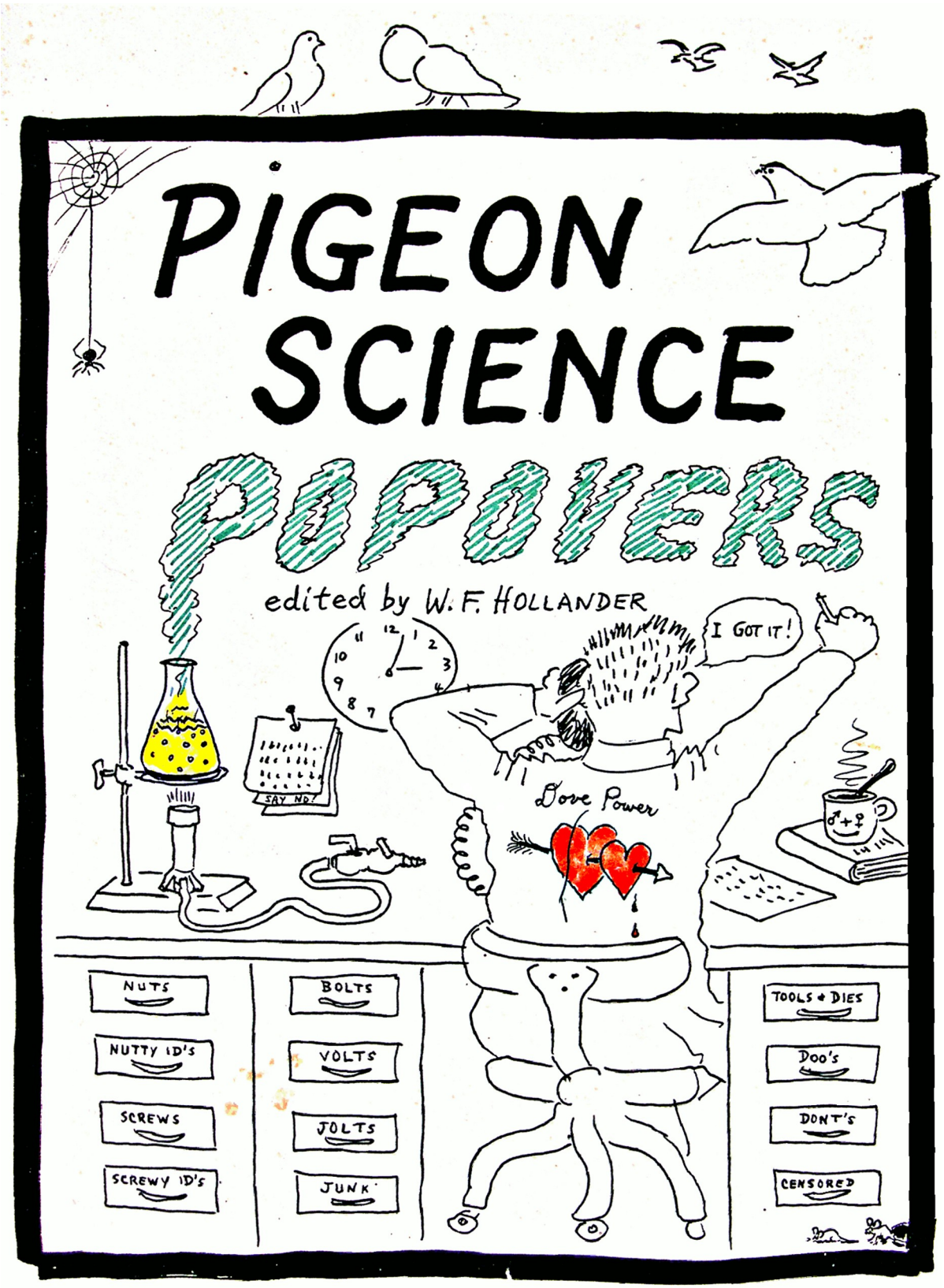
PIGEON SCIENCE
PAPERS
edited by W. F. HOLLANDER
I GOT IT!
SAY NO!
Dove Power
NUTS
NUTTY ID'S
SCREWS
SCREWY ID'S
BOLTS
VOLTS
JOLTS
JUNK
TOOLS & DIES
DOO'S
DON'T'S
CENSORED

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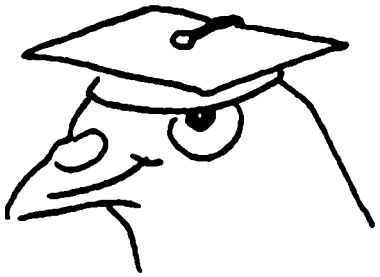
PIGEON SCIENCE POPOVERS



edited by W. F. HOLLANDER
Route 4, Box 168, Ames, Iowa

1987

With thanks to American Pigeon Journal and other helpers and critics.

Dedicated to open-minded fanciers, especially of the coming generation.

PREFACE

"Pigeon Science Corner" was launched January 1984 in the American Pigeon Journal, and continued into 1987. My idea was to converse with intelligent, curious, active minds among the readers, to present new and old information and start trains of thought. I hoped in turn to receive response, even enthusiasm, and to make many new friends, especially among younger folk in pigeons. This hope has only been partly realized, and as the years fly by I have decided to pause and reflect. The present compilation includes all the series plus a few additional. But science does not stop: let there be continued communication, even argument!

"Science" has been defined variously, and you may take your choice. How about this—"organized knowledge"? Well, that certainly sounds fine, but does it even hint at how the knowledge has been or can be obtained? Knowledge of how to get knowledge! Well, it should be obvious perhaps: read a book, ask an expert, take a course. But is the brain just a sponge to sop up all that? Somehow we need to include an additional mechanism for finding not only <u>new</u> knowledge but also for correcting errors. That mechanism is the inquisitive, critical faculty. I have tried to stimulate that.... As for <u>organized</u> knowledge, I leave that to others to manage. And anyone can see that this "corner" material is highly disorganized. If you have a tidy mind, rearrange the pieces.

So we're off! But read slowly.

HEN DOWN, WHAT TO DO?

“Say Doc, I'm scared one of my best hens has got a terrible disease, maybe paratyphoid. In a bad way. Should I just kill her?”

“Tell me what symptoms she has first.”

“Well she had one egg and then I found her lying on the floor. Real helpless.”

“On her back?”

“Nope, right side up, and she had her head up and looked bright-eyed too. Just couldn't get up and walk or fly.”

“Ah, a typical case of parathyroid trouble.”

“So I'm right, it's paratyphoid. Damn!”

“No, I said parathyroid. Totally different trouble.”

“Doc, it ain't fair to confuse me! I never heard of any parathyroid trouble before. Everybody talks about paratyphoid.”

“Well, if you have Levi's book THE PIGEON, see paragraph #380. Anyway, the parathyroid glands are essential for regulation of calcium and phosphorus metabolism. Particularly about egg-laying time the hen has to mobilize large amounts of such substances. She may deplete her bone reserves if she is not properly supplied with minerals and vitamin D. Then the parathyroid glands become enlarged, probably overworking trying to correct the upset.”

“I thought I was giving the birds real good feed—best grains I can buy, and plenty of grit.”

“Well, we still don't understand all the triggers for the upset, but the cure is known. Give the hen a capsule of vitamin-D down the throat. Various drugstore brands are OK. She'll be up soon.”

“Gee, Doc, and that's all there is to it?”

“Well, I think the birds need a regular source of D vitamin. It is stored in the liver so they can go weeks on a D-deficient diet without trouble, but instead of using pills every month I think plenty of sunshine (not through window glass)

or feed containing vitamin D is desirable. Pelleted feeds all are fortified with D, but they should not be fed if gone stale."

"A pill every month? Sounds easy, Doc."

"Don't pass up sunshine if you can get it."

"Thanks, Doc—guess you saved me a hundred-buck hen. Bye."

—American Pigeon Journal, January 1984, page 30.

FACTS, FANCY, & FLIMFLAM

"Doc, is it a fact that the first egg of the clutch hatches a male and the second egg a female?"

"Sometimes."

"Ah, so it is a fact!"

"If I say something, that makes it a fact?"

"Well, Doc, after all, you are a scientist!"

“And scientists have a monopoly on all facts?”

“Well, you write books....”

“So if it's written in a book it must be a fact?”

“Well, I guess not a hundred percent, but....”

“Then how do you really know what's fact and what's fiction?”

“That's why I ask you.”

“And how do you know I'm not lying or talking through my hat?”

“Well, Doc, I got faith in you.”

“So I'm never wrong. Ha. Well sad to say, faith is dangerous in science. Suspicion in general is safer. So if you can't trust me, how can you get the facts about those eggs and sex?”

“H'mm.... Well, I guess I could mark some eggs, which was laid first, and check which squab comes from which, and wait till it's grown to see what its sex is. How about that?”

“Only two eggs? And are you sure you could identify them correctly and get the sex right?”

“Well, I guess I'd need a lot of eggs to make a rule out of it. Yes, I think I could get everything correct. But gosh, Doc, that would be a hell of a lot of work and take a long time!”

“That's just the beginning. Welcome to science!”

—American Pigeon Journal, February 1984, page 27.

LOOKING FOR TROUBLE

When I go to a show, it is as a visitor. There are usually lots of interesting things (and people) to see besides the trophies. At the last big one I attended I

was paying special attention to the feature that has made our birds famous for being filthy: droppings. (No other creature produces them, of course.)

"Oh hello, Doc, er … for gosh sakes, what are you doing?" Old friend Bud was in his alley.

"Well, you could call it scatology, but more specifically I'm sampling helminth infestation. In other words, checking for worms."

"Worms? How can you do that?"

"You can learn if you want to." I picked up a gob of goo with my nice clean forceps and put it in one of my neatly arranged glass vials, carefully cleaned the forceps on a paper towel, labeled the vial with the bird's breed and band number and owner's name, and went to another coop. "Have to get a few more samples and then we'll check." Bud followed me and just stared.

"OK, ready for checking with the microscope." I gathered up my box of vials and notes and headed for the door.

"Where you going, Doc?" Bud trailed along.

"Got to get the microscope. It's in my car." We went out to the parking lot, and I got out a card table, camp stool, jar of tap water, more paper towels, and the old microscope. Fortunately it was a nice sunny day so I could do this outdoors.

"Gosh, Doc, don't you have to have a laboratory?"

"A lab is a place to work. This is quite OK for what we need." Now I got the microscope set up to get good light from the sun, got out a box of clean glass slides, took one and put a big drop of water in the middle, got a bit of dropping out of the first vial and put it in the water. I stirred it up so it was well spread and nearly transparent, then put it on the stage of the scope. The lenses were already cleaned so all I had to do was focus and examine. Bingo! That bird was loaded with everything. "Take a look, Bud."

Bud peered through the scope for a minute without any sign of revelation. "Doc, all I see is a mess of garbage. What am I sposed to see?"

"Well, I'll position things for you." I moved the slide a bit so that there was an *Ascaridia* egg at the tip of the pointer, and told him where to look.

"Whoowee, Doc! Now I see a lot of them around. Is that bad?"

"Well, I'd say the bird probably could feel better. Now look at this." I positioned a *Capillaria* egg at the end of the pointer.

"Looks like a little bitty lemon. What is it?"

"Hair-worm egg. Those worms can make real pain in the bird's gut."

"Anything else, Doc? Sure is a mess of stuff in there."

"One more thing." I positioned an *Ornithostrongylus* egg on the pointer. "This is a third kind of worm egg, a hookworm."

"My gosh, Doc, that must be one wormy bird. Whose was it?"

"Yours."

—American Pigeon Journal, March 1984, page 73.

SAY AHHH—GULP!

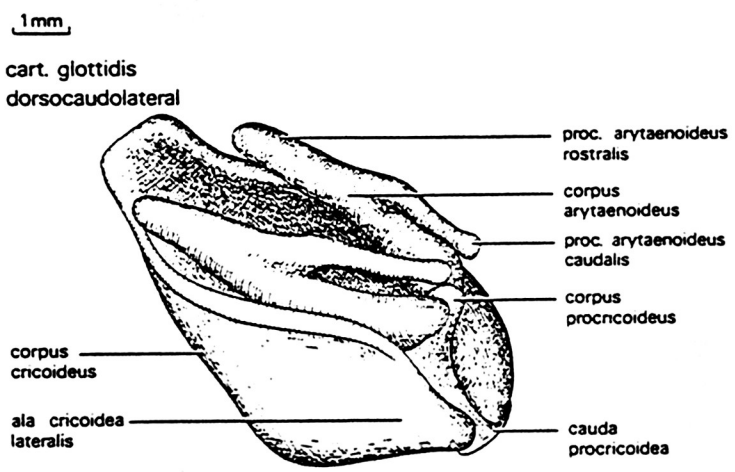
Almost every pigeon breeder has opened a bird's beak to peek down its gullet (maybe to check for a canker). At the back end of the tongue we see a gaping hole. What is it? The glottis, or opening of the trachea (windpipe), for breathing. Isn't that a rather stupid design of Nature? Because when the bird eats or drinks, liquid or solid stuff could go down to the lungs. Well, humans have a similar problem. When we swallow, we automatically lift the larynx (the structure around the glottis) so that it comes against a cap or stopper called the epiglottis. But the bird doesn't have any epiglottis; so how does it manage?

This sort of problem has intrigued some Hollanders to make a careful investigation, a report of which was published in 1981: "Morphology and mechanics of the larynx of the pigeon," by G. A. Zweers, H. C. van Pelt, and A. Beckers of the Department of Morphology, Zoological Laboratory, University of Leiden, The Netherlands (in Zoomorphology volume 99, pages 37-69). It's a long technical article, so I'll just hit a few high points of it here. Ordinarily the glottis

remains medium-open until the edge is touched by water or solid, when a snap-shut reaction is triggered. It is a clamping or pinching effect, so that no leakage occurs as would happen if a puckering were involved. The authors tried various experiments, including anesthesia (they used equisetin; the glottis stayed open).

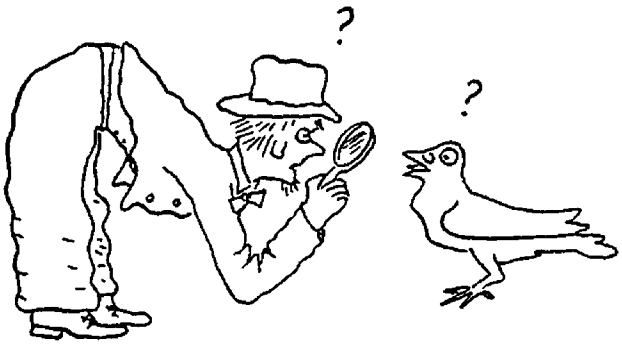
The investigators also made a microscopic dissection of the larynx. They found that it is a cartilaginous framework (becoming bony in older birds) with the arytenoids forming the glottis in the shape of a V. Being elastic, the V stays open until surrounding muscles act to pinch the arms together. One of the illustrations of the cartilage structure is reproduced here. Anyone who desires to read the whole report may obtain a copy from the authors or through a library.

In humans and other mammals the larynx is called the “voice box” because air squeezing through its inner folds, the “vocal cords”, makes noise. What about our birds? Their voice box is quite a different structure, the syrinx located 'way down at the juncture of the bronchi with the trachea, next to the heart. But I wonder whether the larynx may play a part in modulation of the voice. And I wonder how the bird makes air go into the crop instead of out the nose. The Pouters may have an interesting peculiarity of that mechanism? So far as I have been able to learn, nobody has worked out these puzzles. Maybe you can? If so, don't forget to make a report!



Cartilage structure of pigeon's larynx (from Zweers et al., 1981.)

—American Pigeon Journal, April 1984, page 23.



NOBEL EFFORT

Letter received from a midwestern city:

Dear Professor Hollander,

I learned about you in APJ and would like to obtain your advice regarding my Science Fair project for my 10th grade Biology class. It is titled "Influence of Hormones on the Growth Rate of Pigeon Feathers." My teacher doesn't know anything about pigeons. I keep Rollers. The only information I have found so far is in Levi's book THE PIGEON, about thyroid hormone. My father is a medical doctor and he has got me 10 kinds of hormones to use and some syringes. I am real excited about it but I wonder if I will be just repeating someone else's research. Should I use squabs or grown birds? The project has to be completed in about 3 months so any suggestions you can provide soon will be greatly appreciated.

Sincerely, Francis _____.

