Minnesota State Pigeon Association Official Newsletter
Summer 2016

Due to Bulletin Editor, Ardy Prekker, currently being involved with the packing, moving out, moving in, unpacking, building a new loft, etc. which comes with changing living places - Tim Kvidera and Gail Peterson teamed up to layout this issue of the MSPA bulletin. We hope that you all had a very good breeding season and will have some potential show winners in the group of youngsters produced.

In this issue Gail Peterson continues his series of Pigeon Pedigree Puzzlers, an interesting way to test one's understanding of some of the basics of pigeon genetics. He also has an article introducing a couple ways of determining the probability of getting different colored youngsters when the genetic make-up of the parents is known. Tim Kvidera writes about a novel experience while flying his young Tipplers. As always, bulletin editors are constantly in need of material to make the issues informative and entertaining. If you have an idea for the newsletter or would like to contribute an article, please contact us at MSPA@usa.com. We would welcome your input.

The Electronic Newsletter Reminder!

Due to the cost of postage and printing a high quality newsletter, the MSPA Board of Directors has decided to make the quarterly newsletter available on the MSPA web site. Over 93% of the current members have submitted e-mail addresses so we know that the bulk of our members have access to the Internet. For the minority of members that don't have internet access, they can view the newsletter at their local library or request a mailed copy at: **MSPA Newsletter, at a new home address which will be in a future bulletin, an update to the MSPA web site** or call (612) 889-2945. Prior to the posting of every Newsletter a postcard will be sent to each member alerting him/her to the availability of the new on-line Newsletter. For the time being no password is necessary to view the "Membership Section" of the web site. An archive of past newsletters will also be available on the MSPA web site. The Newsletter can be downloaded or printed from the web site if the member desires a hard copy. **If you have already notified me of your desire to receive the Newsletter via conventional mail, there is no need to notify me again, I will mail your copy!**

Officers' Reports

A Message from our President

Submitted by - Bruce Rhode

The show season is fast approaching. Hope your birds are doing well.

The next meeting is Saturday, September 10, at 10:30 AM, in the poultry building on the McLeod County Fairgrounds. After that meeting, Paul Lipinski will chair a separate meeting of those involved in the Loft Certification program.

We need donations for the raffles at the North Star Classic. Please contact any board member or me if you have something to donate.

Premium book ads are due by Sept. 1st to give us time to get it printed and mailed.

Looking forward to seeing you all at the meeting. Bruce

1st Vice President's Message

Submitted by - Tim Kvidera

After getting off to a very late start, the breeding season at Tip-In-Tail loft has had mixed results. The rare colored Homers really kicked out the youngsters, Flying Tipplers did pretty well, Archangels, Pheasant Pigeons and Show Tipplers did OK, but the Fantails and Indian Fantails were sporadic to poor. Hope that you all did better.

It is time to start thinking about the 2016 North Star Classic. Renew or revise your ad in the premium book. Create a new ad if you did not have one previously. Will your breeds be represented with a specialty club meet? If not, have your breed group consider signing up for one. The North Star Classic has consistently been a highlight of pigeon activity in the upper Midwest - lots of birds, lots of exhibitors, lots of fun. The 2016 entry form is already available for downloading on the club website.

Kim Bartz, our 2nd vice president, asked to be relieved of her MSPA officer duties. At the picnic meeting the Executive Board discussed the possibility of having a junior member in that position. Patti suggested that the mother/daughter team of Jennifer Mathias and daughter Mikayla Schlosser, who are heavily involved with animal husbandry and 4H, be approached. They were interested, and so we now have a new 2nd VP team introduced to the membership below.

2nd Vice President's Message

Submitted by - Jennifer Mathias

Mikayla Schlosser (age 14) has been raising pigeons for 4 years. Her main focus is Indian Fantails, but she has had Archangels and Parlor Tumblers as well.

Mikayla enjoys sharing her knowledge of birds with others at fairs and at the petting zoo she runs for Minnetonka Apple Orchards. She is active in Carver County 4H - serving as president of her club, a county ambassador, and as a member of the 4H Federation board. Mikayla competes on the poultry project bowl team and the llama project bowl team, and shows pigeons, chickens and llamas. Mikayla is taking a breeding pair of Indian Fantails to the State Fair. This will be her first time showing pigeons there.

