthy producers, are loath to part with them. When one adds the stipulation that they must be daughters of certain studs, their procurement becomes increasingly difficult.

Suffice it to say here, with no other explanation than that it took me about two years to find and obtain them, I DID get a daughter of each of the above three studs. Moreover, in most respects they evidenced the traits for which their sires were notable, and for which I had chosen them to found a strain.

With only the mention of my foundation BITCHES given above, I am sure I have not sufficiently stressed their importance. It is a much-used aphorism that no stable is better than its mares, and no kennel better than its bitches.

That, of course, is true. The most valuable acquisition a would-be dog breeder can make is that of a good bitch or bitches. Without one or more of these, the tasks of breeding superior specimens in any breed is a long, if not indeed a hopeless, one.

It is better, surely, if the bitch herself possesses all the attributes of a show specimen, but of great importance also is her genetic background. It is in her bloodlines, as delineated by her pedigree, that her potential worth can best be judged.

Perhaps some elaboration and explanation of that statement should be made, especially as there are those who believe that a top bitch, regardless of what may be behind her in blood-lines, will as likely produce good ones as will another who, though less perfect herself, has a family of good ones behind her.

Every experienced dog breeder knows, and it was pointed out in an earlier installment, that sometimes a superior specimen will come from a quite nondescript and hit-or-miss mating. Such a one is an accident or "happenstance".

To claim that a bitch is more likely to reproduce in her own image than that of any one of her litter mates, for instance, is to demonstrate an ignorance of the laws of heredity. Which one or ones, if any, in the litter might carry the genes for the characteristics she alone manifests can be determined only by testing them as breeders.

Here as an illustration is just one example of many observed during my experimental dog breeding days. In a litter of eight there appeared only one who was white. Structurally she was the best of the lot and quite a superior specimen.

Bred a total of seven times during her lifetime, she herself never produced a white, nor did any appear in succeeding generations, at least not up to the fourth, when I lost track of them. She either did not carry the genes for white, or the genes for pigment, which she carried, were dominant. On the other hand, several of her sisters did whelp whites.

### **Bitch's Background of Utmost importance**

While one of the tenets of all animal breeding is selectivity, this does not mean that a superior bitch, with nothing behind her in sufficient strength to dominate, can be expected to produce as well as another who, although somewhat less perfect in her own structure, has a family tree inbred or line bred upon superior quality.

The sometimes heard statement that "Like produces like" is far from being a dependable truism, BOTH are of importance, the over-all quality and type of the bitch, as well as her family tree, but of the two the latter will be found to have the more influence both for good and for bad. The first article in this series explained why this MUST be true.

It is my desire to get away from the subject of my personal operations, in the matter of building a strain, as quickly as possible. Supplying a record of all, or of even a few, of the inter-related matings would be, I fear, not only somewhat confusing, unless pedigrees were given for study, but would also result in book-length articles unsuitable for a magazine, and particularly for one read by fanciers of all breeds. However, in order to explain the "how," it seems necessary to continue with that subject to a somewhat greater length.

Having obtained the three foundation bitches, each related to the others through their sires, and with one having both Pfeffer and Arras close up in her pedigree, I was ready to begin breeding operations, ready, I thought and hoped, to start a breeding program from which would eventuate a noteworthy strain of dogs.

### **Choosing the Males**

If it has not already been noted by my readers, I should call attention here to the fact that, since my start was made with bitches sired by three closely related males, I was able to dispense with some years of preliminary matings.

Had three unrelated sires been chosen, it would have taken several generations of breeding before I could have had in my kennel bitches so closely related in blood as to make inbreeding and line breeding possible.

With two of the foundation males having the same sire (plus other related blood), and the third a close-up descendent of the great German Sieger, U.s. Ch. Utz v. Haus-Schutting. as were the others, I was actually STARTING with line bred animals. (Had either Odin, or his half-brother Pfeffer, been a bitch, and one bred to the other, that would have been inbreeding.)

Therefore one can see how quickly I was "cooking with gas" or, perhaps stated mores understandably, doing planned line breeding, when I bred either an Odin daughter to Pfeffer, or the reverse-and I immediately did both. The results to be anticipated, as described in my first installment explaining what can be expected from inbreeding and line breeding, were quickly brought forth and plainly visible. It took only a few generations until the type I had wanted to establish and "set" was obtained.

While none of the three males upon which I started the strain was perfect in all characteristics (no dog as yet has ever been), it should be pointed out that not, only were they quite superior specimens in themselves, but each compensated the other in one or more respects. This being true, when some unwanted or undesirable trait showed up, coinpensati9n could usually be found in one of the others.

### **Foundation Blood Intensifies**

Pedigrees: Year after year, and generation after generation, this foundation blood continued to intensify in the pedigrees of my dogs. Modified out crossings were made only occasionally. By "modified" I mean that, when reaching out for some needed trait, I used a stud or bitch possessing at least one-fourth, or better, one-half, of the blood of my strain.

Both in such instances, and in the rare ones when complete out crossing was done, I made it a practice to mate one or more of the resultant progeny right back into the strain. By doing this, I did not lose the qualities I had strived to obtain and make dominant, nor did I dissipate them.

Some of the results of this breeding program were reported last month. Multiple champion litters became more the rule than the exception, of ten with every member who was given a chance, through being shown by its owner, finishing for the title.

### **Temperament and Mentality not Sacrificed**

If any of my readers are Obedience enthusiasts, and not particularly concerned with structural perfection, they may feel that no consideration was given to intelligence and trainability in the building of this strain. Nothing could be further from the truth.

Because the abbreviations for German training degrees would be confusing to those in breeds which did not originate in that country, I purposely omitted them when giving the names and CONFORMATION titles of the three sires upon which the strain was founded. Each of them, however, had received, prior to his importation, one or more training degrees showing he had passed the necessary tests to "graduate". As I now remember it, all three had been awarded the PH. (Polizeihund- Police Dog) degree, which signifies much more than our U.D.T.

The crux of the above dissertation on mental attributes is this: Qualities of the mind, as well as physical characteristics, are subject to the same laws of heredity. My strain became well known not only because of its members' structural superiority but because of their exceptional trainability in Obedience work as well.

One member became top-scoring dog, all breeds, in the United States for two successive years prior to his retirement. It should be stated that I take no credit for this, having neither bred nor trained the dog. The sire of this "dual Champion" (both a bench show and an obedience trial title holder) was a son of Pfeffer, one of my foundation studs, while his dam (one of my world-famous "D" six Champion German Shepherd Dog litter) was so closely line bred on both Pfeffer and Arras as to be considered by some geneticists as inbred.

The belief, and some uninformed breeders' contention, that inbreeding and line breeding per se will cause either physical or mental deterioration is a fallacy many times proven. Consider the breeding of the above dog as just one example of many that could be cited.

Inbreeding and line breeding cannot be looked upon as a way to bring NEW characteristics into a breed but, as Humphrey states, it " is a source of never ending combinations of racial characters in new individuals, producing variations, which are:

COMPARATIVELY SLIGHT EXCEPT WHEN THE TWO PARENTS ARE FROM WIDELY SEPARATED LINES."

### **Part IV**

Since I am not a professional writer, nor do I possess either the aptitude or inclination for such work it has been my intention and desire to discontinue these articles as soon as I felt that the editor's request for something on the above subject had been covered. It seems, therefore, that I made a mistake when I stated, at the end of a previous installment, that a continuance would be predicated upon the interest



shown by DOG WORLD readers. I am sure the response has amazed till of us. Because through lack of time I have been unable to write personally to each of those who have requested more articles, I want to express my appreciation here.

The effort made to be of whatever help I can is doubly rewarding because of the many novices who have written that although they had long wanted information on breeding better dogs, and had repeatedly asked successful breeders for help, little had been forthcoming.

One does indeed wonder why so many old timers are chary of assisting the beginners. We seem to forget that we ourselves were once in their position, and how much easier the road would have been for us had we been given encouragement and a helping hand.

The preceding installments have dealt mainly with defining inbreeding and line breeding together with their advantages and the results to be expected. There was also a report of some of the writers successes obtained by using these breeding methods. While much more could, and perhaps should, follow along the same line, it can wait until a future time.

The subject of out crossing is particularly timely now, when there seems to be not only many misconceptions regarding it, but probably never before in the history of dog breeding such a regrettable and harmful amount of it being done.

Somewhere in a previous article I made a statement to the effect that in some breeds the bad results of out crossing were not as evident as they would be were it not almost impossible to find absolutely unrelated blood in those varieties. This, I said, would be explained later. Probably this should be done now, before going into the matter of out crossing.

### **Ancestors in Common Don't Guarantee Worthwhile Breeding**

Many breeds, and the German Shepherd Dog is a prime example, can trace their origin back to not only one or two foundation heads, but also through little, if any, more than a human lifetime. I myself had dogs but a few generations removed from Horand Grafrath. He was whelped in 1895 and was the first dog of our breed to be registered.