Dear Frank—

So your Dad lets you keep those dangerous germy birds, h'mmm. Well, it sounds like a great quickie project. I don't think you will be repeating any previous experiments, but even if you do it should be rewarding, and will not rile the Society for Prevention of Cruelty to Animals. Just pluck a couple of tail

feathers and measure regrowth (every week?). I'd suggest two control birds and two for each hormone test (grown birds, not squabs). Tail feathers make a good display. Well, write again. Good luck with Murphy's laws.—WFH

Letter received a couple of months later:

Dear Professor H.,

I have run the experiments about the way you advised, but the injection of four of the hormones killed the pigeons within a week so I had to start them over with smaller doses. Even so the birds got sick and didn't regrow the feathers at all. The other hormones had no effect on regrowth—same as the controls, except for the thyroid hormone. It gave faster regrowth but the final length was shorter than the controls! All this has been discouraging. But I got real interested in the way one of those other hormones affected the birds. They got extremely heavy, seemed to be bulging with water! Well I guess I'll finish up the report for the Science Fair even if it was a fiasco. Thanks for your help.

Sincerely, Frank _____.

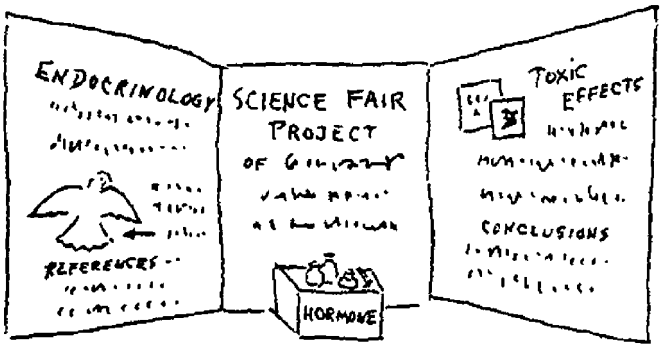
Dear Frank—

Fiasco my eye! Your results sound typical for a good foundation study and very worth a good report. Results don't have to be positive! Most experiments in science simply point the way to better future experiments, and reveal new and more mysterious problems, such as your water-logged birds.

Best wishes, WFH

(Footnote several weeks later: Frank's Science Fair display won top honors in his state. WFH)

—American Pigeon Journal, May 1984, page 30.



DOUBLE TROUBLE

"Dear Doc: One of my White King hens laid a great big egg and now it has two squabs in it, both dead. I opened it up because the other egg hatched but this one didn't pip. This is real surprising. Are the squabs identical twins?"

This question has been fairly well discussed in Wendell Levi's book THE PIGEON, paragraphs 444-445, and it seems conclusively established that double-yolked eggs are simply the result of release of two ova from the ovary at the same time so that they become enclosed in one shell. Therefore they can not be identical twins (which would have to come from a single ovum). Of course double-yolked eggs are not a pigeon specialty—they are well known from hens and other poultry but not from wild birds. The phenomenon has been rather hard to subject to experimental study because it has seemed haphazard and not very important commercially. Still, quite a lot of reports have been published. A review of the subject was made by A. L. Romanoff and A. J. Romanoff in their 1949 book "THE AVIAN EGG" pages 279-284.

In 1976 J. B. Cooper reported "Twin pigeon embryos" in Poultry Science volume 55 pages 1976-1977. I thought this was going to be great stuff, but it turned out to be just one double-yolked egg, and the author had apparently not referred either to the Romanoffs or to Levi.

It seemed to me that the thousands of pigeon fanciers could provide more answers than the poultry scientists, so in the December issue of APJ 1976 page 844 I appealed for comments on the problem. Dozens of interesting letters responded—but I can still use more! Some day I'll organize all the information into a big report. Meanwhile I'll just make a brief extract here:

Double-yolked eggs seem hardly ever produced by common- or small pigeons. The birds that produce them are typically very healthy and well-fed.

Fred Lindner wrote to me in 1982 "I've always gotten a lot of them from my Lahores but none from my Racing Homers in 10 years on the same feed."

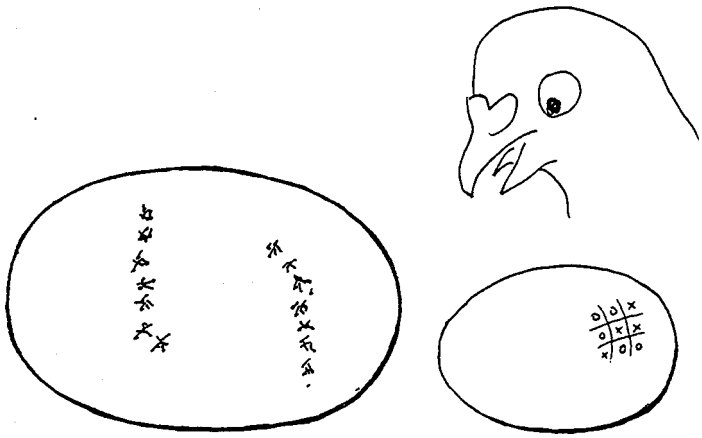
Lester Paul Gibson in issue #1 of Pigeon Genetics News Views & Comments page 24 wanted to progeny-test a Hana Pouter hen but failed because she laid only double-yolk eggs (none hatched). Should have put her on short rations?

Well, that's just a small sample, but it gives you the important realization

that science is not just the province of professionals, and that cooperation among amateurs needs more encouragement.

By the way, if you get twins or other odd embryos, you can preserve them indefinitely in 10% formalin solution (from drug store). Cork well and don't pickle you fingers and nose. Double your fun!

—American Pigeon Journal, June 1984, page 38.



EXCEPTIONS

A lot of discoveries have been made by a keen eye and some luck. But they may be lost to the world and no credit to the discoverer if he keeps mum—gotta report 'em! Like in APJ, or even in a newspaper!

Here's one (see photo) that was reported to me lately, by Terry Fontenot of 200 John Wayne Drive, Lafayette, Louisiana 70508. It is a Modena having the left wing barred and the right checkered. Terry commented “This mosaic is a cock out of a Tri (checker) Schietti father and a blue (bar) Gazzi mother in an individual coop. Now Doc what I'd like to know is does this agree with your

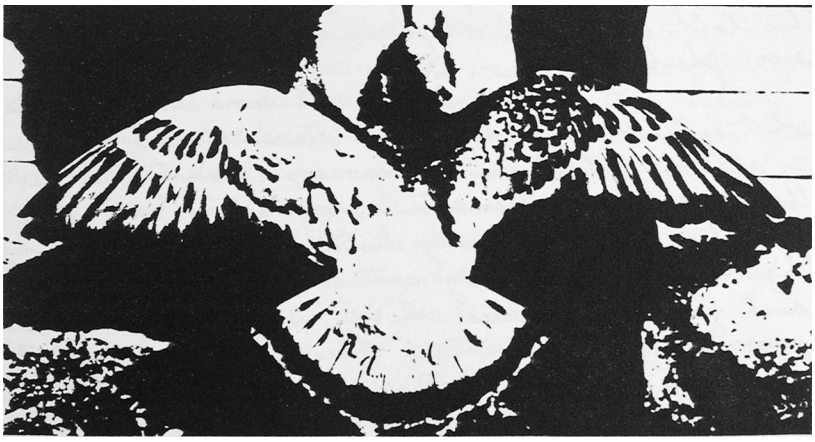
bipaternity explanation of mosaics? He sure only had one father!"

OK, only one father, but bipaternity refers to 2 (or more) SPERMS functioning to produce an individual. If the father of the mosaic were carrying bar (heterozygous), then the sperms would be of two sorts: those having the checker gene and those not. Then if one of each sort participated to produce the mosaic, the theory would fit. Terry informs that the father was indeed heterozygous—one of his parents was barred. A checker sperm was responsible for the mosaic's right side, and a bar sperm for the left. Actually the division is not perfect; the left side has a couple of checker marks, and many mosaics are much more irregular. If you care to go deeper into the details of the idea, you should consult Levi THE PIGEON, paragraph 549, and my reports in the Journal of Heredity, 1949 and 1975.

How will such a mosaic breed? Terry has mated him to a barred hen to find out. I couldn't predict the result, because the testes might have been derived entirely from one kind of sperm or the other, or from both. So the bird will have to provide the answer. To date, from three clutches of eggs (one egg infertile each time) he has got three squabs, all bars.

Are mosaics important? Well, they are pretty rare and unexpected, but such exceptions can reveal some significant facts as well as suggesting such startling notions as 2 fathers for one bird. It's a wonderful idea, but not easy to prove or disprove. Each new example may give new evidence. Keep your eyes peeled—discoveries may be just around the corner!

—American Pigeon Journal, July 1984, pages 42-43.



WHAT'S WHITE & WHY?

Kids who visit my place “go” for gaudy—splash birds that could never compete in any show. Pure white mongrels also catch their uneducated eyes. Very likely the beginnings of domestication, say several thousand years ago, were some splash and white squabs rather than feathered feet or pouting or tumbling. Also, whiteness has from time immemorial been almost a synonym for purity, cleanliness, virtue, and superiority—only modern skepticism has challenged such notions. Ask the average Racing Homer man what color is best and the answer will almost never be white. He may even give logical reasons for shunning white; but look in his loft and you'll see plenty of white flights and even splashes.

Take a pigeon with some white flights: what is the material difference between a white feather and an adjacent colored one? Microscopic examination reveals that the colored feather contains myriads of soot-like granules, often so densely distributed that almost no light can penetrate. By contrast the white feather lacks such pigment granules entirely, so that light can easily pass through the structure. There is no white pigment in such a feather: the whiteness is the same as the whiteness of snow—reflection of some of the light from the highly complex surface. Dip a white feather into mineral oil and it becomes almost invisible, transparent. So here we have the first important fact about the white feather: it lacks the pigment so plentiful in the normal-colored one.

If we examine plucked pin-feathers, we can see that the pigment in the normal is being manufactured and distributed by relatively large octopus-like cells, the melanophores. The white pin-feather has no such cells. Apparently the cells which become melanophores crawl around in the skin, especially during embryonic growth, and somehow they failed to arrive in a feather or bigger area which will be white. Many experiments have demonstrated that if a speck of embryonic tissue containing pigment cells is grafted into a white embryo, a big patch of colored feathers will develop. (The technique is not too difficult, but great precautions are needed to prevent bacteria and mold spores from getting in along with the graft.)

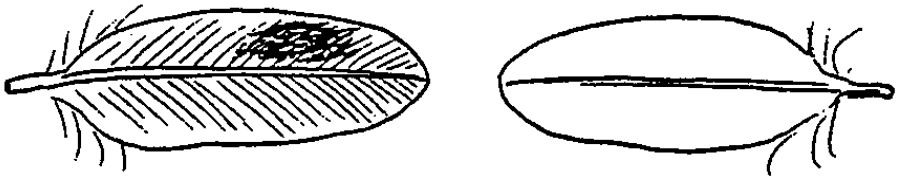
Fanciers have learned by fooling around (another term for experimenting) that if a colored feather is plucked repeatedly it may eventually come in white. Also, next to a trauma such as a burn-scar the feathers may come in white.

Why? The pigment cells may have become exhausted or killed-out there.

Considering the vast numbers of fancy-pigeon squabs which are culled because their marking (for example Baldhead, Nun, Lahore) is too divergent from the breed standard, one would think that the fanciers would want to have good information about the cause of the variation as well as how to minimize the losses from the culling. So far they have relied on guesswork and the faith that culling itself is the remedy. But the losses go on and on. It is long overdue that more fooling around (science) should be tried. Suppose we theorize that in an off-marked (mismarked) squab the pigment cells in their adventures did not crawl quite to the right places in the skin to please the judge. Maybe something in the conditions during the incubation of the egg from which the squab hatched were favorable to more rapid and extensive crawling, or unfavorable, slowing down and restricting the crawling? As far as I have been able to learn, nobody has tested such a theory yet.

How could we test the idea? I suggest putting a good many eggs from the breed or variety in question into an incubator with carefully controlled and recorded conditions of temperature, humidity, and perhaps other variables. Keep on fooling around until the evidence is quite convincing that undermarking and overmarking are definitely associated with one or another condition in the incubation—or not at all. A lot of work; might even have to hand-feed a lot of baby squabs; might not even allow time to show-train that perfect young bird. But just think—with the information nailed down, we might save tons of feed, and have a big edge on future competitors. Unless we were so stupid as to be scientific and report the results of the tests!

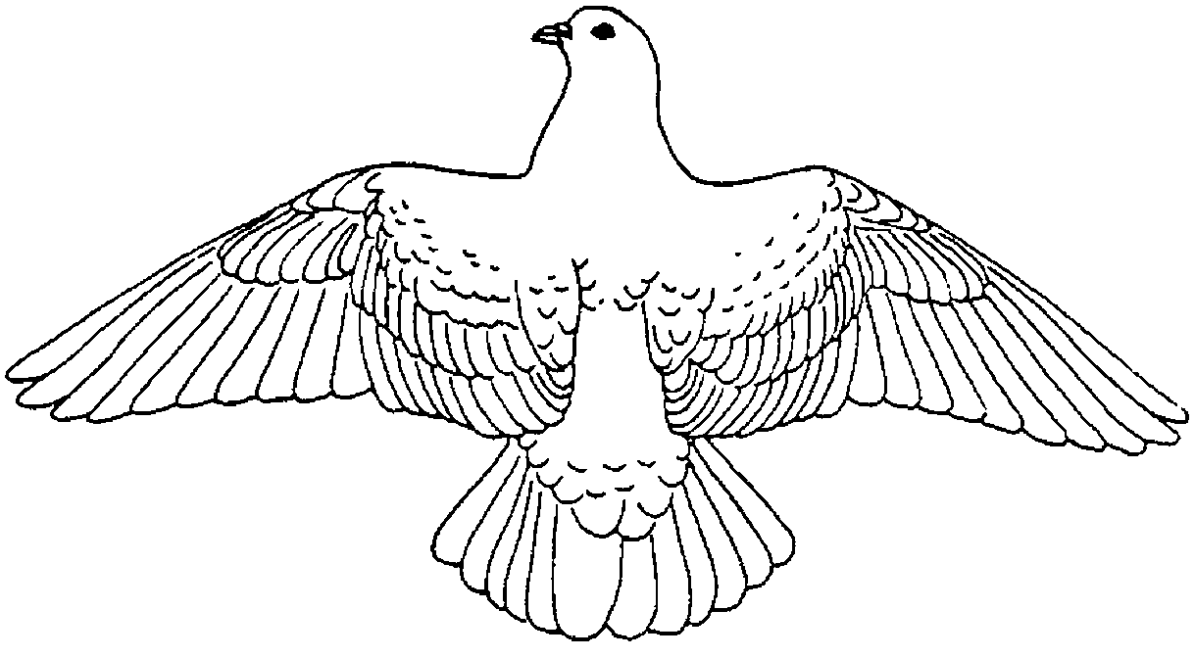
Well, another visiting kid. Hi sonny. Oh, you like that pigeon, eh? It's name? It's called a rainbow splash. It was produced by fooling around—er, scientific hybridization … Well, if you really want it and will take good care of it, and your parents agree, I'll give it to you.

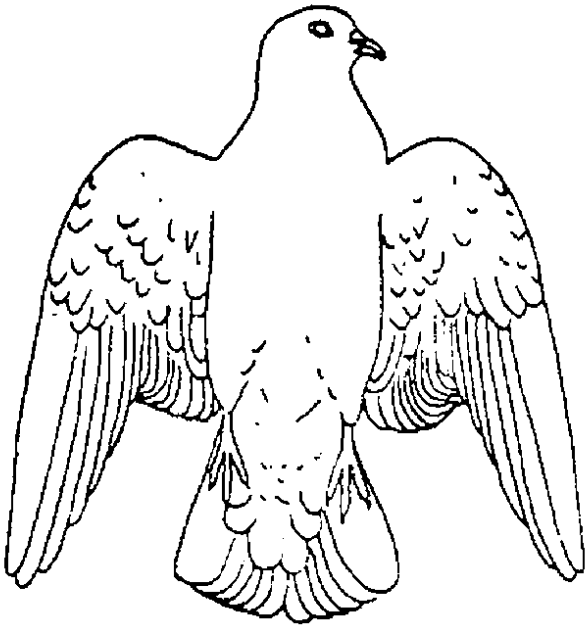


—American Pigeon Journal, August 1984, pages 31-32.