MSPA Treasurer's Report

Executive Summary current through August 15, 2016

Account Information MSPA Trust Checking & Savings Accounts

<u>Checking Account</u>:

Starting balance: $357.59 May 15, 2016

New Revenues: $1580.00

Transfer from savings: $1565.00; One Junior membership: $5.00; One Individual membership: $10.00

New Expenditures: $1437.78

Classic Old Frill Club: $24.00; Junior Award: $20.00; Newsletter supplies: $91.39;
Swap, replacement tire: $264.96; Keipper Cooping: $499.75; Purebred Pigeon: $232.00; NPA: $180.00;
Picnic Rental: $25.00; Trailer repairs, picnic supplies: $72.68; Monthly service charge: $14/month: $28.00

Checking Account Available Balance $499.81 Aug 15, 2016

<u>Savings Account: Business Market Rate Savings</u>

Starting balance: $ 4525.52

Transfer to checking: $1580

Pending Withdrawals/ Debits $0.00

Savings Account Available Balance $2960.52 Aug 15, 2016

Total Checking + Savings Balances = $3460.33

Respectfully submitted by - Patti Dietzel, Treasurer

Minutes of Informal meeting at the Summer Pot Luck

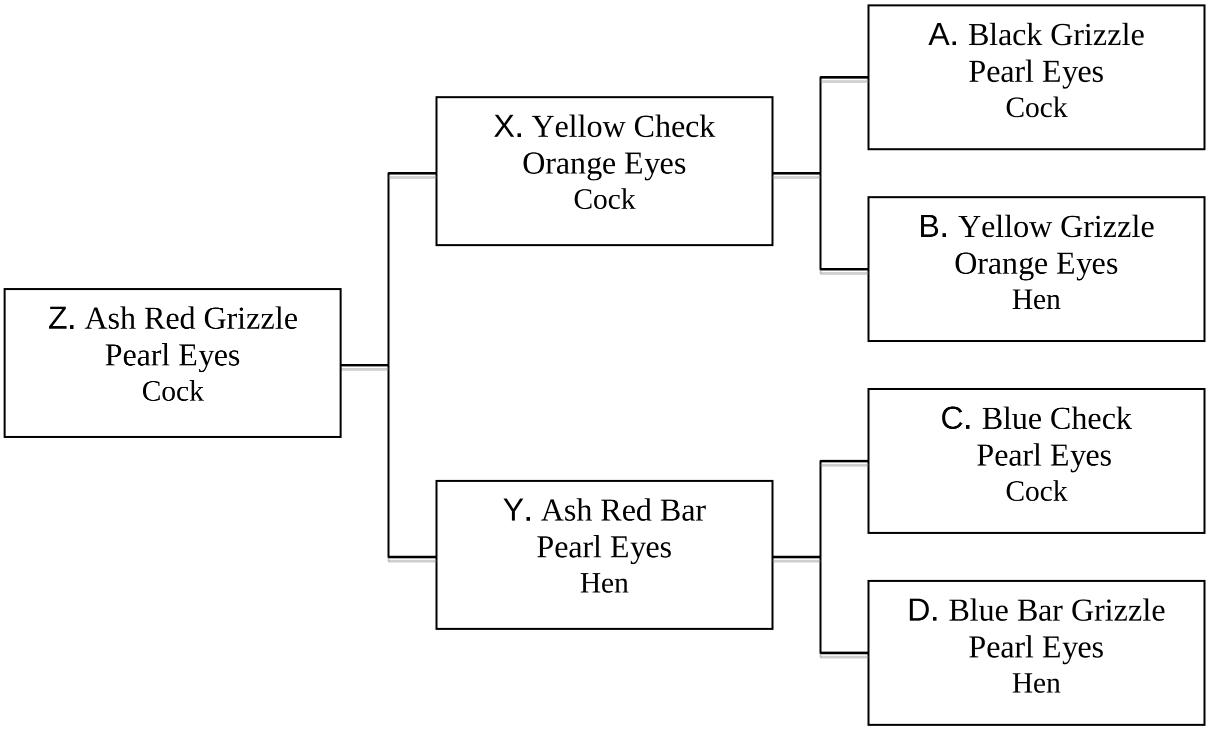
Recorded by Kathy Rhode

- Premium book ads all need to be in by Sept 1.
- At the North Star no birds will be allowed to be cooped before 5pm on Friday.
- Bruce will talk to Paul about insurance, and will get a copy of policy.
- Patti will talk to 4H about setup and clean up. Same kitchen as past years. $350 pay approved for help with BOTH setup and clean up, Carver County Interstate Exchange 4H Club will be approached on this.
- A Show photographer is needed to take pictures all day long at the North Star.
- With loft certification, are we a single entity? Can we put by age/gender without dividers? The board will be looking into this.
- 3-minute time limit on discussions for now will not be implemented, the board will control the conversation, if the board is unable to do so, a limit can be revisited.
- 2nd VP needed, Kim stepped down.

Meeting adjourned

Pigeon Pedigree Puzzler

MSPA Newsletter Summer 2016



From among the three individuals X, Y, and Z depicted in the pedigree above, TWO are genetic impossibilities in the sense that they cannot be the offspring of the specific parents indicated in the pedigree. Therefore, the pedigree cannot be valid.

To solve the puzzle, you need to answer two questions:

1. Which TWO among X, Y, and Z are the genetic impossibilities?
2. Why are they genetically impossible?

To check your answer, go to Page 13.

A New Experience In Flying Tipplers

By -- Tim Kvidera

This past September I had an experience with my Flying Tipplers that, at least for me, was quite novel and very entertaining. It involved something that I have never done in the 50+ years that I have been flying Tipplers. As members of the CNTU, we are all dedicated to bringing out the endurance flying capabilities of our birds. To that end, while settling a new round of young birds I have always quickly determined which squeakers had the most promise, based on their early tendencies as the flock began to kit - similar body type, wing action, temperament, etc. Those were then pulled from the larger group and paid specific attention to mold them into competitive flyers while the balance of that round were more or less shelved. Not totally ignored, but not pushed. Always there, if another bird was needed, but not worked hard.