To my knowledge, every living German Shepherd Dog in this country traces back, through one or another of his sons, to Horand.

Some breeds which have existed since antiquity, with a type somewhat like that of today, can similarly trace their upgrading, which developed the present specimens, to some "great" of the relatively close past. This is true in many varieties of animals, as illustrated by Hamiltonian 10 in racehorses, to cite just one example.

If one will examine the complete pedigrees, perhaps through six generations, of ancestors behind any two purebred dogs of a recognized breed, it may be seen that the two mated dogs will have at least one ancestor in common somewhere in the combined pedigrees. It is more likely that there will be several common ancestors in the six generations and that the name of one or more of them will appear more than once in one or both pedigrees. With the usually shortened pedigree, supplying the names no further back than perhaps the great-grandparents' generation, the breeder may believe that he is making a complete outcross.

While it is most assuredly not my contention that the breeding of one dog to just any other in the same breed is- not out crossing, I am trying to explain that there often is some interrelationship. Although a common ancestor is so far removed as to have no significant influence, the type that lie originated may have kept the breed members more closely alike than they would have been without him.

In view of what I have written above, some of my readers may conclude that an outstanding animal appearing once or even several times further back than the third generation will have a noteworthy influence. One often sees pedigrees, especially those of German Shepherd Dogs currently being imported, stating that there is line breeding to one or more sires, as "4-5" or "5-5", meaning in the fourth and fifth, or twice in the fifth, generations.

When it is considered that a dog appearing the fourth generation contributes only about 1/256 of the heredity factors in a puppy, one can understand that those distant relatives could not have done much to overcome the influence of the unrelated and perhaps inferior specimens appearing in the pedigree later.

Altogether too many fanciers are misled into feeling they have a worthwhile breeding animal because back in the third or fourth generations there appears one or more outstanding dogs.

### **Out crossing, Part of Planned Breeding**

There have been many, and far better, articles than I can write anent the matter of out crossing including if, when, and how to do it. One such appeared only last year in DOG WORLD by the famous geneticist Dr. E. Fitch Daghish. Anything that I, or anybody else might write would have to be repetitious, so well did he cover the subject.

Pointing this out to our editor, he explained that there were probably many who did not read it, that there were new subscribers who had not had the opportunity, and, "Besides, it and the other subjects you have been covering can't be repeated too many times." If all this be true, I need then only apologize for singing the same song again to those who are excepted from the above categories.

Out crossing is, of course, a concomitant of "planned breeding" and therefore MUST be considered when offering any effectual treatise on that subject.

Previous installments have dealt in the main with the use of inbreeding and line breeding to establish a strain within a breed of dogs. It remains now to cover the matter of how often it is advisable to introduce an outcross and, when and if such an outcross is made, where one goes from there.

I would like to interject here my observation of something that continually amazes me, 2nd it has to do particularly with our present-day German Shepherd Dog breeders. Practically none of them have evolved a "plan" of ANY sort.

There is presently a heterogeneous crop of imported males available and they are being used as breeders by hundreds of fanciers who have NO knowledge of those dogs' ancestors.

Neither have they the least knowledge of the producing abilities of these studs themselves, in most instances.

I have asked dozens of these breeders (they cannot rightly be designated as "fanciers"), "Where do you plan to go from there? and I cannot remember a single instance when any one of them could tell me of a breeding plan he had for the future.

We are about to discuss out crossing and, as above outlined, "how often," "when," and "if" to do it. This will mean absolutely nothing, whatever I may write, to such hit-or-miss breeders who are not only starting with outcross-bred animals, but must almost of necessity CONTINUE that process unless they immediately find some way to breed back on the sire's side (often inadvisable when his forebears are considered, or impossible from the standpoint of availability), or start inbreeding on the best dogs of the dam's side. But when asked, "What are you going to do next?" as stated above, the usually reply is, "I haven't gotten that far." or "I haven't thought of that."

Using the vernacular. I will state unequivocally that "nobody but nobody" amongst them is going to do constructive animal breeding or produce a satisfactory percentage of top specimens, and most certainly they WILL NOT build a strain within the breed. This having been proved to be true innumerable times by geneticists and all successful animal breeders, regardless of variety, what follows can be of value or interest to those now doing such outcross breeding only for one reason: to demonstrate why they are not getting the desired results

### **Outcross Only for Definite Purpose**

Those doing planned breeding based upon inbreeding and line breeding should outcross only for a definite purpose. Where the misconception started that it is not safe to inbreed more than three generations without an outcross nobody seems to know, but it is not necessarily valid. To my own misfortune I myself believed this fallacy at one time and reaped the consequences.

Every experienced breeder knows that, perhaps more often than not, the offspring of a first-generation outcross of two excellent animals show many of the good points of their parents. That is why, when so many of those first-generation puppies from outcross matings are doing well in the show ring, their breeders, and others who have noted this, rush to make similar breedings.

They will undoubtedly learn, as I did, that the youngsters of succeeding generations of outcross breeding will be a heterogeneous lot, showing an absolute lack of uniformity.

This will not only prevent those breeders from developing and holding a proper type but will help to make their breed one of even further differing types in size and proportion.

Such breeders then, do a disservice to their breed and are mainly responsible for the great differentiation within it. They also are the cause of many judges' bewilderment. One often hears puzzled judges ask, in judging German Shepherd Dogs, for instance, "What DO you WANT, anyhow, those big and square ones, the small long ones, those angulated as your Standard calls for, or those built about like Collies?"

Breeders who believe that an outcross should be made at some definite time as, for instance, the previously mentioned third generation, are, as another writer has put it, giving credence to one of those "old wives' tales" to which some dog breeders seem to be particularly addicted.

### **When Should Outcross Be Made?**

In answering this question, I can give no better advice than that advanced by Dr. Darglish: "To ask when an outcross should be made in a certain number of generations is like asking on which days of the week one should carry an umbrella." It seems to be a popular belief that bringing in new blood every once in awhile, or even with every breeding, must be beneficial after line breeding and inbreeding have been practiced for a few generations, but it is absolutely the opposite of the truth if my several times repeated tenet,

`Physical compensation is the foundation rock upon which all enduring worth must be built." has been followed during the period of closed-up breeding.

If my readers have obtained a correct understanding of the earlier installments of these articles, they will know that inbreeding and line breeding make for the elimination of recessive factors, which produce faults, and bring about purification within their strain.

This close breeding upon the blood of one or more superior specimens has quite rapidly done away with the influence of the more faulty ancestors, and caused a definite type to be established.

Because, at least after the first generation of an outcross mating, a breeder will LOSE THE TYPE HE HAS WORKED TO OBTAIN through line breeding and inbreeding (unless he then breeds back into his established line), an outcross should be made only FOR A SPECIFIC PURPOSE- to correct a fault or faults which may have shown up in his inbred strain. More will be written about this later.

To be successful as a breeder, one must seek to produce animals which are genetically pure for all those dominant qualities which are demanded by the breed's Standard of perfection. The nearer he approaches that ideal the more uniform-similar in type-will be the dogs he produces.

When a breeder of any variety of dogs uses the more distantly related animals in his matings, he can expect less uniformity in the offspring. So, as previously stated, if complete outcrosses are used at all, they should be made for a definite reason and not with the belief that the purpose of the matings will be fulfilled in one generation. To cover fully the reasons for this statement and prove its worth would entail the writing of a full-length installment in this series, as well as the use and explanation of many terms, which might be confusing to novices in the breeding art.

To supply some backing for what I have written however, other than my own statement of fact) which is based upon both study and experience, I quote Onstott: "Any virtues which may be added to a strain through out-crossing . . . cannot be looked upon as inherent in that strain UNTIL THEY HAVE BEEN PURIFIED AND FIXED WITHIN THAT STRAIN THROUGH INBREEDING.

Out crossing is only to be employed as a means to an end and as a preliminary to the FIXATION of its good results, if any, through inbreeding."

### **Strains and Real Strains**

To those who have become readers of DOG WORLD since this series started, I might explain that in speaking of a "strain" I mean, as someone has put it, a "variety within a variety" of animals.

One familiar with many breeds of dogs is struck by the fact that few breeds have many real strains within them. Uninformed breeders speak of "my strain" or "his strain" when all that any of them have is a kennel of dogs possessing hit-or-miss pedigrees with a hodgepodge of ancestors, perhaps including "Champions" in their pedigrees, which, of course, indicates to the cognoscente that the advertiser is a rank and uninformed novice of the first order. In conversations, these people usually speak of their "strains" when, as stated above, all they have is a mixture of several strains, or perhaps one of "just dogs" with no rhyme or reason for any of them having been mated together.

However, where there ARE real strains within any breed, one seldom finds them unmixed with the blood of other so-called strains, because most breeders start their strain with the same ancestor, or ancestors.

This is done because those mutual ancestors were considered to be great dogs of their time, as they probably were, or else a breeder knowledgeable and serious-minded enough to start building a strain would not have chosen them.