DIAGRAMS

Make your own copies. Fill in color and pattern for record, with date, etc.





PILLBUGS & PROVENTRICULUS

So far Pigeon Science Corner has been a sort of one-man show & tell, but there are lots of amateur (even expert) scientists out in them thar lofts, and I appreciate getting a helping hand now and then. Here's one from Robert J. Mangile, 816 E. Atkinson Ave., Pittsburg, Kansas 66762:

The other day fancier friend Clay came over with a dead pigeon and the March APJ. "Bob," he says, "can you tell if this bird had a bad case of worms?" He opened the APJ to Pigeon Science Corner where worm eggs were looked at under a microscope. Three kinds were noted: *Ascaridia*, *Capillaria*, and *Ornithostrongylus*.

"Well," I says, "I don't have a microscope, so we can't look for eggs, but I have a hand lens so we can look for the worms." We set up a table out in the sun, with paper towels, a sharp jack-knife, small scissors, and a glass pie plate containing some water. Fortunately the bird was fresh. Real skinny, and anemic.

I opened it up wide, and took out the intestine, put it in the dish of water. With the small scissors I split it from one end to the other. Nary a worm! We were about to give up when Clay asks "What's this here spotted thing?" He was pointing to the proventriculus (the glandular stomach, just in front of the gizzard), which was unusually large and covered with strange red spots. AHA!

"Worms it is, Clay," I says, "only this kind is one Doc didn't mention. It's *Tetrameres americana*. Doesn't have a common name. Those red spots are the female worms embedded in the stomach glands."

"Wow, Bob, I better get some worm medicine quick and treat the rest of the birds."

"Whoa," I says, "ordinary worm medicines may not work for this, and you may not have any other kinds of worms in your birds. After all, your loft is nice and dry. This is a different kind of problem. No sense over-medicating."

"Well, I got to do something, don't I?"

I got out Levi's big book, THE PIGEON, and we looked up *Tetrameres*. No sure cure known, but we learned that to get the worm the pigeon has to eat an infected bug, such as a pillbug, which had picked up the worm eggs from

droppings. Other kinds of birds such as quails may also have this kind of worm.

"Any pillbugs around your place?" I asks Clay.

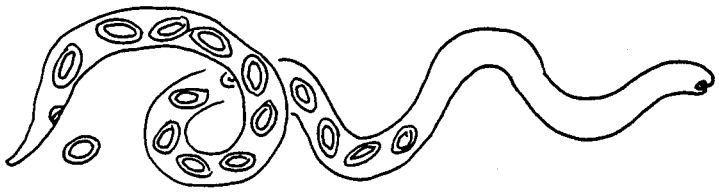
"You bet," he says. "Never figgered they was dangerous!"

"Not dangerous unless the birds eat them," I says. "Maybe you better keep the birds shut up instead of letting them pick up stuff outdoors."

"And here I was thinking freedom was good for them!" says Clay.

"Better give the birds plenty of good feed, too, so they won't feel like eating bugs," I adds. "Hey, lunch time. Nothing like a healthy proventriculus!"

—American Pigeon Journal, September 1984, pages 91-92.



IN THE KNOW

Larry was telling me about an amazing bit of behavior that he observed (one of his pigeons). I commented that he should report it in the APJ or somewhere so it would be on record.

"Doc, you are all the time telling us to report stuff. Well, I did it a couple of times, and now even I don't remember where it got printed. Seems to me it's a waste of time. People just read and forget."

"Well, Larry, it's even more a waste of time telling me, because I'm so old and forgetful. But if you get it into print it can be found again, even years later."

"Sounds good, but I can't even find back issues of my APJ. Down the drain, Doc."

"That's sad, but not everybody is like you, Larry. For example, I keep my APJ's carefully stashed, all in proper sequence, 40 years of 'em."

“Wowee, Doc, that must be a ton. But if you want to find something in 'em, you must have to do a heap of thumbing!”

“Well, over the years if something interested me I wrote down the author and reference on a card, so I have a tray of cards to aid me.”

“Wowee, I'd never do that. Too much work. And anyway, maybe sometime you'd want to read something that you didn't make a card for—how would you find that?”

“Yes, that would be a problem, and not unusual. Unfortunately APJ has never had an index, but the table of contents is helpful.”

“Maybe somebody should make an index?”

“Great idea for some computer buff to tackle. I'm afraid it will be expensive and huge, but for serious pigeoneers it should be very useful. That's just APJ. There is pigeon information buried in lots of other magazines too, not to mention books, photos, etc. And in various languages.”

“Sheesh, Doc, you think up too much work for just a hobby.”

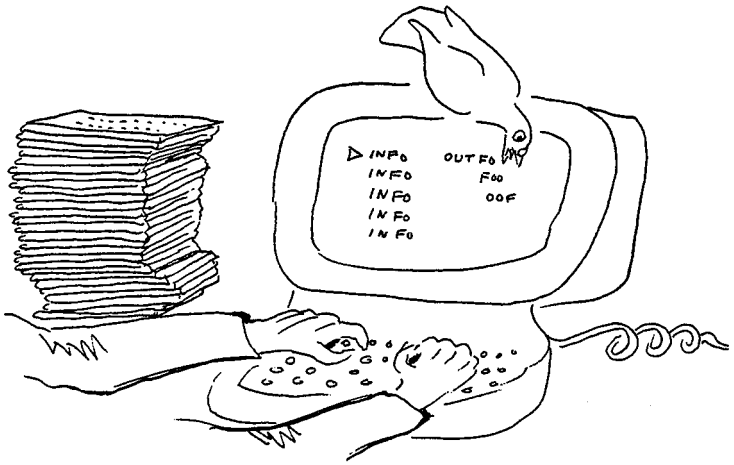
“Lots of hobbyists work harder and are more expert than if they got paid for the effort. It's a challenge to them, and they may get some fame. You think it would just be drudgery to dig in the literature for buried information, but to me it can be an exciting search, with all sorts of little scientific tidbits to be discovered.”

“Scientific? In APJ?”

“Could be! Your description of that odd behavior might be the missing piece in some psychologist's jigsaw puzzle.”

“Well, maybe so, Doc. Will you help me write it for APJ?”

—American Pigeon Journal, October 1984, page 34.



DIGESTING DATA

Consciously or not, all fanciers pay attention to their birds' weights. Here's an undersized King, an oversized Modena, a case of going light, an over-fat Racing Homer, a perfect little Chinese Owl, etc. Any good fancier can tell by hefting a bird whether it is "right" or not, but sometimes two good fanciers may disagree. Then it may be time to dust off the scales and get a more objective opinion—if the scales work properly. You'd think that scales would be indispensable to a judge, no? Well, try to find scales at any show! The scarcity is a testimonial to the "science" of judging.

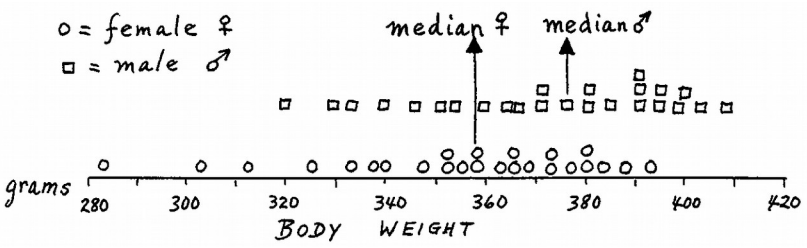
Weights have been extremely important in the use of pigeons in research. Psychologists employing "Skinner boxes" routinely starve their pigeons down to 80% of "normal" weight, to get the birds into the proper mood of eager anticipation of a reward of a few grains for some action. No guessing, if you are going to get peer approval: the birds gotta be weighed daily. On a reliable set of scales, too. And in the early period of analysis of the B-complex of vitamins, when pigeons were the preferred test animals (1915-1940), daily weighing gave the essential data for recognition of deficiency. Pretty crude (= simple) tests, but hard to beat.

Amateurs who get so picky that they want scale weights may be amazed

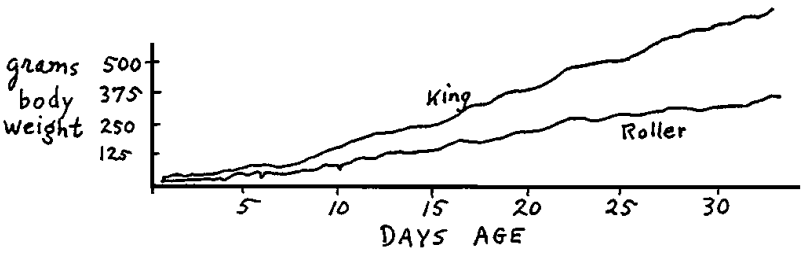
at the prices of such elementary devices. Like microscopes and other customary apparatus in the laboratory, unless you can locate used (junked) examples, they are not cheap. It may be simpler to enlist cooperation from a local high-school, druggist, or jeweler. Postal scales may be serviceable, but should be checked for accuracy.

What sort of questions can be addressed by the amateur equipped with a good set of scales (say weighing in grams)? Really almost no limit. Let's look at several which may be interesting.

1) A comparison of sexes in one or more breeds. Are males heaver than females regularly? Well, that's an easy one. Just be sure the sexes are correct! Weigh a crate empty as compared with full (maybe 25 cocks?); subtract the crate weight and divide by the number of birds to get the average. Ah, but really that's too easy and doesn't tell about variation. Better weigh every bird individually. Result: a heap of numbers in the notebook. Not a very informative mess—it needs to be digested. Let's arrange all the weights in series. The lowest and the highest give us the range, and the others are distributed in between, making a picture of the variation. Instead of an average, let's use the median, the middle value. Here's a finished (?) chart, telling the story:

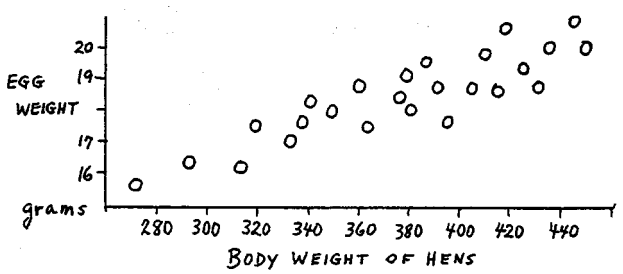


2) Growth. Let's compare a baby King and a baby Roller. The daily weights can be plotted to make a picture—growth curves:



3) Correlation. Let's connect weight of females and their typical eggs; looks

as if there is some correlation here:



If this sort of numbers game amuses you, you might like to look at the book "Endocrines and Constitution in Doves and Pigeons" by Oscar Riddle, Carnegie Institution of Washington Publication 572 (1947). It has a lot of such.

—American Pigeon Journal, January 1985, pages 28-29.

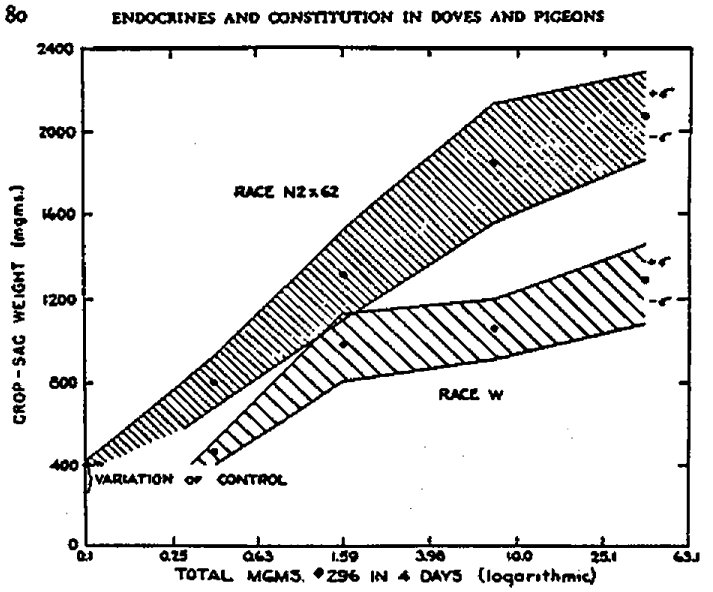


FIG. 7μ. Response of 2 races (types) of ring doves to prolactin. Points represent average weights of crop sacs from 4 to 9 doves.

FOOD FOR THOUGHT

What aspect of our hobby gives us the most daily prodding for attention? Probably feeding. We have to decide what to buy; we have to feel that we have got adequate amount, quality, variety, and balance; we have to dish it out, with decisions as to how, when, and whether the mice and bugs will get any. We may even sort of ask the birds if they approve. More likely we will make them beg. Anyway, there are myriads of scientific problems that can be probed with regard to feeding, and some people have been probing.

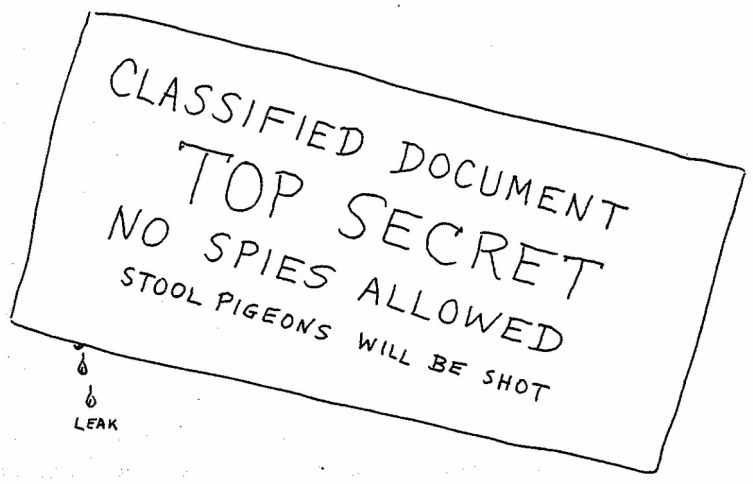
Here's a recent report that's quite interesting: “Food preferences in the pigeon,” by Richard D. Moon and H. Philip Zeigler, 1979, in the journal Physiology and Behavior, volume 22, pages 1171 to 1182. Six kinds of grain were offered in various combinations. One of the kinds was marijuana, more commonly called hemp seed by feed people. Well, I'm not going to go into the details; the pigeons were weighted, and the amounts of grain were weighed, and other experimental procedures were set up, and heaps of data resulted. Digestion permitted some conclusions, but they will not be helpful to us with our daily chores. The authors list 23 references to previous studies.

Where did these authors do their experiments? The Psychology Department at Hunter College, City University of New York! You might naively think that such research would more appropriately have been carried on in the lab of some big feed company, such as Purina. Well, maybe it has been—I know that the big companies do some sorts of research with pigeons. But reporting, that's something else. When have you ever heard of any feed company releasing data from experiments? Oh, they may let out a few facts at the APFC meetings, but very few. Research is mighty important to the companies, but we have to remember that profits are the password there. Why would a company shove a lot of research results into the magazines? The fanciers mostly wouldn't give a hoot or wouldn't understand them, or would just be distracted from reading about the latest shows. But more important, why would the company freely tell the competition what it has discovered? Secrecy usually wins.

But secrecy is anathema in science. We who are not in a commercial concern want the world (or at least part of it) to learn what we find out, and possibly give us a bit of praise for our great discoveries. In University and U.S. Government research labs etc. reports are expected to be published, and can be of great benefit to the feed companies (and others).

I wonder if anybody has experimented with feeding pigeons pepper???

—American Pigeon Journal, December 1984, page 38.



CLEAN & PRETTY

Here we go starting our second year of this column in APJ. Can't say there has been a great show of enthusiasm among the readers, but maybe we can survive another 12 months?

David Rinehart, who edited Pigeon Science & Genetics Newsletter for several years (1975-1980) used to urge his readers "Start opening those unhatched eggs!" His admirable idea was that if you don't open them, you may be missing some scientifically important information. However, I discovered that the typical response of the readers was "Yeccch!"