I normally start off with 8 - 12 youngsters, all about the same age, when initiating the settling process. After a week in the settling cage teaching them to chase grain and trap they are allowed to leave the cage and chase grain on the loft roof. A few of them will briefly strike up and usually quickly return to the roof for more grain and when all have returned to the cage I close them in and trap them. My process repeats this a few times before putting them in the release cage and shooing them out, forcing them to fly, rather than to strike up on their own from the roof. Usually the first couple times out of the release cage they quickly go to the roof. After they get more confidence, they start flying a few laps around the loft, normally as multiple single bird "kits" which eventually begin to group up and may even look like a whole kit for a few minutes. Each time out they improve their kitting and extend their flying time before droppers are put out and birds welcomed back down. Assuming that they are worked daily, the whole process to this point takes about two weeks.

Well, that is the way it usually works for me. This fall I had 17 youngsters from the last round all ready to go at the same time. I do not recall ever trying to work that many previously. I only lost one of the 17 during the settling process and culled a consistent slacker. The novel and entertaining part of the process was the extended time it took for the group to go from the individual bird multiple "kits" to a gelled 15 bird stock kit. Normally by the third or fourth time out of the release cage the youngsters become a definite, reasonably tight flock until the weaker ones start to drop out individually as the stronger ones continue on. This larger group took two weeks on the wing daily before deciding to join together.

During those two weeks I had a most entertaining aerial display of disorganized confusion. After I release a kit I often then adjourn to my hammock and lay down to watch the kit. The only more leisurely, enjoyable way to watch a kit I have experienced is floating in his pool on a warm summer day when Stan Ogozalek had a kit up. With this group of birds, each time out they would spread across the sky above, zipping back and forth in all directions, rarely even two simultaneously heading the same direction together for more than a few seconds. It was mesmerizing watching the sky percolating with aerial acrobatics as the birds learned their craft. This was exaggerated on the windier days. Numerous near impact, mid-air collisions. Fun to watch them zip about with vultures, gulls and swallows amongst them too. After ten days of these multiple solo performances there were groups that would spend some time together as sub-kits of 4 - 7 birds. But each day the members of these groups would be different. Variety was the name of the game. Three or four days of this and presto chango all of the sudden they became a tight kit of 15 going 2+ hours every couple days.