WHEN such superior specimens have in mutuality been selected by the founders of different strains within a breed, the so-called out-crossing between their strains is less hazardous than would be the using of animals with either no, or very distant, relationship.

I shall continue this important subject of out crossing in the next installment and try to explain how best to do it, when it is considered advisable.

### **Part V**

In the preceding installment, I stated that there are few real strains within any of the various breeds of dogs in this country. I defined a strain as being a "variety within a variety" having a distinct type, the members of which are recognizable as being of that family.

It was also explained that, where there are strains, one seldom finds them unmixed with the blood of other so-called strains since most breeders started their strains with the same ancestor or ancestors, this because that dog or dogs were great ones of their time and recognized generally as being so. When outcrosses are made between two such strains, there is not as great risk as though there were not common ancestors reasonably close up in both pedigrees.

Before going further into the subject of out-crossing, I feel it should be repeated that NO complete out breeding should be done unless some fault or faults have shown up in an established strain. If even through careful selection during the building of his strain, a breeder finds he has some shortcomings he cannot eliminate or improve without using outside blood, then it is time to outcross. This may well be one of the most critical periods in his breeding career.

It is not the experienced and informed breeders who constantly practice out crossing but rather the novices and uninformed who hope, through-out crossing, to retain all of the virtues, the while they eliminate the faults, in the first generation resulting from an outcross. Unfortunately, it is not as simple as that, for out crossing BRINGS UNDESIRABLE CHARACTERISTICS TOO. Faults brought in through-out crossing can be eliminated or line breeding of the progeny resulting from an outcross.

#### **To Get Desired Characteristic When**

In reaching out, through outcross blood, to obtain some wanted characteristic not present in his strain, or to correct a fault he has not been able to eliminate from it through closed-up breeding, a breeder should make the outcross as partial as possible.

In other words, he should obtain the desired correction or improvement through using a stud possessing the needed trait, and who is also, if possible, related to his own strain-the more closely related the better.

Through this procedure he may save himself from the necessity of generations of breeding to regain the virtues already in his strain as well as hold those he obtained by out crossing. This is true because out crossing is quite as likely to destroy the good traits already possessed as to add others which are missing and desired.

Perhaps at another time I will explain the basis of this principle by going into the matter of genes and chromosomes and how they combine. For the present, however, as I have stated previously, I am making these articles as easily understandable as possible to the novice breeder. To do so, I must at times make statements of fact known to every geneticist and student of animal breeding, without explaining scientifically the proof supporting them.

So important is the matter of what to do after making an outcross, I think it should be repeated that any bad results from out crossing can be eliminated only through continued inbreeding or line breeding, and careful selection, so that the benefits derived from out crossing may be incorporated in one's strain.

There are two reasons why a breeder sometimes obtains approximately what he is seeking in the first generation of an outcross. The first is that what he believes to be an outcross may be the mating of two dogs who are not as unrelated as it appears to him from looking at their short pedigrees. As previously stated, a more extended pedigree might show relationship.

The second reason takes a bit more explaining. A breeder sincerely interested in producing high quality dogs usually searches for a prepotent stud dog known to sire outstanding progeny. It is quite generally known that such males are dominant because of being, in most instances, either inbred or line bred, and, putting it in the most simple way, they thus have the power to impose their own characteristics over the recessive ones of a hit-or-miss bred bitch. Sometimes I like to explain it this way: such a cold bred bitch can be likened to the seed bed, the earth, while the male's sperm is the seed which produces its own kind. Of course, the reverse is true when the bitch with inbred dominance is mated to a cold-bred stud.

### **Danger**

When salubrious results are obtained in the first generation of an outcross, many breeders think-, the mating was an unqualified success and all they need do thereafter is to continue such out crossing to, become great breeders with an established type of their own, producing a high average of good ones. They could not be more mistaken, since the exact opposite is sure to occur. I can do no better than quote here from the world-famous geneticist Dr. E. Fitch Daghlish, who is also a contributor to DOG WORLD. - The following is an excerpt from his article in the June 1959 issue:

"INVISIBLE FACTORS INHERITED: One of the fundamental principles of genetics is that it is not the visible properties of individuals that are inherited but those factors or genes which endow them with the ability to produce certain qualities under certain conditions. When two animals differing in genetic make-up are mated, their offspring must be genetically impure in varying degrees however closely the two parents may resemble each other in outward appearance. It is this, which causes the wide variation in size, shape, constitution and so on that is invariably seen is, the second generation of cross breeds.

Impressive examples are furnished by the familiar utility crosses in poultry, cattle and pigs produced by farmers. Such first crosses are, as a rule, very uniform in appearance and for certain purposes are preferred as layers or fatteners, but if such hybrids are bred from the results are always disappointing.

They are impure in respect to so many genes for all those factors in which their parents differed-that their progeny show the widest variations and include a large proportion of individuals of very low quality from whatever point of view they are judged.

"It may be objected that what happens when different breeds are crossed is not relevant to the effects to be expected from out crossing within a single breed but, genetically out crossing and crossbreeding differ only in degree. Both involve the mating of individuals whose genetic constitution is almost certain to differ widely so that there must be a drastic reshuffling of genes in the offspring." (Italics are my own.)

It should be remembered, therefore, that as dog breeders we are dealing not only with the physical structure of a mating pair, but with the GENES inherited from the forbears shown in their pedigrees.

### **Failing of Many Breeders**

The number of breeders who know practically nothing about the ancestors of their dogs is appalling. Many cannot even name when asked, without looking at a pedigree, the names of the sire and dam of a dog or dogs they own. Were they asked for a four-generation pedigree of one of their dogs, only a few could write it from memory. In my breeding days I could do this on any one of a hundred or more dogs in my kennel, with seldom an error.

My contention is that, unless a breeder can do likewise and also has quite a complete knowledge of the virtues and faults of all the ancestors through at least the third generation and even further back is preferable he will not become even a good breeder, let alone a great one. He MUST KNOW from whence came certain traits, both desired and undesired, if he expects to retain or eliminate them. This cannot be accomplished by hit-or-miss breedings, be they inbred, line bred, or, most certainly, outcross.

Whenever a breed becomes popular, there is an influx of novices not only ignorant of what constitutes a good specimen in the variety, but much more lacking in any knowledge of animal breeding. Newcomers should be, and usually are, welcomed when they indicate a sincere desire to find out what a good specimen of their chosen breed IS and have a willingness to learn and study. It is they who must replace those who are constantly disappearing from the game for one reason or another.

Of late there has been a big influx of beginners in several breeds, Poodles, German Shepherd Dogs, Miniature Schnauzers and Basset Hounds, to name just a few. Most of my life having been spent hobby breeding German Shepherds; my connection with, and knowledge of, that variety is greatest, but I understand somewhat similar conditions as to the type of breeders above also exist in breeds other than the German Shepherd Dog.

Referring now to what has already been written about out crossing, I can state unequivocally that in the German Shepherd Dog breed, as in no other, can so many of the evils of that kind of hit-or-miss breeding be found today. Out crossing is more the rule than the exception. It is being done not by novices and beginners only, but also by many who should know better because of greater experience in dog breeding. The results are presently visible to all and should be a warning to fanciers of other breeds. In no other breed with which I am familiar does one observe in the show ring such a wide diversity of type.

Recent years have seen dozens of German Shepherd Dogs imported, with no two of them much alike except perhaps in faults not heretofore common to our breed in this country:

short necks, coarse and unattractive heads, insufficiently long and pushed forward shoulder blades, soft backs, rear angulation and proportion of length to height both falling far short of the breed Standard's specifications, etc.

Because of the belief, born perhaps of an inferiority complex, that anything imported must per se be superior to something produced in this country, together with lack of knowledge as to what a good specimen of the breed looks like, many of our breeders are rushing "like mad" to breed their bitches to these imports.

### **"Warning Blood"**

In all dogs we have what is termed "warning blood." As implied, this means that there are certain faults contained in the genes of those animals, which are quite certain to show up when they are mated to others. These shortcomings became dominant through a lack of selection in the matings of their ancestors, which, properly planned, would have eliminated them. I wish to pursue this subject only enough to use it as a demonstration of WHY any kind of out crossing, and especially that which is now being done in German Shepherd Dogs, is dangerous and can eventuate in harm to the breed.

As has been pointed out, a breeder, to be successful and not trust entirely to luck, must know the background of his mating pair.

He must, most importantly of all, know the WARNING BLOOD behind them. It is difficult enough to learn of such warnings in the pedigrees of dogs with several generations bred in this country, so HOW can he find out about those from abroad?

The fact is that probably not one in a hundred of the breeders using imports DOES know one darned thing about what to guard against—long coats and all of those quite commonly possessed faults listed above.

If he is ignorant of what a good specimen of his breed looks like, or hopes that the visible faults in the dog are not inherent and will not appear in descendants "even unto the third generation," he is fooling himself and doing his breed a great disservice.