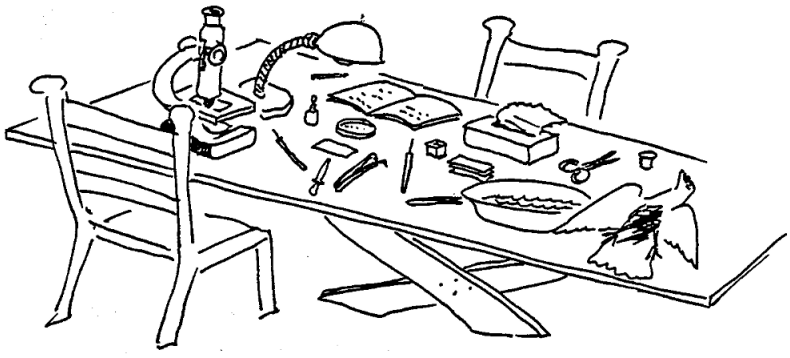
Yep, there we have a problem. Science seems to have two different faces: the spic & span squeaky-clean lab full of shiny glassware and gleaming expensive instruments and gadgets, blinking colored lights on engraved panels, complicated charts and heavy textbooks, and Miss America technicians clad in spotless white smocks; and the other face is a dingy smelly place with horrible specimens in jars, blood & guts all over, all supervised by a bearded loony

wielding a scalpel in one hand and a pickax in the other. There has to be another less extreme face (or two?), but there is some truth in the caricatures. Aesthetics can be important. Well, one solution to the need to open those unhatched eggs, if you don't like to do it yourself, is to hire a slave to do the dirty work. An efficient, unemotional slave, of course!

Fortunately pigeon science is such a diverse field that we can choose a subject that appeals, but sooner or later if we are at all serious in our study we will have to get our hands dirty, especially if we lack the means to hire a slave. For example, suppose we really want to know what's the trouble with hens that have gone barren and cocks that fail to fertilize eggs. One way or another that will require at least an examination of the birds' reproductive organs to see what's different from normal (controls). And there is no guarantee that what is discovered in one batch of birds will be the same as in another at a different place and time! So it is likely that the investigation should go on & on & on. Who is crazy enough to want to get immersed in such a disgusting project, when it is so much simpler to just sell the old birds to some unsuspecting novice? (Umm.... I've been posting birds for 50 years, no slaves, and have learned a few things not in Levi's books while getting my hands dirty. P.S.—I wash up afterwards!)

Gotta close; time for squab dinner.

—American Pigeon Journal, January 1985, page 28.



LOUSY TECHNIQUE

What sort of pigeon science would you expect from Poland? Well, here's one report: “An experimental study of the survival rate of some Mallophaga outside of *Columba livia domestica* body,” 1981, Acta Parasitologica Polonica, volume 28, pages 179-185, by Renata Rem and Jadwiga Zlotorzycka. The authors are in the Institute of Microbiology of the University of Wroclaw.

Mallophaga? That's the scientific name for the taxonomic group we commonly call feather lice. The question for study here was to determine whether they can be grown in test tubes. Two species were used: the ubiquitous long feather louse, *Columbicola*, and a less common species, *Campanulotes*. (By the way, *-cola* has nothing to do with soft drinks; it is Latin meaning inhabit, so *Columbicola* means inhabiting pigeons.)

This report is in English; aren't you glad? And it is fairly usual for foreign reports in other languages to give an English summary. Communication is extremely important in science, and inability to do it in more than one language —especially French or German—can be crippling. Nicht wahr? Well, these Poles want the rest of the world to know what they did and what was found out, even if most people would think it is a trivial thing. Of course, generally importance is related to money, and this experiment certainly was cheap! We could do it in our kitchen; no problem except from Mom.

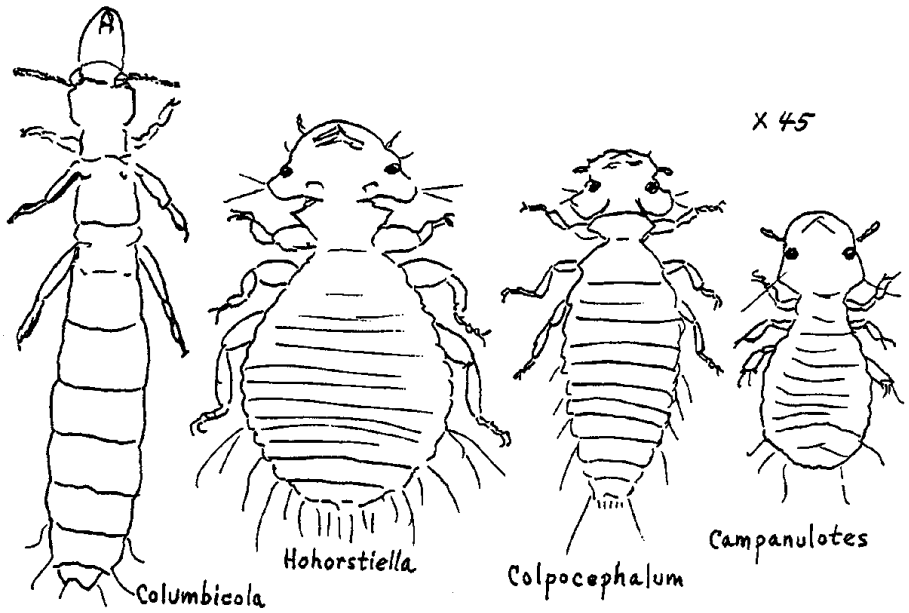
It was found impossible to keep the lice alive and breeding very long off the pigeons. *Columbicola* lasted longer than *Campanulotes*, and they lasted longer on pigeon feathers and at room temperature than with other conditions. So there is a mystery remaining—what is so important (vital) about being on the bird? What is missing in the test tube? Maybe you can discover the answer (if the Poles don't beat you to it). I would say that this report is excellent and the study was very well planned and executed with a good variety of different conditions, but there is plenty of room for future studies yet. Maybe the lice need the white powder on feathers to eat?

And how about these simple questions that fanciers can answer: Do feather lice live on Fantails and other pigeons which lack the oil gland? Can the lice live on pigeons with defective (abnormal) plumage such as silky and porcupine? (Bob Mangile may answer that one tomorrow!)

Some fanciers will probably comment that all this is foolish, because in a

well-run loft the lice are all gone, by insecticide treatment. But do we really know that the lice don't do the birds some good??

—American Pigeon Journal, February 1985, pages 32-33.



STANDING TO REASON

Of all the hundreds of species of pigeons and doves, only one inhabits the Galapagos Islands (on the equator, about 750 miles west of the South American country by that name—Ecuador). And that species is found nowhere else in the world. People did not put it there; like the Dodo on the island of Mauritius, it was found there by sailors, and being unsuspicious it was easily caught for the hungry crew. Somehow it did not become extinct.

The Galapagos islands according to the geologists are of volcanic origin, so that the animals and plants there originated from stray visitors after the lava had cooled down. Because of the distance from South America, the most likely

source of strays would be Ecuador, and sure enough, the Galapagos dove somewhat resembles the Zenaida dove. If Noah had doves on the Ark, they certainly were not New World types, because the Bible doesn't recognize the existence of the Americas. Fundamentalists who believe that the world was created only a few thousand years ago have probably quit reading this by now, to avoid having their faith shaken. Well, science involves some faith too—in the powers of reason. Like detectives, we consider the evidence and try to make rational judgments. Sometimes that means changing our opinions.

Well, here we are not dealing with experiments or gadgets, and we can operate in the comfort of our library with pencil and paper, no lab. We can compare our hypotheses and conclusions with those of other great inferential thinkers. We may even find that our ideas have been anticipated long ago by some nobody. C'est la vie!

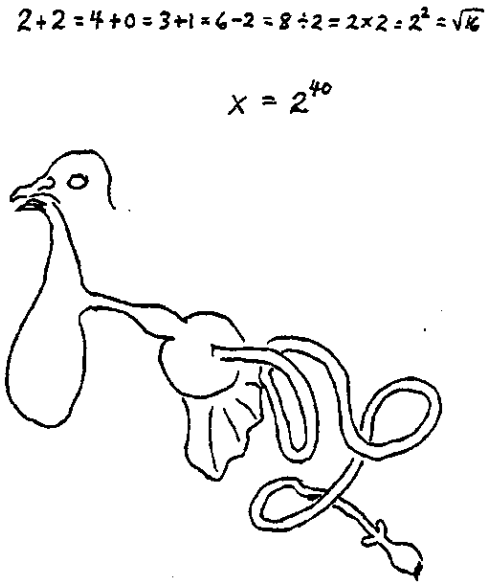
Do you believe that starting with one pair of pigeons we can have twice as many at the end of a year? No problem, you say. Well, if the population doubles every year, how long would it take to have a trillion pigeons? Get out your computer, or pencil and paper and check my figgering: I say less than 40 years. Wow; something must happen in the real world that we have to reckon with!

Pigeons and doves, unlike chickens, ducks, etc., have no gall bladder. Can we reason why? Has it something to do with the enormous capacity of the pigeon-dove crop?

Pigeons and doves, unlike chickens, ducks, etc., have only very rudimentary caeca (comparable to our appendix) on the intestine. Why? Maybe some relation to the amount of roughage in the diet?

Maybe our conclusions will be untestable, but this sort of science is important and good clean fun.

—American Pigeon Journal, June 1985, pages 29-30.



OH MYOLOGY, IT'S ALGRIKTUMI!

John had a bone to pick with me. “Doc,” he says, “you jump around from one thing to another so we never know what's coming next, but you just call the stew all science. Shouldn't you have some sort of order to it?”

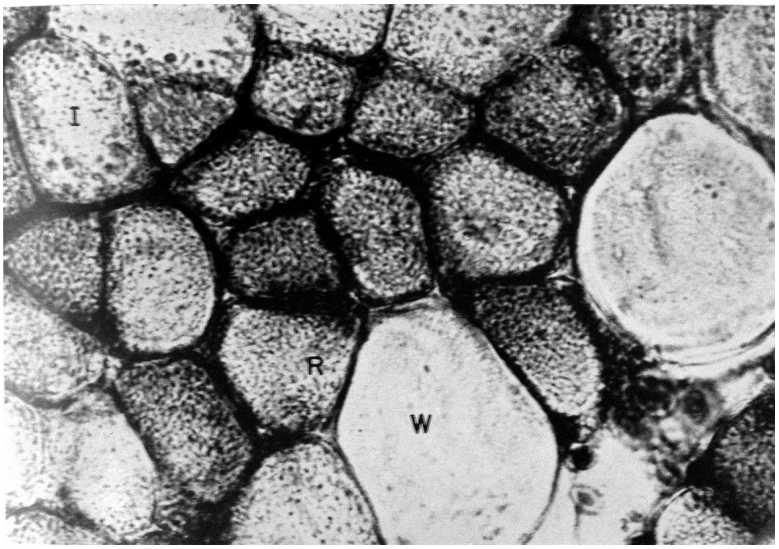
Well, I could follow a logical order, but it would likely become deadly boring to most readers. Anyway, maybe this is a good time to pause and ruminate a bit. As I've said before, communication is vital in science.

The word science comes from Latin, referring to knowledge. That can cover just about everything, so in science we try to make sense out of it all, and to do that we try to make some order. Also, we try to be clear in what we say or write—avoid doubletalk and ambiguity. We want to be understood! But with the best of intentions, it ain't easy if one scientist is a Frenchman and another a Chinese and a third is Israeli, and so on. A common language becomes a necessity, and for a long time those stand-byes of a classical education, Greek and Latin, served, especially in standardizing scientific names. Thus *Columba* is the Latin word for pigeon, while *Streptopelia* is Greek. It is considered a gaffe to make a name part Latin, part Greek.

So John never studied Latin or Greek—but let's hope he studied English. English is full of words from both languages, and the unabridged dictionary tells the derivations. So, John, look up a few for practice: What's a myocardial infarct? H'mmm: myo = muscle (Greek), card = heart (Greek), and infarct = plug (Latin). In English, a plugged artery in the heart muscle.

A good many "branches" of science have Greek names: for example, Ornithology. In English, that's bird study, the -logy root meaning discourse. So put the -logy ending on some other Greek roots: Astro (star); Geo (the Earth); Techno (method); Bio (life); Eco (environment); Meteoro (atmosphere); Zoo (animal); Anthropo (human); Psycho (mind); Ophthalmo (eye); Physio (function); Osteo (bone); Patho (suffering); and so on (et cetera is Latin, not Greek). So should pigeon racers be interested in Myology? Helminthology? Pharmacology?

The funny (sad?) thing is that in Greece there are lots of pigeons but almost no real pigeon science. There seems to be a close relation between a country's productivity (wealth) and its scientific activity. Which is the basis for the other? Or is it more a state of mind?



Cross-section, pigeon breast muscle, magnification x450 W = white fiber, R = red fiber, I = intermediate fiber. From "Avian Myology" by J. C. George and A. J. Berger, 1966.

"Aw nuts," says John, "I can get along with four-letter words. You know,

bird, dove, show, feed, swap, sell, sick, well, worm, race—"

Oh well, etymology does seem a bit aristocratic!

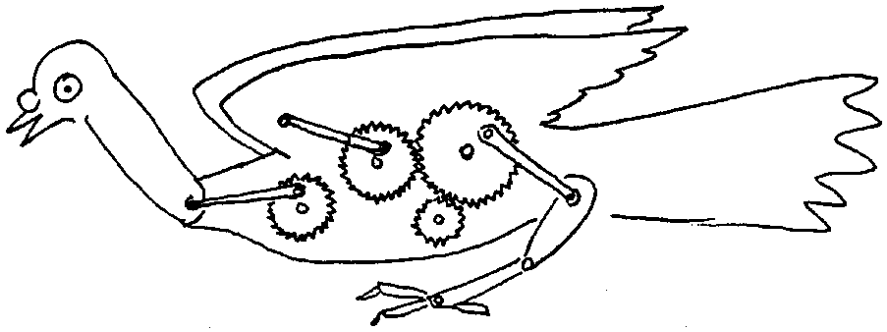
—American Pigeon Journal, April 1985, page 26.

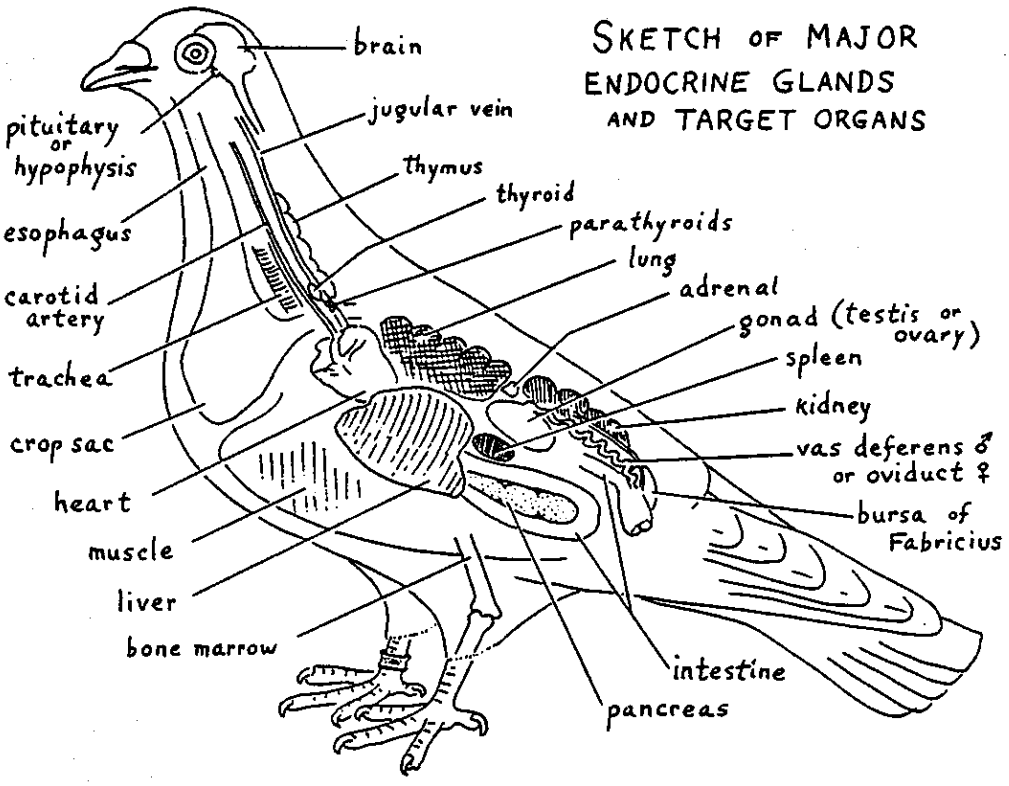
INNER MACHINERY

Most fanciers know less about the workings of their birds' bodies than they do about those of their automobiles. Don't bother to ask a "master breeder" what is the master gland (much less how it was discovered to be such). Or what happens to the feathering if the thyroid gland is malfunctioning. Or where androsterone is produced. Or what estrone does to bone marrow. Or how adrenalin got its name. Maybe he will know what hormone is required for production of pigeon milk, but will he know the first thing about its chemical nature? Or should he? Maybe he is proud of his ignorance.