They have been locked up a week and now that I am able to get back out with them I look forward to more time on the hammock. I can now appreciate the fun that Smittie (aka Harry Smith) had while routinely flying "large" kits of Flying Tipplers.

The Illuminating Tedium of Punnett Squares
(And the Laborsaving Practicality of Math)

By G. B. Peterson

As generations of pigeon fanciers have amply shown, it is entirely possible to be exceedingly successful in the pigeon hobby in blissful ignorance of anything and everything having to do with the science of genetics. On the other hand, it stands to reason that a working knowledge of basic genetics and some of the technical methods that go with it may occasionally be helpful in setting and attaining specific breeding program goals. This article discusses two practical tools for applying basic genetics knowledge: (1) the Punnett Square, and (2) the mathematics of probability.

The Punnett Square is without doubt the oldest, tried-and-true, simple paper-and-pencil tool in the whole field of genetics. It is named in honor of its originator, the eminent Professor Reginald Crundall Punnett (1875-1967) of Cambridge University in England, one of the true pioneers in the field of genetics. His Punnett Square was a somewhat incidental but very important practical spinoff of the many other fundamental and enduring discoveries he made.

What the Punnett Square allows you to do is this: If you know the genotypes of two potential mates with respect to some specific trait or combination of traits you are interested in, a Punnett Square can be used to predict the genotypes, as well as their relative frequencies, of offspring of those individuals. In most cases, of course, the genotypes will closely correspond to known phenotypes, and therefore you are simultaneously predicting the chances of certain phenotypes that interest you.

Let's use some of our knowledge of basic pigeon color genetics to illustrate how the Punnett Square works. Punnett Squares have "windows" or "cells" within a larger square, something like a checkerboard. The genotypes of the prospective parents are represented along the outside edges of this matrix, and are then systematically combined to produce, as the content of the cells, the genotypes of their potential offspring. You then simply count up the number of cells that contain a specific genotype of interest to determine the proportion of overall offspring that will be of that genotype/phenotype. That's really all there is to it.

Let's illustrate a Punnett Square with a simple hypothetical example. Let's say that we have a nice bunch of ash-red and blue colored Racing Homers in all the standard bar and checker patterns. But – we have never, in years and years of breeding, produced any recessive reds, and we would like to have that color in our loft. Fortunately, we know somebody who has some nice recessive red homers, and that person generously lends us a good quality recessive red hen to cross into our family of birds. What can we expect?

We know that the recessive red phenotype is based on a completely different gene from the one responsible for the brown, blue, or ash-red colorations. That is, a phenotypically recessive red pigeon is not actually an alternative color to basic brown, blue, or ash-red, all appearances to the contrary. Instead, the effect of the recessive red genes is to mask the effects of the regular color genes that the pigeon has. In a very real sense, a recessive red pigeon is, at the same time, either a brown, blue, or ash-red bird, but we just cannot see that basic coloration because it is being obscured by the recessive-red phenomenon.

Recessive red is an autosomal gene (the brown, blue, ash-red gene is sex-linked), and the allele for it (abbreviated "e") is recessive to its wild type counterpart (+). Therefore, in order for a pigeon, cock or hen, to be recessive red in its phenotype, it must be homozygous or "double dose" for the e allele in its genotype. This state of affairs is often symbolized as e//e, where the two slashes represent the pair of chromosomes on which the genes reside, but for our purposes we will simply abbreviate this homozygous condition as ee, although at times we may also use the e//e notation to make a special point.

We can safely assume that our hypothetical home-loft bloodline of homers does not have the e allele in its genetic arsenal. If it did, after all these years of breeding, we should have had a recessive red pigeon appear by now. But that has not happened, and therefore we can safely assume that, at the recessive red locus, all of our birds are wild type for that gene, +//+, or ++. We could go on breeding these ++ birds with one another for decades and never get a recessive red. Basically, then, what we have here in our hypothetical home loft is a pure-breeding NONrecessive red family of homers. But the hen our friend has lent us is, for sure, of the ee genotype because that is the only way she could be recessive red in her phenotype. If she were +e (or equivalently e+), she would not be recessive red in her phenotype but some version of basic brown, blue or ash-red instead. Because she is a genuine recessive red in her looks (phenotype), we know she must be ee in her genotype.