### **Imports Could Be "Tainted"**

Our Shepherdists were the first to take cognizance of, and try to do something about, hip dysplasia, that crippling disease found in so many breeds. Great efforts have been made to eliminate it through an educational campaign instructing breeders to use only sound animals for breeding purposes. This is admirable and to be commended, but how sincere, may I ask, are those (and amongst them are several who were the loudest in their demands that affected dogs be discarded as breeders) who themselves bred to these imported males?

The taint has been shown to be inheritable. Not the slightest attention is, or has been, given to it by foreign breeders. The individual dogs may be shown to be untainted through an X-ray examination, upon or before importation, but what about the genes they may carry for it? Do the importers know—do the purchasers from these importers know—do the fanciers who breed to these dogs know? What about the parents or the littermates: are they "clean"? Who knows? The answer is that nobody knows, because no recognition is given to hip dysplasia in Germany—no X-rays and no consequent culling of their breeding stock.

Theoretically, dogs in this country could eventually be produced free of the taint, and then one imported dog carrying it could start the whole thing over again. It is commonly known that some of these imported dogs are amongst the worst offenders in siring dysplastic progeny (and orchidism, as well). At least one



dog, perhaps as perfect a specimen as has recently been brought to this country, and for which a big price was paid, has been returned to Germany by a conscientious American breeder because she was dysplastic.

What does all of this actually mean to breeders? It means that out crossing is particularly dangerous when traits both visible and those inherent in the mating pair's ancestors, are not known. A breeder is gambling when he makes an outcross mating, and it is an outcross breeding when no common ancestors appear in the fourth or, at least, the fifth generation. In out crossing one is mixing the bloodlines of different strains and consequently unwanted recessive characteristics are likely to be brought in. Very often novice breeders present the pedigree of their outcross-bred bitch to me, asking for advice about breeding her. Such a pedigree cannot be evaluated properly because it is impossible to know the genetic makeup of such an animal.

### **Summation**

Never outcross when things seem to be going well-do it only as an experiment, or when some fault or faults cannot be eliminated by staying within one's strain Breeding complete outcrosses is a dangerous procedure, sure to result in a hodgepodge of breed traits with a loss of all true type, if practiced carelessly, or beyond an initial mating for a definite purpose.

When, and if, an outcross is made, every effort should be expended to see that the outcross dog brings in as few alien traits and genetic impurities as possible. To insure this, one should use an individual, which carries as much blood as can be found of the foundation stock of the strain which is to be crossed.

After an outcross has been made, a breeder should then breed right back into the original strain. This is the only safe procedure after the purpose of the outcross has been achieved.

As Dr. Daghli states it: "Only in that way can the high degree of genetic purity established in a valuable true-breeding strain be recovered and the bad effects of mixing the genes carried by unrelated animals be avoided."

## **Part VI**

### **Better Not to Breed Without Knowledge**

In earlier installments I have pointed out both the benefits and dangers inherent in line breeding or inbreeding and dwelt at considerable length on the necessity for using only as near faultless stock as it is possible to obtain as one's foundation animals. It is very evident to me now that I have presupposed a greater knowledge of what constitutes a good animal of any given breed than the majority of its fanciers possess. This being true, it seems to behoove me now again to warn some of today's breeders NOT to attempt any kind of closed-up breedings; in fact, not to do ANY breeding until they have a better knowledge of WHAT they want to get FROM their matings:

Of course, the person who is interested only in the commercial aspect of the game, the breeding of dogs to sell and make money (if indeed that can be done), or because it is fun to have some cute puppies around, will have no interest in what I have written previously or in what I say now.

To the many, however, who seem sincerely interested in breeding better specimens, to the many who want to know HOW to do it, I want to stress as strongly as I can: YOU MUST FIRST KNOW WHAT IS A GOOD DOG OF YOUR BREED. In other words, know your breed before you try to breed it.

The manufacturer of any product must know what that article should be and look like before he starts to make it. The baker of a cake must know what a cake should look like and, in each instance, the manufacturer and the baker must know, and be able to recognize any and all faults or shortcomings in their products.

### **We Must line bred-But Wisely!**

The subject of inbreeding and line breeding might be summed up this way: Probably no great epoch or step forward in any breed has ever been achieved without the constant and unhesitating use of consanguinity; at the same time we must realize that its use is full of dangers and pitfalls for those novice breeders who fail to recognize the imperative need for using only stock which is sound in constitution, organs and structure-and which also possesses outstanding points of merit, with NO SINGLE FAULT COMMON TO THE TWO ORIGINAL PARENTS.

This means we must line bred, but line-breed wisely, and not until we are able to recognize all the shortcomings, as well as the merits, of our dogs, and are informed about the same in their ancestors.

Need for the above advice, or warning if you will, has been impressed upon me more and more as breeders have contacted me. Some have asked if they should line bred upon dogs whom I have found to be so "full of holes"-with so many faults-that they should not be used as breeders at all.

Then there are so very many, especially in German Shepherd Dogs, who state their intention to inbreed or line breed upon imported animals. When asked, they admit to no knowledge whatever of the inheritance factors possessed by these dogs, the good as well as the warning blood in them. To breed to them in order to find out is one thing, but to plan the building of a strain, through inbreeding and line breeding on them, is quite another matter.

### **Always Know What to Expect Through Inheritance**

It should be made clear that I am not taking any stand against breeding to some of these imported dogs. On the contrary, I recognize that doing so has given the German Shepherd Dog breed in this country a boost and eventuated in some excellent specimens.

The point I am trying to get across is based upon what I have written above; i.e. that ONLY those breeders knowledgeable in what constitutes a near-perfect specimen of the breed, as well as those having information on what to hope for, and look out for, through inheritance factors, should even THINK of doing closed-up breeding on them. The same, of course, applies to our American-bred dogs.

While on this subject, I would indeed be remiss did I not again point out some of the traits which I find so very many of our German Shepherd Dog breeders of today are either not knowledgeable enough of their Standard to recognize, or which they ignore- traits that, should they be "set" through inbreeding or line breeding, would put the breed back many years and be all but impossible to eradicate. I realize that these were listed in earlier installments, but because there seems to be few who know them, even amongst judges, I feel that attention should again be called to them.

### **Serious Faults in Some Imports**

The most important faults in the imported German Shepherd Dogs, it seems to me, are these:

Lack of proper type as defined by the Standard of the breed. Where it calls for dogs to be longer than high, very many are practically square.

Proper angulation at BOTH ENDS is difficult to find. Rear angulation, in many instances, approximates that of Collies, while the forequarters have scapulars (shoulder blades) much too short and steep-pushed up into too-short necks.

Properly high-set withers, with strong backs, are all but non-existent in many of these imports.

The very idea of, even the giving of consideration to, inbreeding or line breeding on such dogs, causes any real student and lover of this noble breed great concern.

As most of those either contemplating or engaging in such a breeding program are novices or formerly unsuccessful breeders, I can but hope that my "lone voice crying in the wilderness" will make them pause before irreparable harm is done to the breed.

### **Recapitulation**

(1) Through studying the breed's Standard of Perfection, attending dog shows, talking with knowledgeable people in one's breed, and owning good dogs, a breeder should learn what IS a good specimen of his breed before he starts ANY breeding operations, let alone the more or less involved types such as inbreeding and line breeding.

(2) When either of the latter are attempted, make certain to select as near faultless foundation stock as it is possible to get, and cull relentlessly, never mating together two dogs with similar faults. I repeat for the umpteenth time in this series "Physical compensation is the foundation rock upon which all enduring worth must be built."

### **Regrettably Little Information for True Breed Students**

In some of the preceding installments I have pointed out that most of my experimenting with various breeding theories has been done with German Shepherd Dogs, but stated my sincere desire to be of all help possible to beginners in any breed. Resultant information obtained from the many contacts made since the appearance of the first article in this series has shown me how many dog breeders are deeply and seriously interested in obtaining knowledge which will enable them to produce better specimens of their particular breed.

It is indeed regrettable that, at least in the more popular breeds, with a consequent greater number of fanciers, there are not more sources of information available to such students, that there is not a printed compendium of knowledge about the various qualities of the leading sires in each breed.

It goes without saying that any such record should be compiled by very knowledgeable and experienced fanciers of a breed, and, of most importance, that it be fostered by its Parent Club. While such a program presents great advantages in theory, its practical application is all but impossible, especially if the compilers of such a record essay to give breeding advice.

### **Part VII**

After each article, correspondence and personal conversations have indicated to me the need for further elaboration upon inbreeding. The old bogeys and superstitions held by so many, and for so long a time,

seem all but impossible to eradicate. They pop up even in some scientific circles amongst investigators whose experiments have quite patently been conducted in a wrong or incomplete manner.

An instance at hand is the recent report of a Laura A. Harris and associates regarding inbred bulls and their semen evaluation. Since nothing was stated as to any selection having been made to ensure potency when the inbreeding was done, one must presume that this factor was not given consideration. Most certainly through inbreeding one can increase, or lose, not only virility but the many other traits composing an animal. It all boils down to CAREFUL SELECTION.