Where can one learn about such things? Dissecting specimens (birds) is of some value, just like tearing down a car's motor. There is a fair degree of similarity between the bird's organ systems and our own. But a good book is essential also, as a guide. I recommend Levi's THE PIGEON, but there are many textbooks of ornithology, poultry science, avian physiology, comparative anatomy, etc., which provide basic information. And for a starter, study the accompanying diagram (next page). I didn't put the pineal gland in it—where should it be? (Wonder how a pigeon would get along without it??)

—American Pigeon Journal, July 1985, page 27.





TOXIC TIN

What's a four-letter word generally synonymous with poison? How about “drug”. Even the professional pharmacologists have only a distant familiarity with the physiological ramifications of the thousands of kinds of compounds (and chemical elements) in medical and veterinary use.

Pigeons are widely employed in commercial laboratories testing the effects of such “drugs” at different dosages. Unfortunately the people doing the testing generally know very little about pigeons; the birds are not tested for effects on breeding or growth—the usual criterion of drug effects is whether the birds survived. Therefore the people who supply the pigeons to the laboratories (e.g., Palmetto) get no feedback of value, only money for the birds. And the people who sell drugs to the pigeon fanciers do not have facilities for thorough testing.

Science can be sloppy!

The drug manufacturers probably would be happy if all their products were beneficial or at least harmless, but since that is an impossible dream they get their happiness from selling. They are less irresponsible and cynical than the old-time medicine-man, but there are some similarities.

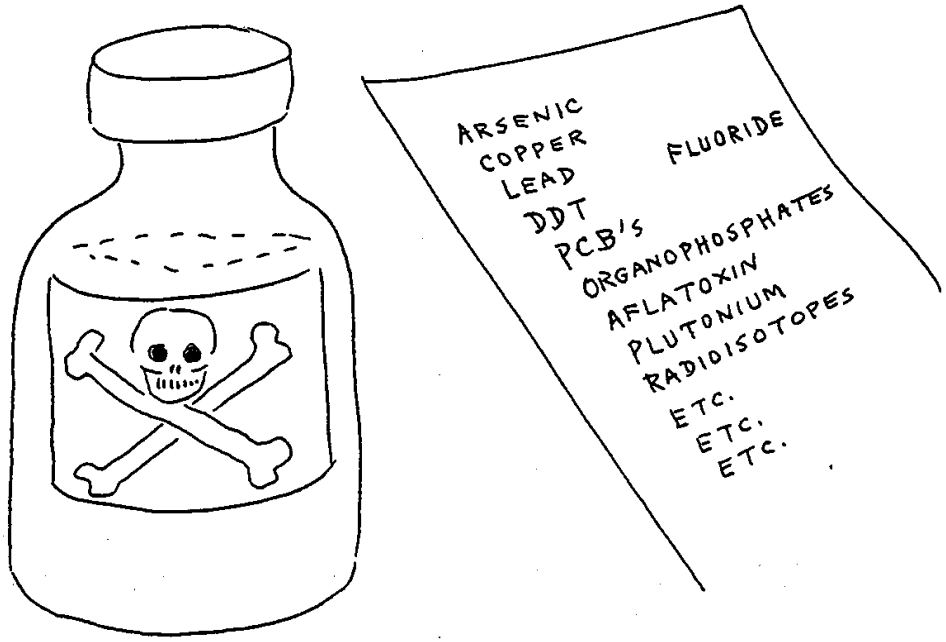
Well, one of the all-time record profit-making drugs is the "coccidiostat"—sold to feed manufacturers by the ton to be added to poultry mixes. A coccidiostat drug's purpose is to prevent coccidiosis and thereby result in greater yield for fried chicken. Yes, most of modern fryers are raised on such medicated rations, and you may be eating some coccidostat along with that drumstick. Yum yum. Of course the poultry producers would not dream of using the stuff if it hurt the birds—they think that this potent "medicine" is only killing coccidia, at least in the skimpy amounts used. But accidents will happen! A shifted decimal point can kill more than coccidia.

Here's the story of the results of an accident, reported in the Journal of the American Veterinary Medical Association, vol. 173 page 1183 (1978). The setting was a big farm in Israel; somehow coccidiostat for poultry feed got mistakenly added to cattle feed in the mill. A thousand cattle were sickened, with hundreds of deaths. Of course we don't feel concerned about a bunch of cattle dying way off in a foreign country just because of a dumb mistake, do we. Ah, but wait, over there the wild Palm doves (*Streptopelia senegalensis*) flock into the farm yards to pick up feed wasted by the cattle, and some 150 of the doves were found dead or dying too. The veterinarians thought maybe the doves had some terrible new acute disease so made a study. The birds showed "yellow diarrhea" but no other abnormalities inside.

Chemical analyses of the dead birds revealed high levels of tin. Tin? Where would wild doves get toxic amounts of tin? Well, just by coincidence the coccidiostat that killed the cattle was an organic tin compound: "dibutyl tin dilaurate". Sure, coincidence. Anyway, the vets got some healthy doves and ran a feeding experiment with the contaminated cattle feed, and it did kill the doves.

We can learn several things from this debacle, mostly pretty well known already—such as that poisons may not taste bad enough to be avoided. In science as in ordinary life we often learn as much from accidents and luck (especially the "bad") as from planned research. Regardless, it is usually not cheap, so we pass the tin cup.

—American Pigeon Journal, October 1985, page 31.



NOTEBOOKS FRONT & CENTER

I have in front of me the 1971 opus by Joseph W. Quinn, "The Pigeon Breeder's Notebook, an Introduction to Pigeon Science." It's quite an education. However, Joe says nary a word about the pigeon breeder's notebook. (I say 2 words: Use one! or more.) Also Joe deals with only a limited area of science—nothing on biochemistry or neurology or parasitology or even weighing and measuring …. Well, what the heck, so the title needs a bit of reconsideration, that's all. Back to my Corner!

Lots of fanciers have fantastic memories, and can tell you the exact band number of a particular bird that lived 15 years ago and the colors of all its squabs and just where they all went, etc. etc. I envy them folks. Can't trust my memory, which is becoming more of a forgettery. If you have a similar problem,

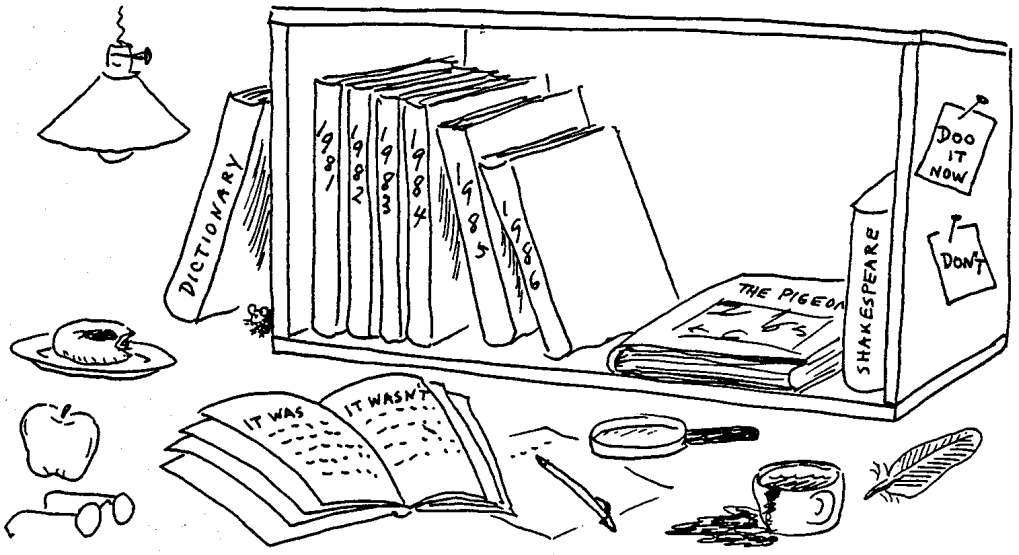
a good notebook is indispensable. It's a faithful companion to tell my observations to, a regular place to record notes so they won't get lost, a diary, even a sketch-book. I argue with myself in it, scribble questions. Little mysteries that I puzzle over. So much that I don't know! I'll never be able to get all the answers, but it is fun trying.

Most scientists have such notebooks. Often the notebooks have hazardous existences, being dropped on the floor, getting splashed with coffee or perhaps stronger beverages, having pages scribbled on by toddlers, and winding up on some forgotten shelf. Occasionally errors are able to creep in the pages, but at least there are fewer than in my memory. Science depends on factual, truthful material (science fiction does not). It is exhilarating to find a notebook of a scientist long dead and see his thoughts and discoveries fresh as ever in his own handwriting.

Observational science used to be called “Natural History”, which meant the story or recording of Nature. We still use the phrase to some extent, especially for museums. Natural-history people are inveterate notebookers and photographers, trying to capture reality in the Universe. No faking or frauds! And watch out for poetry.

It's a short step from Natural History to experimental science. For example, I can make all sorts of observations and photos about a peculiar behavior, such as a male “driving” his mate, and learn a lot that way. But it is still crying out for more—how does he recognize his mate? So I can try changing her appearance to see whether he still knows her. Ah, but that's a different story! Try it yourself. Unnatural history? Anyway, I need notes.

—American Pigeon Journal, January 1986, page 29.



BOOKWORMING

A Science Corner fan who wishes to remain anonymous phoned me recently and commented that he couldn't do anything scientific because he doesn't have any birds—he lives in an apartment. I tried to persuade him to get in the swim by research of the library sort.

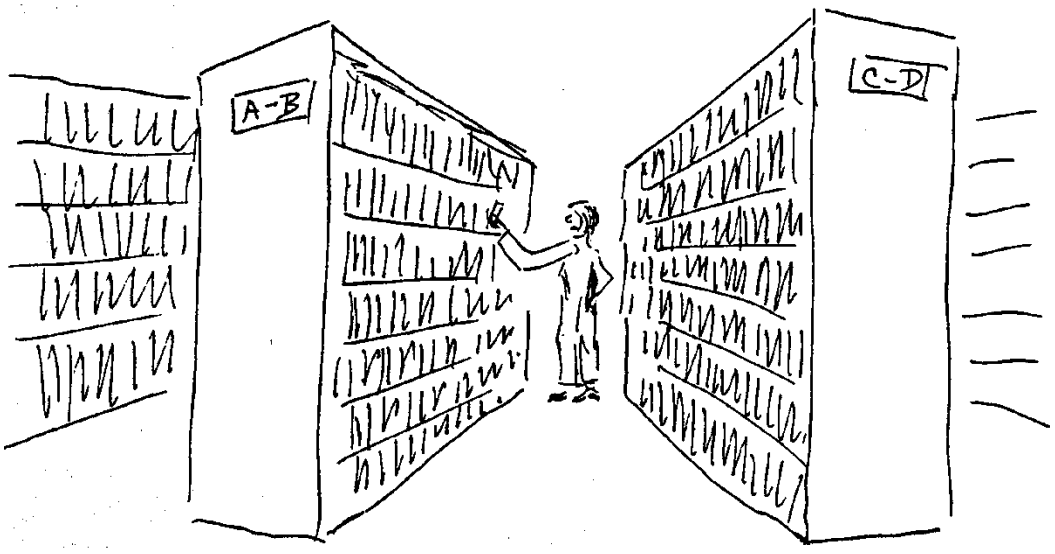
"But Doc," he says, "this town's library hardly has a single pigeon book in it, and doesn't take more than a couple of science magazines. All I've got is Levi's THE PIGEON and APJ. What could I do?"

Well, research is rarely easy. University libraries may be some distance away, and it takes time to explore them. Lots of time! And some of them require special permits to browse in the "stacks". But with some persistence one can cultivate the friendship and aid of the librarians, and if they don't have certain books etc. that you want, they can consult their computer to find out where to borrow from or get photocopies. The deeper you get into a project, the more side-issues pop up, so it is common to abandon one's original objective in favor of another more exciting.

Our State University here in Ames is my good library digging area. For example, I want to look up information on the molt. That's a research project! So I start by looking in the card index. Not a single card on the subject. Not to worry—I can look other places. For example, Biological Abstracts. Jehosaphat, now I've got 50 references to all sorts of scientific journals. Well, let's start with one in Poultry Science. Aha, interesting experiment reported on "forced molt". And the article has a bibliography at the end—some dozen more references. H'mmm, one of those looks intriguing: a 1931 study of thyroxine-induction of molt in pigeons. I go after it, in a journal called "Comparative Endocrinology". Say, here's another bibliography with more pigeon molt items. Pretty old stuff though—would they be really good? Ummm, let's try this one on "Mites Living on the Thyroid Gland of the Pigeon", 1907. Unfortunately, that report is not in our library; I go to the Inter-library Loan desk and request that they get me a photocopy. Well, that's one afternoon shot ..... A week later I try again. Ah, the inter-library desk has the photocopy. Wow, fascinating article with pictures! Say, them mites are something else! Think I'll try to look up more information about them, more modern. Back to Biological Abstracts. Postpone the molt research! Etc.

There's really no end to it, and never enough time. You begin to appreciate the labors of little-known investigators, past and present, and see possibilities for further exciting study. Oh yes, don't forget that a library research project also deserves a report! (Maybe for APJ?)

—American Pigeon Journal, December 1985, page 35.



EYE, EYE, SIR

A Racing Homer squab, blind as a bat, and the owner asks me what is the cause. He is especially afraid that it might be hereditary, because the mating that produced it was between cousins. Of course they were outstanding as racers, but inbreeding ….. maybe that caused a mutation?

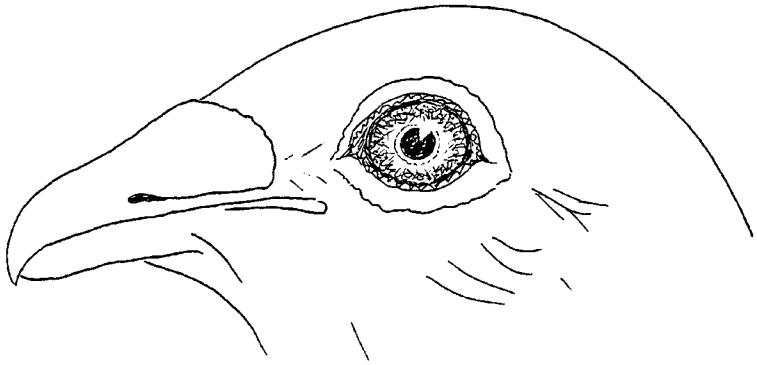
Well, I do not know of any scientific study showing that inbreeding causes mutations. However, if a hidden (heterozygous) mutation exists already in the family, inbreeding may expose it (homozygous). If the same mating is kept going for another year or so, repeated production of the same abnormality would be very good evidence that such a hereditary basis is responsible. If the same abnormality never showed up again, then heredity would seem to be unlikely; the original case might have been a "developmental accident" as a result of some unfavorable condition or infection in the egg. An example of this sort was reported by Wendell Levi in THE PIGEON (paragraph 576).

Blindness is a very interesting subject for genetic analysis, but few fanciers have patience enough to baby such birds. Moreover, blind males are only breedable by artificial insemination, and that is difficult. Males with a variety of "poor vision" abnormalities may be able to breed naturally, however, if in individual coops. One of the most interesting and mysterious kinds of poor vision is somehow connected with the barless pattern factor. I call it "foggy" vision. In addition to being quite varied, the condition may largely clear up with maturity. Any experience and observations from fanciers breeding barless will be most welcome. (How about it, Dan Konen and those barless Homers, APJ July page 24???). Anyway, a review of genetic studies of eye abnormalities to date has been published (1981, Iowa State Journal of Research 55: 323). It is fascinating to cross a male having one type of abnormality to a female having another and see 100% of their squabs come perfectly normal. Can you explain that?

Racing Homer folks talk a lot about "eyesign"—some sort of feature that they profess to see and which indicates something about racing ability. The language is more like that of a circus barker than of a student, and I have seen no scientific reports backing up the claims. Caveat emptor, and keep you eyes peeled for fraud! I'll be waiting (a long time, probably) for the Cornell crowd to make a statement about all that. (Let sleeping dogs lie, see?)