Remember, when sexually-reproducing animals mate, the female contributes one member of each of her many pairs of chromosomes (and all the genes on it) and the male contributes one member of each pair of his, and these half-contributions from each parent come together at the moment of conception to form a full complement of chromosomes and genes in the resultant offspring. This halving of the parents' genotypes and their recombination in the offspring's genotypes is formally represented in the Punnett Square. With respect to the recessive red gene donations by the e//e hen and the +//+ cock of our example, what will their respective offerings be? Well, no matter which of her relevant chromosomes the hen donates to the fertilized egg, be it the e/ one or the /e one, it will bring the e allele with it because she has that allele on both chromosomes (is homozygous for e) and therefore has nothing but e to contribute. Similarly, but oppositely, the cock is homozygous for the wild type allele at the recessive red location (++), and therefore whether he gives a sperm the +/ chromosome or the /+ chromosome, his contributions in this regard can be nothing other than +.

Determining the parents' possible contributions like this is the first step in constructing our Punnett Square. In this particular example, the e from the mother and the + from the father will be placed on the outside edges of our Punnett Square. As a general rule, the female's possible contributions are indicated on the top outside edge of the Punnett Square, and the male's on the left outside edge. In our example, the hen will contribute either an e or an e, and the cock either a + or a +. To fill in the windows or cells of the Punnett Square, you simply put the symbols on the left side edge into the cells that go across in the row that corresponds to each of them, and you put the symbols on the top edge into the cells that go down the column that corresponds to each of them. The result is that each cell now contains two symbols, one from the male and one from the female. This mechanical paper-and-pencil combinatorial process can be thought of as parallel to the male and female chromosomes coming together biologically in the fertilized egg. In this case of mating a hen from a pure-breeding line for recessive red and a cock from a pure-breeding line for NOT recessive red or wild type, we have:

		From the Hen	
		e	e
From the Cock	+	+e	+e
	+	+e	+e

What this Punnett Square tells us is that 100% of the progeny (i.e., four out of the four cells) will be of the +e genotype, and that fact, in turn, tells us that they will all be NONrecessive red pigeons as far as their actual color is concerned because, remember, the e allele is recessive to the + allele and therefore all +e genotype individuals will be wild-type *for the recessive red trait*, which is “not recessive red” in their phenotypic color. We could go on to mate this borrowed ee hen to each and every one of the ++ cocks we have in our home-family loft and never, ever, get a single recessive red youngster. On the other hand, as the Punnett Square tells us, every single one of those youngsters would be carrying the recessive red (e) gene. They will all be *carrying* the recessive red gene, yes, but they will all be ash-reds or blues whatever basic color their basic color genes dictate; none will be recessive red in its visible phenotype.

People are often surprised when they do a cross with an individual from a long line of pure-breeding animals for some trait but then get not even one youngster that has that trait. But as this recessive red case exemplifies, there is a perfectly lawful biological reason why that happens. In our example, our recessive red hen might come down from many generations of nothing but recessive reds, but when she is crossed with a cock from a line that does not carry the recessive red gene, she produces no recessive red youngsters --- but her young all carry the e gene.

Can we ever get any recessive reds in our hypothetical homer loft? Yes, but not just any old mating will work. Indeed, the whole point of the Punnett Square is to help us find a mating that will work. We might ask, for example, what would happen if we mated one of those +e young cocks back to his ee mother? Let’s see what the Punnett Square tells us we’ll get if we do that. The +e cock will generate two kinds of gametes, + gametes and e gametes, and therefore each of these two kinds of gametes is represented on his left-side edge of the Punnett Square. Again, the old ee hen can actually generate only one kind of gamete, namely the e gamete. So we have the following 2x2 Punnett Square:

From the Hen

From the Cock		e	e
	+	+e	+e
	e	ee	ee

So, this mother x son mating has the potential to produce two kinds of genotypes in the youngsters, the +e genotype, which will yield NONrecessive reds yet again, but also the ee genotype, which will yield, finally, the sought after recessive reds that are at least partly our home-loft bloodline. Moreover, because two of the four cells are ee, we can predict that about 2 out of 4 or 2/4 or ½ or 50% of the youngsters we produce from this mating will be recessive reds.