In this short article, preceding the final chapter which I hope to have ready for the March issue of DOG WORLD. I would like to draw attention to some facts which are so often overlooked or forgotten. Because there are so many misconceptions about closed-up breeding, it might be well to touch upon certain categories of living or animal organisms, starting with Humans.

### **Humans**

The origin of the human family is mysterious, but history has given us certain examples of consanguinity. We have read of an old Syrian tribesman named Terah who had three sons and a daughter named respectively Nahor, Haran, Abram and Sarai, by different wives. Contrary to modern custom, the two latter (half brother and sister) married, and their son married Nahor's granddaughter who was twice his first cousin, once removed, and they were known as Isaac and Rebekah. Their son Jacob married his two first cousins (great-granddaughters of Nahor, Terah's son) and had eight sons, who became the founders of the most persistently influential nation in human history, the ever-miraculous Jewish race.

Eight of the twelve founders of tribes have each four separate crosses to Terah, and they passed a law to establish their tradition that their children should not marry into strange families, which law survives in essence today.

Of the many charges brought against the Jews in all of history, nobody has ever levied, or even heard, that of degeneracy.

### **Wild Animals**

In wild animal life amongst deer, foxes, rodents, cats, dogs, horses and cattle, inbreeding, checked only by the SURVIVAL OF THE FITTEST, has prevailed uninterruptedly since time immemorial. As a result, there has been a pronounced similarity prevailing in the age-long result; nor is there any inherent degeneracy traceable to such inbreeding.

### **Horses and Cattle**

Some mention has been made in previous installments of foundation horses from whom almost all of today's race horses stem. Those much more conversant with horse pedigrees than am I could supply interesting and valuable data, I am sure, but I shall not attempt it without a great deal more studs' being given to the subject than is possible.

A piece of enlightening information did come to my attention some time ago, however, regarding cattle. It has to do with milk-producing Jersey cattle.

Quite some years ago, a daughter of the bull Saturn and the cow Rhea was mated to her full brother, and the resulting heifer was mated to her sire; the daughter of this mating was mated to her full brother and,

again, the resulting heifer was mated to the same bull; their calf was put to the same bull and their calf yet again to the same sire.

The result of this intensive and exaggerated inbreeding, by which the last calf had nine crosses of the same original parents (Saturn and Rhea) and no other blood, was Purest, a cow of exceptional vigor and robustness, and an amazing milk producer.

### **Pigeons**

Many such examples as the above might be found in all varieties of livestock but only those in which the excellence lies in strength, vigor and fertility would help to open the eyes of a generation of breeders who have associated inbreeding with a loss of those attributes.

There is perhaps no greater test of physical endurance than the prolonged flight of a racing pigeon; here, if ever, one might expect a constant demand for "new blood," but what are the facts? I have read that Continental and British breeders of racing pigeons vie with one another in "wrapping up the blood" of their stock-that is, in preserving their own strains in concentrated form.

### **Summary**

What is true of humans, horses, cattle, pigeons, and every variety of animate beings is, of course, equally true of dogs: By inbreeding and line breeding we intensify both the merits and the faults of the original foundation parents.

The Syrian tribesman Terah must have had a strong, healthy body and a keen, lively and judicious mind. The cow Rhea must have had much more than a productive udder to commend her highly for being bred upon so heavily. Dreadnought (the Abraham of homing pigeons) must have had not only a deep keel and strong wings but must have been perfectly balanced throughout. Cottage Queen (the first hen to lay an egg every day of the year except Sundays and Bank Holidays) must have had no ovarian blemish to bequeath to her countless daughters.

We as dog breeders, when considering inbreeding and line breeding, MUST remember that outstanding quality is good; indeed, it is excellent, but the absence of similar faults or shortcomings in the mating pair is every bit as important. We must also remember that by using as our tap-root, or foundation, animals for inbreeding or line breeding two specimens having a similar fault, it is far more easy to establish that fault in our strain than had we used some other type of mating.

Any student who will take the trouble to study the original forebears of any strain in any species of livestock will find that inbreeding and line breeding have played a large part in creating their type. There is a persistent belief that such breeding endangers virility and fertility, but the absence of the latter essentials to existence is, in any case, very common, inbred or not.

Many domestic animals are weakly, many are sterile, and any tendency in that direction in a parent becomes, of course, doubled by inbreeding. This belief, therefore, becomes re-established by the experience of those who have inbred their stock WITHOUT ADEQUATE SELECTION OF SOUND SPECIMENS.

### **Part VIII**

In these, the final installments of the series which has been appearing for several months, I have been asked to supply both a summation, and some examples, of planned matings.

First, it must be recognized that all faults, excellencies, capabilities and diseases of all living matter can be divided into two categories, depending entirely on whether they are (1) inborn, or (2) acquired.

To obtain a proper understanding of these two terms, it is necessary to study briefly another point. All life has its origin in what is known as the living "cell," the lowest form of animal life consisting entirely of one single cell. As the animal forms rise to a level above this simplest type of life, more cells are added and the creature becomes an organism of multi-cellular life.

The cells of which an animal is composed are of two kinds: the pro-creative germ, or birth cells, and the body cells. The first of these, the germ cells, are the most important in planned breeding and are the result of the fertilization of one cell, the ovum of the female, by another germ cell, the sperm of the male. Because these cells are the true bearers of the heredity of the individual, and their chromatin material passes on from generation to generation, these are the ones with which we are concerned in this study.

### **The second group of cells**

The body cells are essentially covering or protective cells. In higher animals they are always associated with the idea of protection and use and are of various kinds; such as, muscle cells, bone cells, skin cells, etc.

Because we are here mainly concerned with the matter of heritable characteristics, rather than acquired, little need be said about the latter. It might be well, however, with the object of clarification in mind, to consider briefly some differentiation between the two groups of cells—this particularly because, I have found, there is confusion in the minds of some beginner dog breeders as to what constitutes inherited characteristics in contrast to those which are acquired.

So very many ask, when some fault of their dog is pointed out to them, "Can I do any-thing to correct it?" or "Will exercise improve the condition?" They thus indicate their confusion over the two types of cells. It seems to me that unless an understanding is had on this matter, there would be little help given to novices in the breeding art by the further consideration of a breeding program.

As is well known, there is never any growth without the stimulus of nourishment of some kind. Thus the GERM cells develop under the stimulus of nourishment, while the growth of BODY cells comes through the stimulus not only of nourishment, but also of use or injury. As examples, muscle is developed by use while the bad effects sometimes eventuating from distemper are caused by injury.

These points are important for an understanding of the subjects of particular interest to dog breeders, named the inborn and acquired faults, virtues, or diseases of their stock.

### **Inborn Traits Heritable - Acquired Are Not!**

It can thus be seen that the inborn and the acquired characteristics are in two separate classes.

The inborn is the result of the germ cells and is heritable, while the acquired affects the body cells, is not continuous in its life, and so cannot be transmitted. Take as an example rickets, which is a disease of the bones (the body cells) due to a lack of vitamin D, calcium and phosphorus. It is, therefore, an acquired disease and is not transmitted, although, through faulty metabolism, the ability to assimilate the above mentioned essentials of proper nutrition might be.

On the other hand, the short tails which often appeared in the descendants of Nores v.d. Kriminalpolizei back in the nineteen twenties' German Shepherd Dogs were the result of an inherited trait due to genetic influence.

Contrasted to this, we find that the tails of several breeds of dogs, such as Fox Terriers and Dobermans, can be docked for generation after generation and, as this is a body cell injury and not inheritable, no change is made in the germ cells and succeeding generations of these dogs continue to come with long tails.

If the above principles are understood and applied to dog breeding, it will at once be seen that the main essentials of a good specimen are all dependent upon inborn characteristics and are therefore inherited.

By training, feeding, and other good care, they can be improved up to a certain PREDESTINED point, but beyond that it is impossible for them to be changed or improved.

This explains the characteristics, which are hereditary and thus transmissible, but when we come to the manner in which they are transmitted, in what degree they are transmitted, and how we can increase or eliminate them, the questions become much more difficult to answer.

Numerous scientists in the field of genetics have propounded various theories of animal breeding. As is well known, Mendel based his experiments on sweet peas, with which he explained the transference of characteristics from parent stock to succeeding generations. The characteristics of sweet peas are limited, but in dogs there are almost unlimited inherited factors and combinations of factors.

Gait for example, depends not only upon the conformation of the dog as regards his skeletal structure, but also upon the muscles working over it and the motor-nerve force stimulating them to action. The complexity of all these influencing factors is such that any attempt to use the Mendelian theory in the breeding of dogs is, for all practical purposes, out of the question.