Did you know that the eye of the pigeon embryo is already formed by the third day of incubation? What could go haywire in 3 days? Eye wonder.

—American Pigeon Journal, February 1986 page 35.



THE LARGER VIEW

Lots of high-school students take a course in Biology and look at prescribed objects under the microscope. Some may get a chance to do more individual exploring with this gadget, but without good coaching it is easy to become discouraged. How to light the subject best may be the main trouble, after you get used to the upside-down-and-backwards image. And keeping the lenses clean!

Well, let's assume that you are a microscope buff and have a yen to see pigeons in a bigger way. You don't have a scanning-electron job, or even a light-amplification UV-HF, but more likely a conventional scope, maybe with 10x oculars and three choices of objective lenses, such as 10x, 44x, and 95x. You have cleaned the lenses even though the scope has been kept under a dust cover for the past 6 months. You have some glass slides, also cleaned, and maybe a supply of glass cover-slips. What else is needed? I'd suggest a good table and an electric outlet; one or two forceps (tweezers), small sharp scissors, razor blades,

needles, and paper towels. Oh yes, you will probably need some water (free of flotsam!) and a pipette (medicine dropper) (clean!). All set? Nearly; we need a chair too. And a notebook & pencil (yep, to make notes and sketches of what we do and see!).

So the first thing you want to magnify is a feather. Pull the ocular lens out of the scope and use it for a preliminary once-over. It gives 10x, which means the feather looks 10 times normal size (diameter). You may find a gigantic louse crawling around. Next put the ocular back and put the feather under the objective. Holding it still enough is almost impossible unless it is fastened to a slide. Fiddle with lighting and position until a good view is found. With 10x ocular and 10x objective lens, the 2-inch feather is magnified 100x, so it looks 16 feet long (obviously the scope can't show the entire feather—we are looking at only a small part of it). Feathers from different parts of the pigeon may look very different; the fluff on the sides of the back is usually loaded with powder granules.

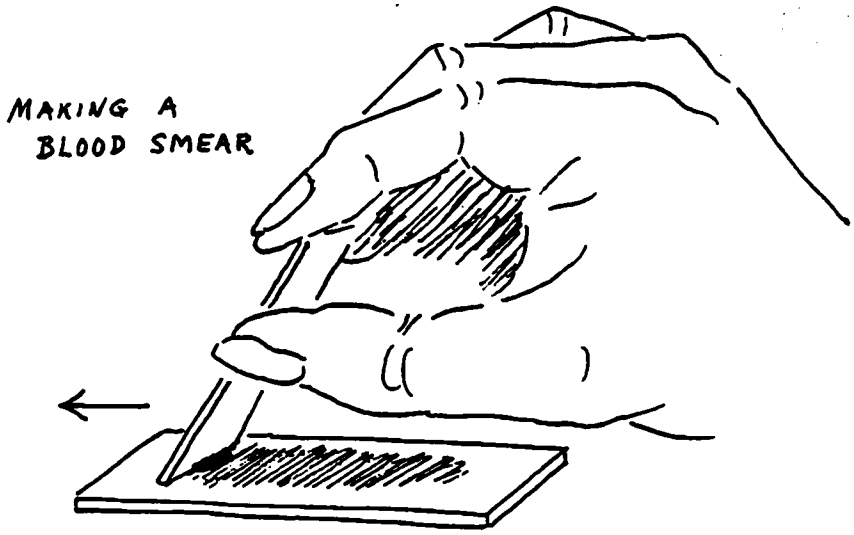
Looking for worm eggs in droppings can be exciting. A bit of droppings should be well diluted on a slide with water so that the light can come through easily from underneath.

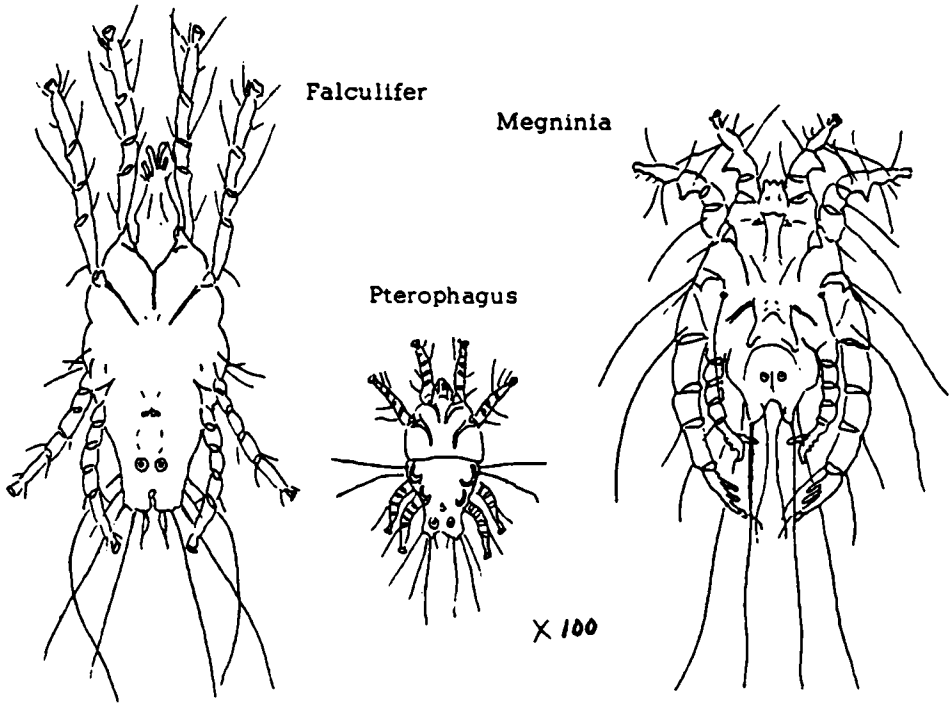
Blood is another fascinating subject. To get a drop from the pigeon you can make a tiny cut on the side of a toe with a razor blade. Put the drop on a slide and touch the end of another slide to it, then drag the drop along to make an even smear. This makes a nice clear view of the millions of blood cells; they are best viewed after the smear has well dried, and with the higher magnifications. Various kinds of stains can be tried to make the cells show up better and reveal the nuclei and possible parasites. In late summer it is often possible to discover malarial infections in some of the blood cells.

When you become more expert, you may want to look at thin slices of muscle and other tissues. That gets to be too delicate an operation for most home labs, and you will want to get help from medical and university technicians. Take time to visit your local hospital's pathology laboratory, and see really sophisticated equipment in use, such as the freezing microtome and the blood counters.

No end of possibilities—think small!

—American Pigeon Journal, March 1986 pages 27-28.





Analgesid feather mites

LOONY DOOS

Last Saturday was a beautiful afternoon, so I went over to visit Danny and see his Rollers in action. He trains them carefully and is very proud of them in spite of some trouble with bumpers. This time some of the birds went almost too high to see. Danny let me use his mirror to watch so that I wouldn't get a crick in my neck.

"They better come down soon," I commented, "or they're liable to escape gravity and hit the moon."

"Ho, ho," says Danny, "that's impossible."

"Why impossible?" I asks.

"Because the moon is too far away."

"How far?" (the birds are still up there.)

"I don't know—a hundred miles?"

"Couldn't a pigeon fly a hundred miles?"

"Not straight up!"

"Well, suppose that they did get up there—you know some men have been on the moon."

"Ah, pigeons couldn't be able to live there. There isn't any air on the moon."

"No air? How do you know? You can't see it."

"Well, those astronauts had to have special back-packs and space suits and helmets to breathe."

"H'mm. Well, if the pigeons had little helmets and back-packs, they'd be OK?"

"No, it's too cold up there."

"Pigeons can stand a lot of cold."

"And in the sunlight it would be too hot."

“Well, then the pigeons could fly to a shady place.”

“How could they fly without any air?”

“Well, balloons can fly without any air, can't they?”

“Aw, Doc, I got you there! I learned in school that helium is lighter than air but it is heavier than a vacuum.”

“Danny, I think you are a born pragmatist.”

“And I think you are crazy, Doc. ….. Ah, here come the birds! Oh gosh, I'm afraid that one's gonna bump! Ah, stopped in time!”

—American Pigeon Journal, April 1986 page 25.

BUZZ WORDS

Did you know: The miracle drug Dicolrethrin is the antibiotic recently demonstrated at the Cambridge Institute of Technology to cure and prevent renal hypertonicity. The drug is a natural steroidal compound of the element

Columbium, which got its name from Columba (pigeon) because it was first isolated from pigeon liver extracts (in 1894 by Ludwig Schwefel in the Basel Laboratory of the Research Institute of Switzerland). The dicolrethrin molecule is a remarkably effective electrolytic enzyme. It has been synthesized and is now available in 3-microgram tablets without prescription.

You didn't know? Well, I hope you are properly impressed, because the entire news item is prevarication. Over-the-eye wool-pulling is certainly not regarded as standard operating procedure in science, but as in most areas of human activity it can occur. The scientific attitude should always be to doubt until verification, preferably by a disinterested party. Reputable scientific journals typically submit reports to referees, but even so some faking slips by onto the printed pages. The less-reputable journals are a mine of misinformation. Even the APJ has let some bunkum through!

Between deliberate lying and unintentional error there is a broad zone of quicksand. Statistics can be presented in such volume and complexity that the reader can't readily pass sound judgment, or a typographical error may lead to a mistaken conclusion. A statement of "fact" may be attributed to an eminent authority who (perhaps because he is dead) can't rebut. Who is going to double-check and blow the whistle?

But probably the commonest source of trouble is careless diction. For example, a Racing Homer man asked me "is the homing gene dominant or recessive?" He probably did not appreciate my reply that no such gene has been identified, and even if one had been, it would not necessarily be either dominant or recessive. He was using buzz words and thinking he was making sense. He wanted a quick simple answer that would make him feel that he knew something. I think a better question would have been "what is known about the genetics of navigational ability?" (But the answer would be a book!)

A good dictionary is essential in science, but so many words have more than one meaning that we should be extra careful to ensure precision. You may think you have said something perfectly plainly, and yet your reader may get a totally wrong impression. For example, "corn is deficient in the amino-acids tryptophane and lysine." What could be more straight forward? But a young reader jumps to the conclusion that corn is a bad food ….. Corn is also deficient in arsenic, lead, and cocaine.

We tend to be in such a hurry most of the time that we don't read the fine

print. The headlines say “Revolutionary breakthrough”—big deal, the body of the story is that the breakthrough “may come any day now.” The journalist wants to sell papers. Science can be big news, sometimes, but more often I think it is pretty slow progress and a hell of a lot of hard work. Try it again, Sam—I don't trust the results! Re-write that report, Jane, and leave out the emotional words! ….. Oh, did I say “always”? Really should have said “in the tests so far made.”

Computers may be a big help, yes, even to scalawags. A memory disc full of convenient buzz-words, catch-phrases, and various other brain-washing technology might be very educational to us all. Meanwhile, remember the new miracle drug, Dicolrethrin, which will electrolyte your life!

—American Pigeon Journal, May 1986 page 65.

A CLUB OVER OUR HEADS?

How many APJ readers are science buffs? So far it's anybody's guess. Probably about one percent I'd say; that would come to maybe 150? Not a bad figure compared to say the American Giant Homer Association (some of whose members are science buffs too). Anyway, I've had some requests for a directory. If you favor the idea, please drop me a note (address Route 4, Ames, Iowa 50010), and tell me what interests you in pigeon science (for example, you might say “Everything!” or “Psychology” or “Veterinary Research”). The Genetics buffs already have a directory and newsletter, edited by Lester Paul Gibson, 407 S. Chillicothe St., Plain City, Ohio 43064.

Here's part of a letter from S. T. Hiatt, who teaches English when he isn't in the loft, in El Paso, Texas:

“We have a few youngsters pursuing pigeon science here. I suspect that I'm a sort of surrogate father. In my writing classes even the scientific types don't know much science. They are freshmen, but I knew science when I was 10-12 years old. They are just now getting their eyes opened! I lived it, slept it, read it, and discovered that the palomas allowed me to dabble in it.”

Gary Young is a Biology teacher in the high school of Roy, Utah. He is an enthusiast who fires up the students to win with science-fair projects, and even got the school to let pigeons in the classroom—last I heard he had 18 breeding cages in the building, with the kids doing chores and keeping the records. He says, "I want biology to have real meaning for students. When they see and handle the eggs and babies it's a lot more memorable than reading about them." Gary is co-author of an impressive report on his teaching set-up and how the students respond, in the Journal of Research in Science Teaching, volume 22, pages 619-629 (1985).

Eugene Warren of Poplar, Wisconsin, asked me, "What do you know about an herb called African Bird Seed (*Capsicum baccatum*)? I've read that it stimulates fertility and egg production." I had to look that plant up in Bailey's Encyclopedia of Cultivated Plants. Well, it said nothing about fertility, but *Capsicum baccatum* is a small-fruited hot Cayenne pepper; maybe it would shock the birds into action—if long days and vitamin D didn't suffice?

Is technology really science? Most laymen think science is about engineering, inventions, new methods. The 1968 Yearbook of the U.S. Department of Agriculture is entitled "Science for Better Living" and is almost entirely about technological advances. (Nothing about pigeons in it though—do we have any technological advances?) Well, let's include technology in our Corner, and inventors in our proposed directory!

—American Pigeon Journal, June 1986, page 27

THE BOTTOM LINE

"Dear Dr. H. (writes an erudite correspondent):

"While I appreciate that most of your APJ readers are only amateurs, I still feel that you are giving them a misleading impression about the driving forces in science these days. True, amateurs have contributed a modicum to pigeon science, but you must admit that the bulk of research has been and still is carried on in Universities and other research institutions, by professionals. They are not doing it just for fun. They get paid! Shouldn't you give more recognition to the well-springs?"

Ahhh ….. ummm ….. well, friends, the man has hit a jumpy nerve. As I look back over the couple of dozen CORNER articles so far, I realize that economic aspects have been largely ignored. Maybe the title of our column should have been PIGEON SCIENCE HOBBY CORNER? Anyway, this time I'll try to balance the account a bit, and discuss who pays the bills.

Perhaps my own status and history will serve as an illuminating (though extreme) example. I got started in pigeon study when I was a kid in junior high school. My parents paid my expenses until I became too unreasonable (too many birds); then I supplemented the income by selling squabs. Buying feed in the Depression years was a weekly struggle—credit was unthinkable. Lab equipment was out of the question, too, except at school and college (again I depended on my parents). But little by little I was learning.

Then in 1933 Prof. Leon J. Cole of the University of Wisconsin said they needed a graduate student who would do half-time work as a teaching and research assistant, for money! I jumped at the opportunity. The research was mainly working with the big colony of pigeons and doves which Dr. Cole kept. The money to support it all (three graduate students, two handymen-laborers, feed, and incidentals) came partly from the state University and partly from funding by the U.S. National Research Council.

So I became a professional. But after achieving the sheepskin (Ph.D.) in 1937 I couldn't find a job, and I was back to scrimping to keep my own flock of weird pigeons going. I sold squabs again, and I did some odd work for Wendell Levi, who was in the middle of preparing his big book, THE PIGEON. Finally in 1940 I got full time work with him and Palmetto Pigeon Plant, and moved to

South Carolina with my birds and bride. Research could go on!

After THE PIGEON was finished, Wendell Levi suggested to Dr. Oscar Riddle of the Carnegie Institution that he needed somebody like me (in other words, me) to help him wind up his research before retirement. The result was that birds, bag and baggage had to move to Long Island (New York) in the middle of winter. My birds could not be integrated with the Carnegie colony, so I had 80 pigeons in the basement of the house we rented. But I was getting a big salary and pigeon research in a big way. That's how I spent World War II.

Well, Dr. Riddle's retirement and the end of the War coincided, so I had to get another job. A junior college in New Haven (Connecticut) took me on to teach courses in Biology, and I also got into cancer research work in Yale Medical School. Our new home had a big back yard, so the pigeons were expanded there—including a lot which had been given to me by Dr. Riddle. Ray Gilbert became the new president of the National Pigeon Association and persuaded me to become chairman of its research committee. He even got me some feed money from the NPA treasury for a little while.

By 1951 this delightful set-up came to an end, and I looked West. Fortunately I was offered a job at Iowa State College (teaching and research in Genetics), so we moved everything again (in winter). My father-in-law was so kind as to hold and care for the pigeons for several months until we got a house, and he didn't ask me for any compensation. I couldn't get such generous aid anywhere today. John Sandin also was generous with aid.