One very important caution here: Although the cells break out so that two out of four are +e and the other two out of four are ee, implying that we will get 50% nonrecessive reds and 50% recessive reds, this will not necessarily happen with every four babies hatched. It is a probabilistic thing. In, say, two rounds of four youngsters total, it might work out that two of them are recessive red and the other two something else, but alternatively maybe only one of them will be recessive red and the other three something else, or maybe they'll all four be recessive red or all four nonrecessive red. All those things could happen. But in the long run, such as if this mating or a number of equivalent matings were done over and over so that we get a large number of youngsters, things should break out pretty close to the 50/50 pattern. So don't forget, although we can analyze the big picture logically, every new breeding is a roll of the dice, and when you're dealing with probabilistic processes, there is no way of predicting the result with absolute certainty.

And this, then, is a propitious time to introduce the second topic of this article: the mathematics of probability. If we know the genotypes of our prospective mates, which we must in order to make a Punnett Square, we can use that information together with a bit of math to predict the likelihood that an offspring will possess a certain genotype (and/or phenotype) without going to the trouble of drawing out a whole Punnett Square. Using this mathematical approach may not gain us much with respect to a simple 2x2 Punnett Square of the kind we've done here, but it saves us a lot of tedious drawing when we are faced with a larger matrix, like, say, a 4x4 with 16 cells or an 8x8 with 64 cells. Then the math method is a godsend.

Here's how it works: First, we write out the genotype that we need to get the phenotype we want. Take the ee in the last Punnett Square above, for example. Then we look at the probability that the alleles for this genotype will be contributed by the parents we are considering. In most cases, we just multiply those probabilities together to get the likelihood of the sought-after offspring.

P(ee in offspring) = P(e from sire) x P(e from dam)

The above expression is read as follows: "*The probability of the ee genotype in the offspring is equal to the probability that an e allele comes from the sire times the probability that an e allele comes from the dam.*"

If the sire has genotype +e, then the probability that he will contribute the e allele is 50% or 0.5. If the hen has genotype ee, then the probability that she will contribute the e allele is 100% or 1.0. Therefore,

P(ee in offspring) = 0.5 x 1.0 = 0.5 = 50%

So, whether we draw out the Punnett Square or use math instead, the above analysis indicates that mating the ee hen with one of her +e sons (or any +e cock bird, for that matter) will give us 50% recessive red offspring and 50% normally colored offspring.

We will do just one quick example of how you would use the Punnett Square method or the math method to consider two different genetic factors simultaneously. This will require us to change our notation system slightly so that we can distinguish the two different wild type alleles from one another in our diagrams. To do this, we will adopt a method suggested by Joe Quinn where the plus sign (+) for wild type will carry a superscript of the letter that normally symbolizes the gene in question. For example, because the letter e is used for the recessive red gene, we will use the symbol $+^{e}$ for the wild type recessive red gene that, as noted above, is actually the allele for NOT recessive red. Similarly, we will use the symbol $+^{G}$ for the wild type *grizzle* allele because G is the symbol normally used when discussing the grizzle factor (G for "grizzle", of course).

We will continue to use the example of our hypothetical pure-breeding family of non-recessive red homers outcrossed with our borrowed recessive red hen. Let's assume that we do not have either the brown color allele or the barless pattern gene in our own old homer line, and we will assume that our borrowed hen also comes from a line without those particular color and pattern genes. Now, consider the case of two offspring from matings with the borrowed hen, say, half-brother and half-sister, both blue bar grizzles. Their phenotypes tell us that they must both be homozygous for the bar gene, and their pedigrees tell us that they must be heterozygous for recessive red and that, from their fathers, each has also inherited one dose of grizzle (G). We can infer that their genotype for recessive red and grizzle is: $+^{e}$ e, $+^{G}$ G. The $+^{e}$ e means that, when it comes to the alleles they each carry for recessive red, one is the non-recessive red wild type allele ($+^{e}$) and the other (from our visiting mom) is the recessive red allele (e), and when it comes to the two alleles they carry for grizzle, one is $+^{G}$, the wild type for grizzle (which is actually "NOT grizzle") from mom, and the other is G, from their separate dads, the allele that causes grizzle. G is dominant to the wild type $+^{G}$.