This law, now generally accepted by all authorities on animal breeding, presupposes that the two parents contribute, between them, half of the inherited traits, each of them contributing one-quarter. The four grandparents contribute among them one-fourth of the inherited traits, or each of them one sixteenth. The eight great-grandparents contribute among them one-eighth, or each of them one sixty-fourth, and so on, the whole inheritance equaling the sum of the series.

It might be well to interject here a mention of how little influence any grandparent or great-grandparent has, when it appears no more than once in a pedigree, and also to indicate, to the proponents of continual out-crossings, how they are misleading both themselves and those who listen to them when they point to some notable dog in the third or fourth generation of their dog's pedigree as being of particular value.

In order to apply Galton's law with any degree of success, an animal breeder should be in possession of very accurate data as to the characteristics of the ancestors of the mating pair, and this is often difficult to obtain. Furthermore, too few dog breeders are sufficiently interested in their breed's improvement to take the trouble to look for such data before making their matings.

A further hindrance to the obtaining of accurate information is that our conception of beauty and perfection is so changeable. Ideas regarding these attributes are comparative and our standards change continually, while perhaps not in actual wording, at least in interpretation by the judges.

These differences of opinion and selections by judges, some qualified and perhaps more who are not, lead to confusion. They make all but impossible any definite standard of beauty or utility.

While, scientifically speaking, neither Mendel's nor Galton's laws can be applied, practically speaking there are known results which work out very much in accordance with them.

### **Producing and Breeding Hybrids**

For example, Mendel, in his experiments with sweet peas, bred together a tall and a short variety and got a hybrid generation. He bred these hybrids together and found he obtained 75 per cent tall plants and 25 per cent dwarf plants. The small plants were then bred together and produced nothing but small plants, but the 75 per cent of tall plants, when bred together, produced two kinds: (1) a mixed collection of tails and dwarfs, and 2) nothing but tails, the ratio of tails to dwarfs being as 2 to 1.

In this way he learned that by breeding two hybrids (or intermediates) the result was 25 per cent tall, 50 per cent mixed, and 25 per cent dwarfs.

In all breeding it must be remembered that there are two types of characters, or factors, DOMINANT and RECESSIVE. In sweet peas, the tails were proven to be dominant and the dwarfs recessive, and each, when bred to its own kind, bred true; whereas the mixed when interbred produced the same formula of 25 per cent tall or pure dominants, 50 per cent mixed, or impure dominants, and 25 per cent dwarfs, or pure recessives.

To set up the formula as simply as possible, we will take the letters PD to represent pure dominants (tails), PR to represent pure recessives (dwarfs), and ID to represent impure dominants (intermediates).

The result of a union of two ID would work out as follows:

ID plus ID = 1PD, 2ID, 1PR.

That is, there would be one pure dominant to three others.

### **The Formula in Practice**

If we consider some of our most prominent sires of the past whose records are available to us, as well as a few of the present dogs, we will find that occasionally there comes along a stud who seemingly sires outstanding specimens, as judged by their show wins. This is also true of bitches, as evidenced by Ch. Nyx of Long-Worth, for example.

I am mentioning the late Ch. Nyx here both because she is well known to every Shepherd breeder, and because she has undeniably had a greater influence for good on the breed than any other bitch, at least in comparatively modern times. Something of her record was given in an earlier installment and, while much more could be supplied, it would not serve my purpose here.

By the same token, I could use her grandson Ch. Vol of Long Worth, were I to choose a male for the purpose. Let us suppose that the parents of Nyx were both impure dominants and, for use in as simple a manner as possible, that the average litter is four in number. Then it is possible, even if not proven scientifically, that Nyx was the pure dominant, in various characteristics, in her litter.



While I found in actual breeding use that she was dominant in quite a number of characteristics, suppose we select one, rear angulation, to use here. (Although I am cognizant of the fact that rear angulation is not a simple genetic factor, but rather a combination of factors, it will nevertheless serve to well illustrate my point.)

Now let us set up some possible matings and their results. Taking the average litter as four, and figuring on three litters, there would be twelve puppies. Nyx, with dominant good rear angulation, if mated to a male with dominant good rear angulation, would produce all pure dominants. Mated to a sire with impure dominant rear angulation she would produce one-half pure dominants and one-half impure dominants. If mated to a pure recessive—a male with straight angulation in the rear as a pure recessive characteristic—she would produce all impure dominants.

These results may be tabulated as follows:

PD plus PD all PD

PD plus ID = one-half PD, one-half ID

PD plus PR all ID

Of the twelve puppies from the three sires, Nyx would produce six pure dominants and six impure dominants, but no pure recessives, as shown above.

Now take a bitch who is an impure dominant in this factor of rear angulation. which for demonstration purposes we have selected as the trait to use as an example, perhaps one of the above ID offspring.

The formula works out as follows:

ID plus PD = one-half impure dominants, one-half pure dominants

ID plus ID one-fourth pure dominants, one-half impure dominants. one-fourth pure recessives.

ID plus PR = one-half impure dominants, one-half pure recessives.

Again, taking the average litter as four, there would be twelve pups out of this impure dominant bitch, sired by a pure dominant male, an impure dominant male, and a pure recessive male. There would be three pure dominants, six impure dominants, and three pure recessives in the offspring.

Thus, from a pure dominant female there would be in twelve puppies twice the number of good ones, or pure dominants for sufficient rear angulation, and no really poor ones. Again, as stated above. I used the bitch Nyx in these illustrations only because she is better known amongst the fancy than any other bitch of the breed, with a record of producing winners from every mating.

In the actual working out of these theories it is perhaps easier to use a sire. His ancestry is usually better known, and through being bred to many bitches his classification as to whether he is PD. ID. or PR in certain factors is more easily and quickly determined.

All of this seems more simple than it is often found to work out in actual practice but we all know that, in speaking of the prepotency of a sire or dam, we mean to what extent that animal is able to predominate in the blend resulting from matings with it. Its prepotency may vary and extend to any degree up to an entire inheritance.

Earlier in this article I mentioned Galton's law and stated his theory that each ancestor contributed a certain proportion of the sum total in the offspring.

We will now take up what is sometimes termed "piling up the blood" of certain ancestors, or inbreeding and line breeding, the terms used when the name of some ancestor appears several times in the pedigree. The exact term varies according to how many times the name occurs and where it occurs in the pedigree.

It stands to reason that if an ancestor's name appears twice in a pedigree, especially if it is not far back in it, then his influence must be greatly increased; if three times, then it is of still greater value.

In matings where similar blood is united- where the pedigrees of each of the mating pair contain the name of a notable specimen of the breed-we often get results which are so fortunate as to cause us to speak of that particular mating as a "nick mating."

Suppose, for example, that a bitch has the blood of many sires but three of which we will designate as A, B and C. If she is mated to a stud who also has blood of different sires, but amongst them he also has stud C. as a close ancestor, we will say, then the resultant offspring will more likely inherit the characteristics of the C dog than of A or B, or any other dogs in the pedigree.

If these characteristics are desirable and what we are striving to breed into our dogs, then the mating can be called a "nick mating." The Nyx mating to Ch. Marlo was an example, for this "D" litter containing six.

One too often hears from exhibitors and breeders such remarks as, "I breed for the type that is winning, regardless of the Standard." This means to me that the speaker's future as a consistent producer of high-quality dogs is most doubtful-and that his real interest in the "game" is the superficial one of Champions (all that were ever shown out of the eight is represented in a large percentage of our modern type, and later-day, prepotent American bred German Shepherd Dogs).

### **Applying Theory**

In as simple a manner as possible let us try to apply this breeding theory.

All animal breeding operations must, of necessity start with the female and, as it is a truism that "No stable is better than its mares." so is no kennel any stronger than its bitches. Too much stress cannot be placed upon the importance of the careful selection of a prospective matron or matrons, and an entire chapter could be devoted to this subject. It is highly important to ascertain that the brood bitch is as free as possible from inherited, or inborn, faults.

Perhaps the easiest fault for a beginner to recognize, as well as the most important, in many breeds, is that of temperament (again not the result of a single genetic factor), so I shall use that as an example here.

The brood bitch, then, should be free of inherited shyness or savageness, one fault about as bad as the other, the latter often a result of the first, and both probably as difficult to eradicate as any other fault in some breeds.

Careful selection of mates who are pure dominants in the matter of proper temperaments through several generations, is the only way to eliminate this, as with any other fault. Close breeding to pure dominants on the other side of the pedigree from the one showing the fault is the best and surest way to get rid of it.

Again, given a bitch whose pedigree is "hit-or-miss " with no definite breeding plan indicated in the combining of the blood of her ancestry-a bitch whose pedigree's so open that there is nothing to "catch hold of" the best results from any standpoint should be obtained by mating her to an inbred or line bred stud who is a pure dominant in as many desired requisites as possible. His influence should, and usually will, predominate over the traits of an outcross and a hit-or-miss bred bitch. In practically all breeds there is a big majority of such bitches, the result of generations of careless out crossings.

We will next consider a mythical bitch and try to plan a mating for her, with the object in mind of improving the mean or average quality of the breed.