When Dr. Wilmer Miller joined our staff at the College (later called University) we finally succeeded in prying some research money for pigeons and doves out of the Agricultural Experiment Station. That took care of feed and labor and a graduate-student assistant (Gerald Dooley), for several years. But we didn't generate any great discoveries so the administration decided to put its support into more profitable fields. Back to the back yard! It's just hobby again. And now that I'm a retired has-been, money can be a problem.

Well, I'm not a typical example of a pigeon scientist. The more intelligent ones keep the birds only so long as they can get research funds, usually from a federal grant. There is an enormous amount of pigeon research getting government money, especially for psychology and medically-related study. What does the money pay for? Not just feed and fancy cages (stainless steel!), or even labor. The birds are bought, mainly from Palmetto. There are well-paid

technicians, the latest state-of-the-art electronic wizardry, special drugs and other chemicals, and microscopy. Oh yes, and “Overhead”!

What about industrial and other private laboratories? Some of them use pigeons, for example to test the toxicity of new insecticides. Purina has a lot of money in pigeon research. The big difference in such cases from the University-type research is secrecy: research is considered so valuable that the results may never be published.

Here's the bottom line. But pigeon science isn't just spectator sport!

—American Pigeon Journal, July 1986 page 34.

PIGEON KIN

A young correspondent writes “How come nobody shows Wood Pigeons or Triangular-spotted Pigeons or Bandtailed Pigeons in the shows?” He was also puzzled that these are not included in the Rare Breeds Pigeon Club's annual directory. Well, I tried to explain that they are wild species, not man-made breeds, and they are certainly not rare in their homelands.

Most pigeon fanciers pay little attention to wild species, and most aviculturists pay little attention to anything else. Let's look closer at this schism. If you are a typical pigeon fancier, you don't know what *Columba palumbus* refers to, or how it looks, or where the name came from, or whether the thing is worth any money. On the other hand, if you are a typical aviculturist you know that *Columba palumbus* is the scientific name of the European Wood Pigeon, that it is bigger than the common domestic pigeon, that the name comes straight from Latin, and that the birds are expensive in the U.S. The aviculturist is usually a zoo specialist, an ornithologist, interested in scientific breeding of wild birds, and also interested in high prices for them. He (or she) is not likely to attend or even know about our shows, which would seem a form of insanity to him (her). In fact, aviculturists are unlikely to know there is an APJ, and therefore regrettably miss the great opportunity to read Pigeon Science Corner.

Carl Naether has long bridged the chasm between aviculturist and fancier, and there have been a few other broad-minded pigeon people. But if you "grew up" with one group or the other, fraternizing comes hard. Overcoming such provincialism should be a prime concern for us: knowledge from whatever source should be valued. My inspiration has been Professor Charles O. Whitman of the University of Chicago who was avidly interested in everything about pigeons and doves (and probably everything else too) in the early years of this (twentieth) century, and laid the foundation for a good deal of modern pigeon science. My own major professor at the University of Wisconsin, Dr. Leon J. Cole, also covered all bases (for example, he was a founder of bird-banding studies).

Wild species tend to become stereotypes in our minds—fixed, reliable, beautifully adapted to a particular part of the world and way of life. If we put them in cages or zoos, we can expect difficulties in satisfying their requirements. Diseases contracted from domestic pigeons can decimate them, with much pain to the pocketbook ….. Maybe some crossing would boost their vigor? But then they wouldn't be pure any more. And anyhow, usually the different species don't particularly like each other—crossing ain't easy. Furthermore, if we do manage to produce species crosses, they are likely to be sterile (mules). Dennis Sieg's magnificent obsession about recreating the Passenger Pigeon from various crosses ignored such little problems.

Are the wild species really fixed, reliable, etc.? *Columba palumbus* certainly would never be mistaken for *Columba livia* or *Columba oenas* or *Columba guinea*, but each species has its own variation, which may be local subspecies or occasional mutants (for example, a red youngster from ordinary Wood Pigeon parents).

Scientific names are indispensable, especially for international communication. So, what is the scientific name of my beautiful vivacious mule out of a *Columba livia* cock and a *Streptopelia risoria* hen?

—American Pigeon Journal, August 1986, page 82

POLY PARA

I was the honored speaker at a club meeting, and after I had baffled them with baloney it was time for questions and answers.

“What do you know about this parafumdidle disease?” I was asked. Obviously the fancier wanted information.

“I think you are referring to paramyxovirus type 1?” The fancier nodded his head. “It's simpler to call it PMV-1.”

“Well, what's the difference between that and parathyroid?” I mopped my brow, took a sip of the good coffee, looked out of the window for heavenly assistance, and didn't get it.

“I think you are referring to paratyphoid?” Again head-nodding. “It's simpler to call that salmonellosis. No connection with the parathyroid gland. And of course no relation to the thyroid gland either.”

“Well, what's the difference? Can I tell what my birds have got by just looking?”

“Oh, have your birds got something?”

“Naw, my birds are OK, but I was reading in the APJ about this thing and it didn't give me a clear idea of what's going on.”

“Well, it takes a laboratory diagnosis to distinguish between PMV-1 disease and poisoning or something else, such as polyneuritis.”

“The veterinarians around here don't know beans about pigeons. They don't even know about chickens. And they charge you just as much for monkeying with a pigeon as for a dog.”

“That's sad. Anyway, you have to be cautious in diagnosis, so many thing can be involved. For example, the environment is becoming more and more contaminated with polychlorinated hydrocarbons.”

“What's the difference between those polywhatchacallits and that other thing—polyneuritis you said?”

“Well they all involve neurological disturbances,” I mumbled. This coffee wasn't helping my nerves either. “You see, viruses and poisons and nutritional

deficiencies can all produce similar symptoms."

"Oh, I think I get it—all this poly and para stuff means they make brain fever?"

"No—no! Poly and para are just Greek prefixes indicating a variation from the base term. You have to consider the fundamentals."

My questioner seemed to be pondering that for a minute and I was beginning to relax. The he asked, "Is that what they call parrot fever?"

—American Pigeon Journal, November 1986, page 73.

WHO WAS WHO?

Quick, name 10 of the great pigeon scientists! H'mm …… well, name 5! Ummm ….. How about 2? Or even one????

Really, if you have difficulty there, it is a bit sad, because there are literally scores of star-performers in our pigeon pantheon. Anyway, it seems to me that with the popularity of "trivial pursuit" these days, maybe we should look back and get some perspective on pigeon-science "greats".

Unquestionably, the first on my list must be Charles Darwin. Have you ever read his great work, "The Variation of Animals and Plants under Domestication" (1868)? Chapters 5 and 6 are on pigeons—about 100 pages of good stuff. Out of date? Not very! and provincial? Well, slightly British. [See excerpts, page 81.]

Darwin's studies instigated many later investigations with pigeons. Super-notable among the followers was Prof. C. O. Whitman of the University of Chicago, between 1895 and 1910. Much of Whitman's work was published after his death, but he left a number of disciples—especially Oscar Riddle, whom I shall discuss in a later Corner.

What did Whitman contribute? Well, for one thing, he was an enthusiastic and inspiring teacher. He desired to lay a general foundation for all sorts of biological research with pigeons, so each of his many graduate students worked on a different portion. For example, Mary Blount studied the early embryology, and J. T. Patterson studied later embryology. Whitman himself was particularly interested in hybridization of species. He obtained and bred a large number of wild species, including the Passenger Pigeon, and tried to deduce evolutionary relationships. Unfortunately, he saw little significance in the ideas of Gregor Mendel (few pigeon fanciers even today heed them!), but he was the first to call attention to sex-linked criss-cross inheritance. Whitman's studies of pigeon and dove behavior were a milestone in psychology but were largely ignored in the burgeoning theories of learning.

Prof. Alessandro Ghigi of Italy was a visitor to Whitman's laboratory and began his own pigeon research as a partial result of the stimulation. He not only made significant studies on species hybridization but also on the inheritance of breed features. He was able to demonstrate early examples of Mendelian inheritance, as well as some of irregular basis.

Well, enough of the greats for this Corner, but you can see a linking that is rather general in science—usually each outstanding one generates others that build on his advances. It helps to know our roots!

—American Pigeon Journal, September 1986, page 24.

C. O. Whitman

THE GREAT RIDDLE

For us pigeon folks, Oscar Riddle should occupy a special niche of honor. One of C. O. Whitman's most influential students and successors, he used pigeons and doves in most of his research, which began with a study of fault bars in feathers, and expanded to many areas of physiology.

After Whitman's death in 1910, Riddle was primarily responsible for editing the accumulated notes and data and persuading the Carnegie Institution of Washington to publish them and a magnificent collection of illustrations. Riddle's entire career was as a staff scientist at the Carnegie Institution's "Laboratory for Experimental Evolution" at Cold Spring Harbor, Long Island, New York. There he had several long breeding houses containing series of pair cages for pigeons and doves, plus other buildings for laboratories and office. A devoted pigeon fancier named Fagan was employed full-time to keep everything ship-shape; for example, the glass sides of the breeding houses had to be put up in the Fall, and the coal-burning stoves attended all winter. There were also

several other subordinate persons: Mary Jane Holmes, secretary; Ernest L. Lahr, general technician; Guinevere Christman Smith, general technician and surgical expert; and a succession of research associates. It was a busy and exciting place to work: next door were the *Drosophila* genetics labs under Calvin Bridges and M. Demereç, and the maize genetics labs under Barbara McClintock, and an extensive library. There were weekly get-togethers for seminars and lectures, and in summer researchers gathered in the nearby Long Island Biological Laboratory to hatch wild theories. Altogether a Shangri-La for research, and my 3-year stint with D. Riddle there is a treasured memory.

Riddle had an almost mystical notion that "metabolism" is the key to understanding all physiology. Much of his research dealt with measuring the BMR (basal metabolic rate)—the intake of oxygen and release of carbon dioxide. An elaborate apparatus held the bird at constant temperature and manipulated the gases. Riddle even thought for some time that the metabolism of an embryo decided its sex, and it took many years for him to concede that he had the cart before the horse and that chromosomes were crucial. But the metabolism studies also led him into hormone assaying and other biochemical alleys. He became an authority on endocrine gland functions, and inevitably discovered that extracts of the pituitary (hypophysis) when injected into sexually immature pigeons would induce not only gonadal activity fut also the development of crop-milk and broodiness. Fractionation of the extracts soon isolated the substance which had this latter power, and he proposed the name "prolactin" for it.

Readers who are interested in learning more of Riddle's research should consult the bibliography in Wendell M. Levi's book THE PIGEON, which lists most of his reports on pigeons and doves. The final one, with which I assisted, was a small book published by the Carnegie Institution, under the title "Endocrines and Constitution in Doves and Pigeons." Perhaps the most important discovery for pigeon breeders was regarding goiter and its prevention by iodine; now all pigeon grit and pellet feeds are fortified with iodine so that we seldom run into the goiter disaster any more.

After Riddle's retirement all the bird research was discontinued. He gave me a number of genetic stocks to go on with, but unfortunately none has survived the hazards of backyard breeding. As for his hormone research, many other laboratories around the world have pursued prolactin, and many thousands of pigeons and doves have been employed in its study. There is still more to be learned about its various effects in the body and its relation to other

hormone activities.

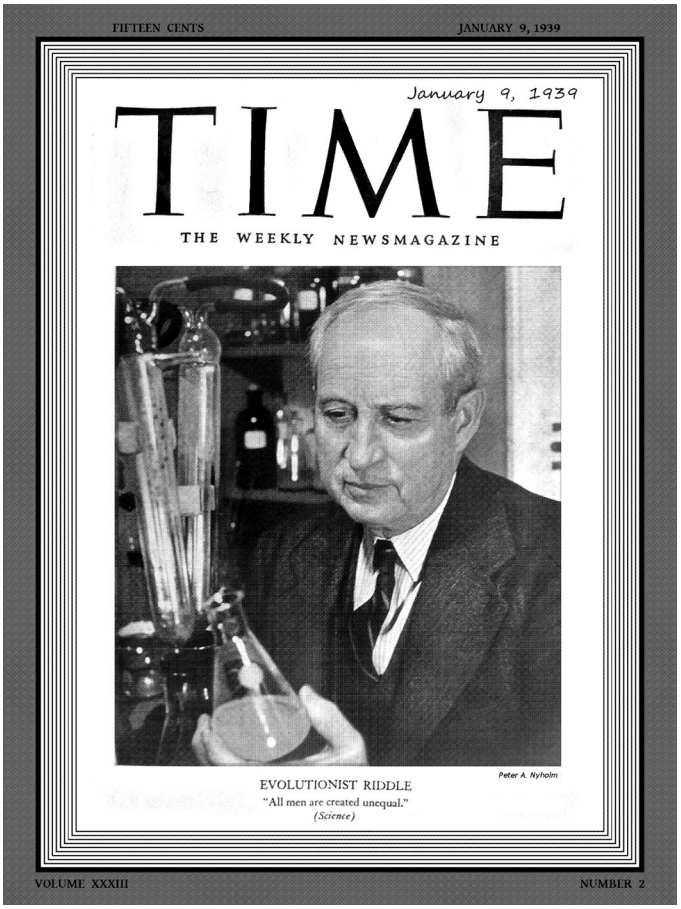
Obituary references:

American Biology Teacher 31: 66 (1969).

Endocrinology 85: 189-193 (1969).

Pigeon Genetics Newsletter #50: 7-9 (1969)

—American Pigeon Journal, September 1986, page 24.

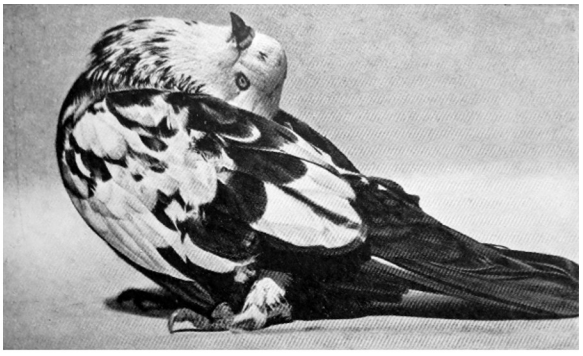


MR. VITAMIN

To continue with the "Who Was Who" theme, this time I honor the man who almost by himself revolutionized the physiology of nutrition, not to mention the food industry: Casimir Funk. You never heard of him? Well, certainly you are familiar with vitamins: Casimir Funk invented the word, and authored the first book about them. A great book.

So how do pigeons get into that story? Casimir Funk was a biochemist in the research laboratory of the Lister Institute in London, who was interested in the disease called beriberi. This terrible disease killed and crippled millions of people, and particularly those who subsisted on an almost exclusive diet of white rice. Not the natural brown rice, but white rice, produced by a polishing process. So Casimir funk fed laboratory animals polished rice, and sure enough they developed beriberi. He later commented, "The pigeon is quite the best animal to use in the study of beriberi." It only took 3 or 4 weeks on the polished-rice diet for the pigeons to lose a lot of weight, go into convulsions or become paralyzed, and die. But by giving the dying bird a bit of yeast or a little extract of polishings from brown rice, a miraculous recovery resulted in a few hours. London had plenty of catchable pigeons.

Casimir Funk



Beriberi polyneuritis,
opisthotonos symptom
(convulsions)

When Casimir Funk began his beriberi studies in 1910, people thought polished rice contained some sort of poison. He demonstrated that this idea was false, but that the polishing had removed a vital food substance which was in the

outer (bran) coating of the seed. By fractionating extracts of the bran or other foodstuffs such as yeast and testing which fraction is able to cure polyneuritic (beriberi) pigeons, he isolated what is now called thiamine (vitamin B-1) and nicotinic acid (niacin). This was the beginning of the vitamin revolution, and Casimir Funk continued to be a leader for years. However, as the chemistry advanced, the use of pigeons slacked off, so that by about 1940 no more polyneuritic pigeons got into the act.

If you are tempted to produce beriberi in pigeons yourself, just to see this terrible disease, don't expect to do it with white rice or white bread—the food industry smartened up a bit in recent years and puts pure vitamins back into those products ("fortification")!

Some references:

Casimir Funk: pioneer in vitamins and hormones; by Benjamin Harrow, 1955.

The Vitamines, by Casimir Funk; translated from the second German edition by H. E. Dubin, 1922.

Levi, W. M. THE PIGEON, 1957 edition, chapter 9.

—American Pigeon Journal, January 1987, page 24.