We mate the blue grizzle cock to his blue grizzle half-sister because we are seeking to produce some beautiful recessive-red mottles and spangles, which is what we will get when the recessive red combines with grizzle.

What are the possible gametes that each parent might contribute? Actually, in this case they are the same for each parent because they are both heterozygous with respect to recessive red and heterozygous with respect to grizzle. So, the four gamete possibilities are: $+^e, +^G$; $+^e$, G ; e, $+^G$; and e, G.

The four different types of gametes from each parent are what we put on the outer edges of our Punnett Square. How big must this Punnett Square be? There's an easy formula: if we let D stand for the "dimension" of a DxD square, then $D = 2^N$, where N is the number of factors being considered. In our current case, we are considering two factors, recessive red and grizzle, and therefore N = 2, so $D = 2^2 = 4$. Thus, we will be dealing with a 4x4 Punnett Square. Because 4x4 = 16, there will be 16 cells in this 4x4 Punnett Square. It is easy to see why, as you increase the number of factors being simultaneously considered from one (as in our earliest examples) to two or three or four, etc., the size of the Punnett Square increases exponentially: 2x2, 4x4, 8x8, 16x16, 32x32, etc., with the increase in the corresponding total number of cells being: 4, 16, 64, 256, 1024, etc. This is why people who use this method typically limit their interest to a very small number of simultaneous factors.

Here is the completed 4x4 Punnett Square for this mating:

		From the Hen			
		e, $+^G$	$+^e$, G	e, $+^G$	e, G
From the Cock	$+^e$, $+^G$	$+^e$e, $+^G+^G$ [Blue Bar]	$+^e+^e$, $+^G$G [Blue Grizzle]	$+^e$e, $+^G+^G$ [Blue Bar]	$+^e$e,$+^G$G [Blue Grizzle]
	$+^e$, G	$+^e$e, G$+^G$ [Blue Grizzle]	$+^e+^e$, GG [Blue Grizzle]	$+^e$e, G$+^G$ [Blue Grizzle]	$+^e$e, GG [Blue Grizzle]
	e, $+^G$	ee, $+^G+^G$ [Solid Red]	e$+^e$, $+^G$G [Blue Grizzle]	ee, $+^G+^G$ [Solid Red]	ee, $+^G$G [Red Mottle]
	e, G	ee, G$+^G$ [Red Mottle]	e$+^e$, GG [Blue Grizzle]	ee, G$+^G$ [Red Mottle]	ee, GG [Red Spangle]

That was a lot of work. Would the mathematical method be easier? Let's say our main purpose is to produce some red spangles, i.e., recessive red with so much white that there is as much white as red if not even more. How would we use the mathematical approach to calculate the odds of getting one?

We begin by writing out the genotypic "recipe" for a red spangle, and let's assume that that is a recessive red with a double dose of grizzle. Therefore, both parents would have to contribute the e allele to get the recessive red, and they would both have to contribute the G allele to get the double dose grizzle. Thus, we want ee,GG.

Remember, our sire is $+^{e}$ e, $+^{G}$ G, and the dam is the same, $+^{e}$ e, $+^{G}$ G.

P(ee in offspring) = P(e from sire) x P(e from dam) = 0.5 x 0.5 = 0.25

P(GG in offspring) = P(G from sire) x P(G from dam) = 0.5 x 0.5 = 0.25

P(ee,GG in offspring) = P(ee in offspring) x P(GG in offspring) = 0.25 x 0.25 = 0.0625

In looking at the Punnett Square, we see that only 1 of the 16 cells (the one in the lower right hand corner) contains the ee,GG genotype and red spangle phenotype. 1 chance in 16 is equal to 1/16 which is equal to 0.0625 or 6.25%. Note that this 6.25% that we get from the Punnett Square is also exactly what we get from the mathematical method.