### Part IX

One too often hears from exhibitors and breeders such remarks as, " I breed for the type that is winning, regardless of the Standard" This means to me that the speaker's future as a consistent producer of high quality dogs is most doubtful and that his real interest in the "game" is the superficial one of winning rather than of breed improvement.

It becomes, therefore, more important for the beginner breeder to obtain some knowledge of genetics, together with a complete misunderstanding of his breed's Standard, than for him to visit dog shows to see what type is winning!

It goes without saying that in the long pull, the time it takes to breed consistently good specimens, let alone establish a strain, a breeder must hitch to something-and that should be the Standard of his breed rather than what is currently the "style" as established by the interpretations or perhaps vagaries of the judges.

In other words, if there is to be any continuity of effort toward the production of a standard type within, a breed, it must be predicated upon an all but unchanging written Standard of perfection, rather than upon an often-changing of the Standard (either written or implied) through interpreting it to fit the present show dog. Any current fad incorporating qualities not called for by a breed's Standard can, and often does, change periodically, leaving breeders who have based their efforts on producing stock to conform to "today's winners" out of the running.

With the establishment in the minds of beginner breeders of what has already been written, we can now turn to some applications of these precepts and theories which have been propounded in this series of articles on planned breeding.

Much easier would it be, and more quickly could salubrious results probably be obtained, were the beginner breeder for whom I am writing the owner of two or three very good bitches. Such is not the customary case, however, judging from the situation of many who have contacted me since the inception of these articles. Few indeed are those who have more than one bitch and, more often than not, that one not such a specimen as a knowledgeable fancier of the breed would select as a foundation brood matron.

Questioning brings forth this usual information-they are stuck with what they have and feel they must use it. Affection for the animal, lack of funds with which to purchase a better one, or inability to find and select a more suitable bitch for their start, are the more common reasons given for not beginning with something better than the one perhaps mediocre specimen they already own.

In addition to the physical shortcomings of the average beginner's bitch, she is apt to have a hit-or-miss pedigree. There may be numerous "Champions" in it, more likely than not all picked for use because they WERE such title holders, but without any selection having been made, in the matings producing her and her immediate ancestors, for physical compensation of faults.

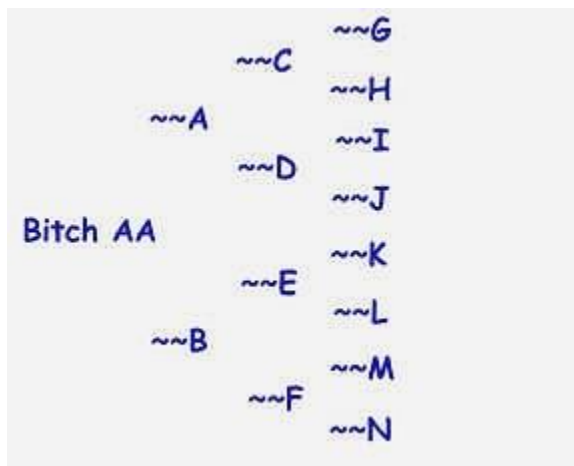
### To Achieve Better Results Faster

Our editor has asked that, taking such a bitch as an example, I try to point, out a procedure by which a beginner breeder might, most quickly and surely, improve the "mean or average quality of his production- and indeed might within a few years bring forth, and quite consistently, some "toppers."

Granted that the possessor of such a foundation bitch as outlined above must expect to spend much more money and time than if he could start with either or both: the bitch herself a good show specimen, and/or the possessor of a line-bred pedigree. In the absence of these qualifications, however, he must take the longest and most difficult road the one being traveled by the greatest number of beginners, and whom we most want to help.

Instead of names for the animals in the pedigree, I shall take alphabetical letters. In the interest of keeping the use of space to a minimum, as well as for elimination of confusion, I shall, at least for the present, project only a 3-generation pedigree.

Following, then, is the pedigree with which we will start:



It will be observed that no dog appears more than once in the above pedigree, so it is what is known as "wide open". Also that none has been designated as a Champion, although several or all of them might have had that title.

We must now carefully analyze the structural attributes of the above bitch and to do so. I shall presume her to be a German Shepherd Dog. As explained in previous installments, although I have made some study of almost all of the A.K.C. - recognized varieties, with particular emphasis on Working and Non-Sporting, the most of my breeding work has been done with Shepherds.

Furthermore, the Standard requirements of quite a number of breeds, especially those of the larger varieties, demand somewhat similar specifications They all stress the importance of type, balance, top lines, ribbing, fore and rear angulation, bone and substance, feet, correct "bite," gait, color, of eyes, color

and texture of coats, etc. Surely there are enough characteristics in that list for us to use here in an evaluation of the hypothetical bitch being considered.

Studying her, we will probably find that she has many shortcomings and faults, that she is more or less, "just another dog" of her breed. To the non-critical and uneducated eye she might be called "pretty," and is easily recognizable as a specimen of her particular breed. She might have done, or be capable of doing, some winning, even placing above superior specimens at times for one reason or another. Yes, she may even be a Champion for, as we all know, "holes" can be found in even the best of such title holders, and no absolutely perfect specimen of any breed has ever been produced or is likely to be!

### **Know Faults to Breed for Correction!**

For the purpose of our present study, we must center our attention on several faults in type or structure possessed by this bitch, so we can go about breeding her for correction and over-all improvement. I shall select top line, fore-assembly (the entire shoulder structure composed of shoulder blade and upper arm, the length of those bones, as well as their placement one with the other - the angle made where they join) and, as the third structural characteristic to be considered, rear angulation.

I have selected these three for several reasons but mainly because the proper formation of these is the most important in the make-up of the greatest percentage of dog varieties, as well as the ones most often found to be faulty.

No more than a cursory glance at our bitch indicates to the knowledgeable fancier of her breed that she is "soft in back"-that is, she has a dip in her top line, the back between her shoulder blades and hips being lower than either. When trotted, her back "bounces" instead of holding steady and firm as it should in order to insure no loss of power as it is transmitted from the rear to the front.

So, since we find this bitch to be somewhat soft in back, we will want to mate her to correct this fault in her progeny, or at least in most of her grandchildren.

Closer inspection, necessitating perhaps the use of our hands, divulges a too short and "steep" shoulder blade. Instead of being long and well laid back, or put on "obliquely", as many Standards state, this one, we find, is too perpendicular.

Likewise, as in the matter of top line, the third fault in our bitch is quite easily observable-she hasn't sufficient rear angulation, is "too straight in the rear." A full explanation of this as well as the two above-mentioned faults would necessitate the use of all the space allotted to this article.

Besides, I have explained earlier that until a breeder is fully conversant with what constitutes idealized perfection, as well as faults and shortcomings in his breed, he should not attempt, or at least expect, to consistently produce outstandingly good specimens. I must therefore presuppose a complete knowledge on the part of my readers of ALL facets pertaining to the three structural faults listed above and possessed by our mythical bitch.

Because, amongst the 14 animals in her immediate pedigree, there does not appear the same dog's name more than once, it would not be likely that we could determine from which, or any several of them, came one or more of her faults.

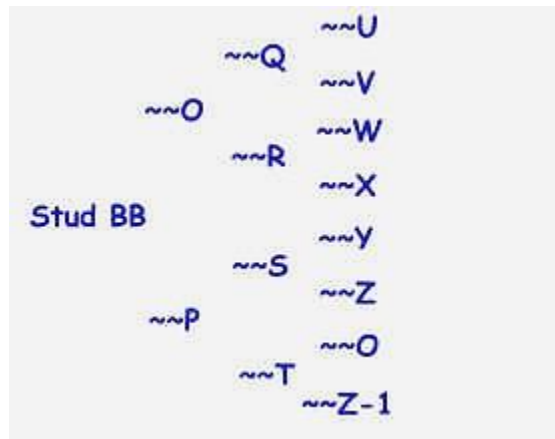
If we DO know that either the sire or dam, or any others amongst her ancestors, did have one or more of the faults mentioned, then we most certainly do not want that dog or dogs in the pedigree of the mate we select for her if we can possibly avoid it. Should such be unavoidable, then that animal should be so far back in the pedigree as to make its influence negligible.

Having a hit-or-miss bred bitch with which to start and one with such a complexity of faults, we must consider her as only a seed bed the "ground" in which to plant the improved seed (sperm) of a male who, in particular, is correct in the places where she is faulty and without other and perhaps as bad shortcomings. We must also try to find one who not only possesses these correct attributes himself but comes from dogs who had them.

We should also select a stud who is preferably inbred, or at least quite strongly line-bred, so that the strength such breeding gives to his prepotency will most likely insure his dominance in the mating pair.

### **Favorite Breeding Practice for Superior Stock**

After quite some searching for a compensating male, and study of available studs' pedigrees, the male whose pedigree follows was selected.



There is a favorite breeding theory, or system, used by successful breeders of many varieties of animals. It usually eventuates in superior stock IF the male selected is himself an outstanding specimen, nearly faultless, and has such progenitors.

It goes as follows: "Let the sire of the sire be the grandsire of the dam, on the dam's side."

Does that seem complicated? A look at the above pedigree will clarify it. The dog we are using (BB) has as his sire O, while his dam P also has as her "grandsire on the dam's side" the same dog O.

Because the majority of dog breeders formulate no breeding plan and seldom if ever, when making a mating, consider how or what they will mate any of the resultant progeny, a stud bred such as the above dog is not common. As you will recognize, it takes some years of planned breeding to produce such a dog.

In the absence of a stud with such bloodlines, those with modifications of it can be used.

As one example amongst many, the sire of the sire might be the grandsire of the dam on the SIRE'S side, instead of on the dam's. Another: the sire selected might be the result of either a full or a half brother

and sister mating, and thus inbred. And so, we might go on listing differing formulas indicating inbreeding and line breeding.

The point I want to make, however, is that in selecting a mate for a faulty bitch whose wide-open pedigree offers no individual in it free of her faults, and dominant in correcting them, one must select as her mate a dog not only himself CORRECT where she is failing, but through some intensity of corrective blood is dominant.

### Foundation on Which Worth Is Built

I feel it well to interject here that "paper breeding" is not alone the answer, any may be dangerous-in case I haven't made it sufficiently clear heretofore that:

"Physical compensation is the foundation rock upon which all enduring worth must be built."

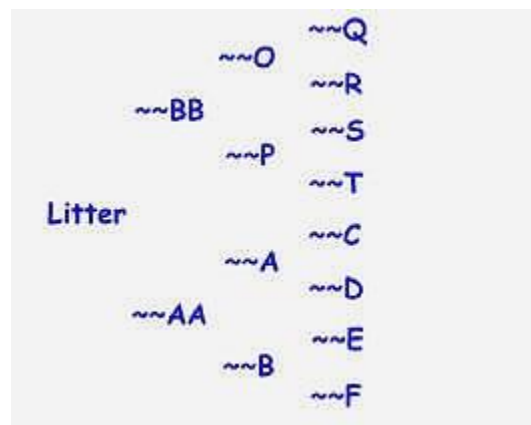
It therefore goes without saying that we have selected stud BB not only because of his line-breeding on O, but also because both he AND O are correct where the bitch AA is faulty.

It has not seemed practical for the purpose of this article to become involved with listing dogs further back in the pedigrees than are given. However, it is worthy of note that in the ancestry of our stud RB there are lines running in the fourth and later generations to top quality as well as top-winning males and bitches.

Two studs and one bitch, for instance, appear three or more times back of the 3rd generation, and all three were eminently strong in the sections where our bitch is weak. The male O, as an example, goes back with three lines to the great dog we will designate as UU and four times to one of the best bitches ever produced in the breed, ZZ.

The latter, incidentally, not only possessed a practically perfect fore-assembly, ideal rear angulation, and an un-criticizable top line, but, in turn, was a descendant of another "great" in the breed, one dubbed as "the dog with an iron back."

The litter resulting from mating the dog BB to the bitch AA would have the following pedigree:



It would be unreasonable to expect that in this first generation produced from an entirely outcross-bred bitch with several faults, although sired by a line-bred male without them, we would get any, let alone all,

of the resultant litter entirely "trouble-free." It is, however, reasonable to assume that one or more of the pups showed some, or a complete correction of one or all of the dam's faults. Why?

Because, as we have pointed out, the sire through his line breeding should be somewhat dominant over the "seed bed" in which his sperm was placed. As all experienced dog breeders know, such a mating as outlined above does sometimes produce considerable improvement over the dam, with some or most of the puppies resembling the sire a great deal more than their dam.

So that we can proceed with this projected breeding plan, in which we found it necessary to start with such a foundation head as described above, and attempt to "breed up" from her, we must go on, using the best of what we have obtained for this first mating.

### **Select Best Bitch Puppies Not Male!**

As soon as the litter is sufficiently grown so enough can be told about them to make a fairly safe selection (and this varies amongst different breeds), we try to pick the best bitch puppy. Let us presume that we find one resembling her sire more than the dam, as we have planned and hoped for.

We are not at all interested in keeping a male, and should not be in the foreseeable future, unless none such as we must use in our breeding program is available at public stud. As a beginner breeder without the space and means to permit us the luxury of maintaining a large breeding establishment, we must of necessity confine ourselves to the use of others' studs for the small number of bitches we can breed and litters we can produce.

Impatient for desired results and those good-quality specimens it is our determination and desire to eventually produce, there are two things we can now do with our foundation bitch AA. We can "pension" her as a pet, discarding her as a breeder, or we can mate her again while waiting for the selected puppy from her last litter to become old enough for breeding.

Incidentally, it is always best to keep two females in a litter from which one plans to pick future breeders, giving some insurance that, should one be lost while maturing, there will be a replacement.

Should the alternative be decided upon (breeding the bitch AA a second time), there are again two decisions to make: Shall we repeat the first mating or select another stud? The decision as to whether to repeat the mating will, of course, depend upon what came out of the first.

If a different mate is selected for AA's second litter, then who should he be? One could decide upon several courses-select another stud with different bloodlines but equally corrective and prepotent, or one closely related to stud BB.

In the first instance, the resultant litter might be of such higher and more uniform quality as to make it advisable to use one from it with which to carry on, and in the second, with the two litters having a measure of identical (and corrective) blood, a puppy or puppies from each litter might later be mated together.

### **Breeding Bitch from 1st Litter**

We are patently unable to delve deeply into such problems or matters in this article. In fact, it is bound to run a greater length than planned if I go no further than suggest what to do with the selected bitch from the first litter of BB to AA, which litter I will designate as CC.



If what I have written in earlier installments, together with this one, has been followed by our readers, I am sure you will pretty well know what I shall suggest as the next move in this projected breeding program. Yes, you are right-further use of the bloodlines of the original male BB and, in particular, that of his sire and his dam's grandsire O.

We will say, as would have been quite likely, that the puppies in litter CC showed improvement in, or correction of, the listed faults of their dam, at least to some extent. Also, that the bitch puppy selected for future breeding use was found to possess her sire's good fore-assembly, and top line but not his proper rear angulation. After all, one cannot hope for, or expect. EVERYTHING wanted from just one mating, and I am stretching the probable facts greatly when I admit to the above two improvements so soon after the start. But, in the desire to be helpful, I should be as encouraging as possible. Right?

If it takes longer to obtain such correction as outlined above, do not be too discouraged, you must continue with intelligent breeding to corrective and, if possible, closely related animals.

In the mean-time, this warning: Make sure you do not lose other and valuable characteristics possessed by your breeders, the while you work to eliminate the three special faults we have listed as needing correction.

This sounds simple, but I must warn you that it "ain't".

Well, while we have digressed above, we shall take it for granted that our young bitch has matured to breeding age. The answer as to how we should mate her, from own experience and in my best judgment, as well as in accordance with genetic knowledge, has been given above. It occurs to me that we have not as yet named our young bitch, the product of a mating of BB and AA-so, being a 50-50 combination of the two, she is named BA.

We have presupposed that BA received from her sire BB his good fore-assembly and top line but no improvement over the rear angulation of her dam AX. We therefore want to hold and 'set' the good characteristics obtained from BB. the while we acquire the proper and needed rear angulation.

Our greatest chance for success in this endeavor lies in returning to either the sire himself, breeding his daughter back to him, or in using one of his sons who not only possesses BB's front and top line but, because of blood from his maternal side of the family, has a strong dominance of proper rear angulation.

In other words, BB having been bred to a good bitch, herself possessing proper rear angulation (and if possible, others in her ancestry). Bb's son out of such a bitch should carry extra strength in this characteristic.

Here again we would be doing "paper breeding" had we not stressed the importance of physical compensation in the mating pair.

Space permitting, I might go on with outlines of suggested future use of the progeny of bitch BA from the litter by her sire BB. or one of his sons.

It should be recognized that the recommendations made in this article are not always possible of exact fulfillment. For instance, no such stud as BB, with a pedigree in which "the sire of the sire is the grandsire of the dam on the dam's side" may be found and, if located, his sire and dam's grandsire might not be at all the type of animal one would want to line-breed on.

It should be understood that, in its widest application, the recommendation made as to a mate for the foundation bitch AA would be a stud who not only himself but, more importantly, his immediate ancestors, possess as nearly as possible the proper structural attributes demanded by the breed's Standard.

Stressing the importance of the above, we must remember that inbreeding and line breeding serve to accentuate not only the GOOD but the BAD points and, Again, that when such breeding is used. STRICT SELECTION must be made.

Given a foundation bitch who herself is of superior quality as compared to the average of her breed, and who has a pedigree in which some top-quality dogs appear one or more times, the procedure recommended herein, of course, would have been different Advice would have been given to breed back on one or more of those.