As you get used to doing calculations like this, most of those steps will become more-or-less automatic and intuitive, and the calculation can be done much faster, on the back of an envelope or even in your head. The overall point is that although the Punnett Square approach lays things out in clear detail, it is often a rather tedious way to go, especially as the number of different factors we want to consider at the same time increases. The math approach is neater and faster and lends itself more easily to complex cases.

The take-away message of this article is this: regardless of which method you choose to use, Punnett Square or mathematical calculation, if you know the "genetic recipe" for what you're after, as well as the constituent ingredients your breeders have to offer, it is possible to determine, quite precisely, *the chances* that a specific mating will give you what you're trying to get. And if it turns out that those chances are slim, then at least you'll know not to lose heart if you don't get the desired results right away. And by the same token, if those chances are slim, you will be able to truly appreciate how lucky you are when you win the genetics lottery and what you're looking for actually appears!

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Found Pigeon Needs a Home

I have rescued a lost dark blue check hen French Mondain that was caught in a yard northwest of Webster, Minnesota. In the couple months that I have had it none of my efforts to find the owner have been successful. The bird was bred by a fancier in the St. Cloud area who sold it to a gentleman who wanted a few pair for his daughter. The name of the buyer is unknown. If you have any knowledge of to whom this bird belongs, or if you have any interest in obtaining her please contact Tim Kvidera, 952-226-3528 or email timkvidera@yahoo.com I have no interest in keeping her, so first to express interest is welcome to her.

Answer to the *Pigeon Pedigree Puzzler* –

1. Which TWO among X, Y, and Z are the genetic impossibilities?

   The answer is: Y and Z.

2. Why are they genetically impossible?

Y is genetically impossible for one of the most fundamental reasons of pigeon color genetics: Y is ash red whereas her parents, according to the pedigree, are both blue. It is genetically impossible for two blue coloration pigeons to produce an ash red. This is because at least one of the parents would have to be carrying the ash red gene in order to pass it on to the offspring, but if either of them were carrying the ash red gene, then that bird would be ash red itself (unless covered by recessive red, which is not the case here) because ash red is dominant to blue. Therefore, this pedigree cannot be correct. Either the breeder's records are completely mixed up and neither C nor D are Y's actual parents, or, at a minimum, Y's sire is not C but some other male in the loft who is carrying ash red. This latter scenario is the likely explanation if the breeder keeps his active breeding pairs together in a communal loft, as many fanciers do.

Z is genetically impossible because he is a grizzle but neither of his parents is a grizzle, and "it takes a grizzle to make a grizzle". Just as ash red is dominant to its counterpart alleles (blue and brown) and, therefore, it takes an ash red to make an ash red, grizzle is also dominant to its wild-type counterpart (NOT grizzle). For any and every grizzle pigeon, at least one of its parents passed on the gene to it that has made it a grizzle, and the parent that did that must itself be a grizzle. According to the pedigree, neither X nor Y is a grizzle, and ***if that is true*** (see caution that follows), then Z cannot be their offspring. Z may be the dam Y's offspring, but if that's the case, then there is no way that X can be the sire. Some other cock in the loft, a grizzle one, must be the real father.

There is one important caution on this conclusion when it comes to grizzle. The grizzle factor exhibits what geneticists call "variable expressivity", which means that the same gene has a greater or lesser effect on the phenotype in different pigeons. In fact, sometimes the grizzle effect barely shows at all. Therefore, there are rare occasions when a bird that is actually a grizzle is misidentified as a plain check, bar, or barless and not a grizzle. However, if you take a really close look at such birds, you will always find some sign of the grizzle effect. If it is not evident in the wing shields or tail feathers, it is usually evident in breast and neck feathers, although even there the speckled white feathers may be scattered extremely lightly among the ash red, blue, or brown ones. But if you look, you'll find them. The point is that on rare occasions, in what may appear to be the genetic impossibility of a grizzle having been produced by two non-grizzle parents, if you examine the parents closely, you will find that at least one of them is, in fact, a grizzle, albeit a cryptic one.

All the other feather color and eye color inheritance patterns in this *Pigeon Pedigree Puzzler* are A-OK and in accord with the laws of genetic inheritance in pigeons.

Minnesota State Pigeon Association

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