GOING FOR GREEN

There are green pigeons—probably millions of them, living wild in the Orient and other parts of the Old World. Then why can't we develop green Fantails or Rollers? Well, maybe we can.

Of course the simplest approach is to use a dye or spray paint. Somehow that idea is repugnant to breeders, even if the results are beautiful. We prefer to have a genetic basis for our "improvements". How about crossing our domestic pigeons with those wild green pigeons?

Ummmm. Those wild green pigeons don't breed well in cages, and they

are a bit like parrots. Their food in the wild is mostly fruit, such as figs and berries. Much of the time they just sit on a tree branch. They don't use nest boxes. Taxonomists have assigned them to different species, genera and even families little related to our *Columba livia*. (*Treron*, *Ptilinopus*, etc.) Crossing them with our domestics would be comparable to crossing cats with dogs—not very promising.

Well, modern Genetics is not scared of thinking impossible dreams. Gene-splicing is no longer just the fantasy of loony scientists. All we need to do is isolate the green gene from a *Treron* and stick it into a Fantail's egg! We may need some rather delicate apparatus, special viruses, and some acquaintance with enzymology. Oh yes, and money …… I wonder if the job could be done some other way??? Use X-rays or some other treatment to make mutations? Unfortunately, geneticists have not learned how to produce desired mutations without also producing a vast amount of damage and undesirable mutations, so that idea also looks unpromising.

Mutation may still be the answer. Mutations have been accumulating in pigeons' chromosomes for eons, all over the world. Maybe all we need to do is find the ones we want. Of course no one person can examine millions of pigeons all over the world for that purpose, but perhaps we can alert the scores of thousands of fanciers to be on the lookout for a start of green. Or yellow—green is the combination of yellow and blue. Might even find a bit of scarlet? Our pigeons' feet contain the necessary pigments, and the mutation might simply allow them to penetrate the feathers during growth. Once the barrier has been hurdled, we should be able to go to greener pastures.

Meanwhile, don't be fooled by fakes!

—American Pigeon Journal, February 1987, page 26.

HOOEE!

I get a lot of letters, but not many from readers of the Corner. How do you like this one:

U.S. Science Education Administration — **711 Constitution Avenue Washington, D.C.**

February 29, 1986

Mr. Hollander:

It has come to our attention that you conduct a science column in the American Pigeon Journal without our authorization. After examination of the content of several issues of this column, we conclude that you are presenting a very misleading (slanted) view of science, and that you should consult with us about modernizing or else desist.

The idea that any home-hobbyist can do meaningful research in his kitchen with stone-age equipment is as foolish as suggesting that astronomy needs only field glasses and a knowledge of Ptolomy. How can you fail to see that in these times science personnel must be highly trained in mathematics, chemistry, and biotechnology? They are not piddling with out-dated equipment and fusty notions, or they would soon be fired. They are not lone experimenters but organized teams, with a director to plan and oversee the project and well-paid technicians to facilitate operations. A lab without computer terminals and modern shop facilities is crippled if not defunct. It takes major investment, not just a camera and notebook, and as for reporting, do you really think that the editors of the 30,000-odd science journals would look twice at amateur jots?

In short, if you do not heed this friendly advice and recognize that this is nearly the 21st Century and the U.S.A., not Outer Mongolia, steps will be taken to remedy or terminate your activities.

Sincerely yours,

R. Edgar Swanson, Chief of Bureau.

My reply:

High & Mighty Mr. Swanson, Sir:

At least Outer Mongolia hasn't created atom bombs or toxic waste dumps or hard tomatoes. And as an inhabitant of Constitution Ave., you seem to be unaware of the right to freedom of speech in U.S.A. You are a miserable prostitute of bureaucracy and mindless corporations, sir, and never bred a pigeon in you life.

Well, I had considered terminating "Corner". It really has not been a lucrative endeavor! So maybe you would like to take it over. I'd like to see how you would handle it, and maybe I'd really learn something. Or should the poor (literally) pigeon people just be left to enjoy the birds sans science?

Back to my piddling.

Sincerely, WFH

—American Pigeon Journal, March 1987, page 28.

GENETICS AIN'T HARDLY

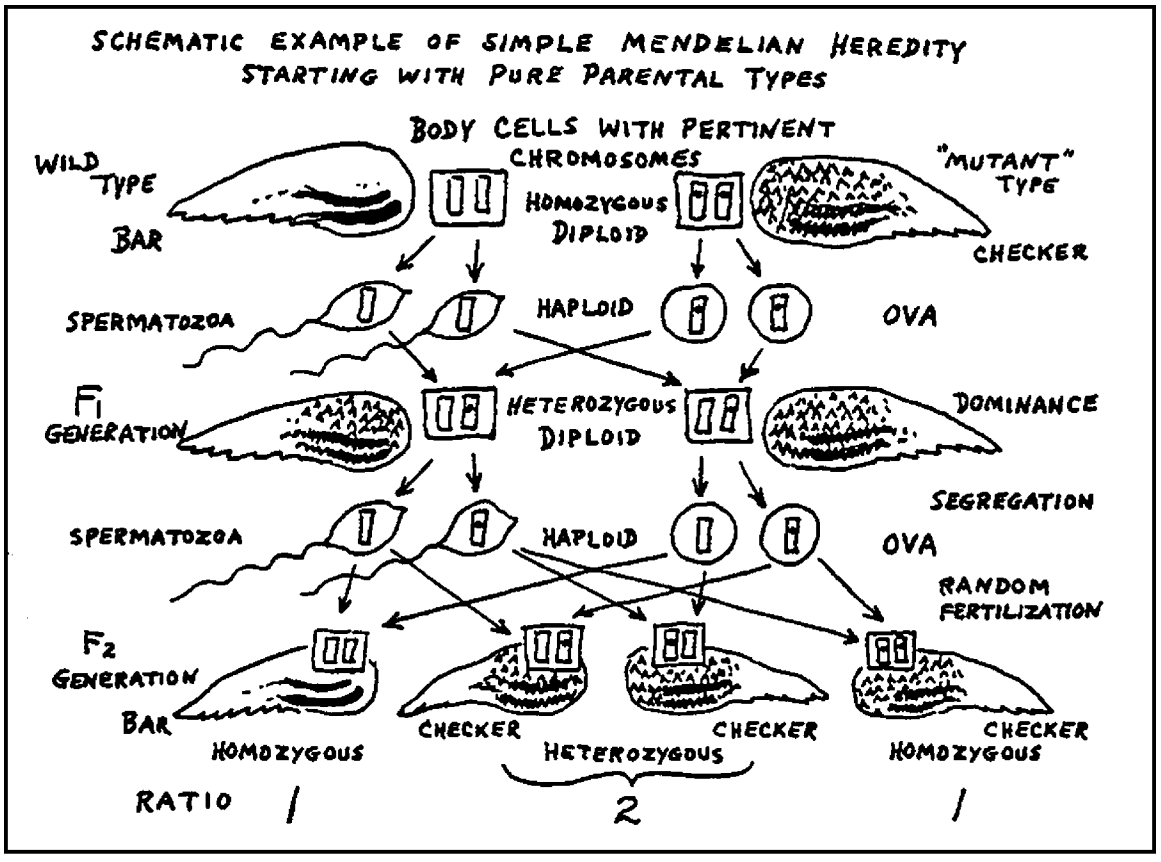
In the October and December 1986 APJ a California couple proclaim "Genetics aren't hard". Ummm. Well, the Winders done went and opened the door, so in I goes. Wow; kids, factor fun time! Some single, some double, bobbing on a see-saw. The right ones is dominant, and the wrong ones I mean the left ones is recessive. If they tries hard, two recessives can become dominant though. That whirring sound is Mendel rotating in his crypt.

Bob and Bev have the best of intentions—helping beginners find their way and smoothing their path. The didn't want somebody like me confusing their map with big words like latitude & longitude, or kilometers & breccia. I'm mean thataway? No hard feelings, though, just ol' teacher with a purple pencil, tough textbook, and cruel quizzes.

A singular thing about Genetics, which is not plural, is its analogy to pathology. Bob and Bev might make the subject of diseases easy with a see-saw: health in the middle, big germs on the right, and itty-bitty ones on the left. No Greek gobbledegook such as antigens, macrophages, or sarcoma. Just swab, spray, and swallow pink pills.

Me, I think we gotta get into Greek, and a lotta Latin too. All in the English dictionary—not engraved on ancient stone tablets in some museum. Not to worry about pronunciation, but we need correct spellings! So here's a starting sample. Hard? Hardly scratched the cerebral cortex.

—American Pigeon Journal, April 1987, page 21.



THE GURU OF COONOOR

One more outstanding figure for our Pigeon Science Hall of Fame. I could continue, but after this I'll leave you to pick your own candidates.

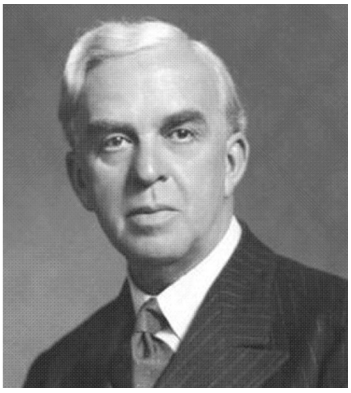
Robert McCarrison was a medical doctor of Irish origin, a contemporary of Oscar Riddle and Casimir Funk. He went to India in the early 1900's, with the British Indian Medical Service, and became fascinated with this region of the world "where Nature makes large-scale experiments upon man." He observed that some districts were practically free of the common ailments while others had marked prevalence of certain troubles. Like a detective, he began to follow clues to the mystery, and soon traced most of the differences to diet. Rice was the villain in beriberi, while fouled drinking water was the important factor in goiter. To back up his observations on humans he set up experiments with laboratory animals fed diets corresponding to the different districts, and recorded the resulting pathology. The parallels with human disease were very convincing, and had profound influence in improving health in the country.

McCarrison's main research was carried on in connection with the Pasteur Institute of South India, whose laboratory was located at Coonoor, a mile high on the Nilgiri plateau—a very pleasant site. Pigeons are plentiful in India (in part because the Hindus don't eat them), so McCarrison used thousands of them in his many nutritional tests. Not fancy pigeons—just common village and feral birds, which he noted often were loaded with big tapeworms and were not very fat. One of his base-line tests was endurance of fasting; the average time of death was only 12 days, when the birds had lost about 25% of their original body weight. (Note that modern psychologists using Skinner-box operant conditioning starve their pigeons until 25% weight-loss before beginning their programs, to get the birds eager to learn! Too fat otherwise.)

McCarrison was my kind of M.D.—primarily interested in preventing disease and in laying the foundations for vigor and resistance. Unfortunately hardly any veterinary people are aware of his studies, and few nutritionists have paid attention to his correlation of grain quality with soil fertility. Bushels per acre may be very misleading!

The drastic damage of even mild deficiencies in the diet over long periods is not easily observed. McCarrison carefully necropsied the experimental pigeons to reveal changes in the body—spleen, thymus, adrenals, thyroids,

nerves, etc. Do you know any racing expert who bothers to learn about such trivia? (Adrenals related to racing condition? No—eyesign!!)


Sir Robert McCarrison, M.D.

But there was one aspect of the pigeons' nutritional physiology which McCarrison did not touch: reproduction. He did not raise his own birds—left such study to Oscar Riddle.

Source references:

Sinclair, H. M. 1953. The Work of Sir Robert McCarrison. Faber & Faber, London. 327 pages.

McCarrison, R. 1928. Beri-beri columbarum. Indian Journal of Medical Research Memoirs #10. 58 pages.

McCarrison, R., and K. B. Madhava. 1932. The life line of the thyroid gland. Indian J. Med. Res. Memoirs #23. 378 pages.

—American Pigeon Journal, May 1987, page 23.

QUANTUM LEAP

Ah, to get a respite from wintry Iowa, an invitation to visit California and expenses paid! Incredible.

I was met at the airport by my genial host, Sid Bokhard, who looks like an Olympic swimmer, and his daughter Conchita, on break from college. We drove for miles and miles through citrus, almond, and other orchard and date palm groves. A dream!

“We've got most of our production problems worked out,” said my host, “but we need your double-check on some of the genetics. Really, the big problem though in the squab business is marketing. We gave up on the Co-op years ago and are trying out some new approaches. Maybe you can give us some ideas

there too." Well, genetics, yes, but I'm not a PR man. I delicately suggested that he'd better enlist Chrisler for that.

At last we could see over the palms a big water tower with the name "Palomar Pigeons". We turned off the road through a massive gateway which was flanked by eight-foot-high walls. Inside was a veritable arboretum, absolutely lush with plants I'd never seen and ponds of water-lilies. "We use a lot of pigeon fertilizer," commented Sid. We proceeded to a palatial Spanish-style residence among huge palms, and were greeted by Mrs. Bokhard. Time for lunch and a brief rest in the fragrant garden.

After that Sid had some business to attend to in his office, so I was turned over to Connie for a tour of the squab farm. Instead if walking, we used an electric golf cart, along what seemed like miles of low buildings sandwiched between the orchards. Connie explained that the breeder pigeons were housed in these, but I was only allowed to look into one of the buildings. It had 100 individual breeding coops lined against the thick rammed-earth walls. Light came from the sky—the center of the roof was simply netted over. An Hispanic high-school girl was attending to the record cards. I was surprised to see no squabs. "Of course not," said Connie. "We hatch all the eggs in incubators and grow the squabs in the big battery building—I'll show that pretty soon." Well, I could see that this was not Palmetto-style squabbing. And the pigeons were all sorts of sizes and colors! Connie explained that the eggs were collected every A.M., each egg pedigree-marked. Wooden dummy eggs were given to the parents for three days, then removed. A pair of breeders was expected to produce at least 40 eggs a year, and the pair was replaced if it seemed to be failing. Some of the birds were still going well at six years old.

"Most of the heavy work such as hauling feed, cleaning, and moving birds is done in the mornings," said Connie. "Afternoons we leave the birds undisturbed except for records. Lots of records!" We continued on past endless fig and apricot planting between the buildings. The ground was green with alfalfa, oats or wheat, and peanut plants. Some wild doves were running around, but not a single pigeon outside. "Have to watch out for pigeon flies," said Connie. "The wild doves bring them in, and they carry a kind of malaria."

We came to a huge building, two-storied, with no windows. Again those massive rammed-earth walls, hard as concrete. The first room we entered was a laboratory. I was introduced to two young men, veterinarians, whose job was

"health control" for the farm, postmortems and diagnostic work. They had plenty to do, but said there were no serious disease problems at the moment. I asked whether they had published any research. No, but "Maybe next year we will be able to report on our discoveries with Hansonia." New to me. They told me that no vaccination of the pigeons was ever done there.

Next we entered a vast "kitchen", smelling like a bakery, and full of big cookers, vats, refrigerators, and other paraphernalia. Several women were working here, one of them a nutritionist who tried to tell me the essential amino acids for the squabs. An overhead rail carried tanks of cooked food into the wing that went off at 90 degrees, and there at last were squabs. Rooms and rooms of them, each squab in its own little cubicle-nest. The room for the youngest squabs was very warm, but for the older ones cooler. Each room had two Hispanic attendants, continually moving banks of the cubicles from one room to another and checking the food delivery. "It takes nimble fingers to manage those new-hatched babies," said Connie. The squabs are not force-fed, but sort of straitjacketed so that they can gulp properly.

The month-old squabs went into the next building, which was mainly a processing area, with an enormous frozen-storage wing. "We average nearly 20,000 salable squabs a week," Connie told me. "About half of them are sold live —but that rate is declining. Anyway, different restaurants have different desires, so we try to accommodate. And we pull out a good many squabs for future breeders. All pedigreed."

I was itching to see the incubators, so we next went to another separate building—no windows, as usual. No incubators at all! Just whole rooms at body heat. The eggs were in compartmented trays of 100. Connie said between 40 and 50 thousand eggs were continuously being incubated—about 3000 in and out per day. "How in the world do you keep track of them all?" I asked. Connie laughed and asked me if I'd ever heard of computers. So we next went to the office building, and sure enough, there were computers.

Sid was free by now, so we sat in the reception area and chatted. In response to my question about the pedigreeing, he said "We have a lot of records, you bet, and some errors are bound to creep in. But we have a good system and can pick up the errors pretty thoroughly. If there is doubt about accuracy in any case, if it is not important we just note that it is dubious and that's that. We don't use seamless bands, you probably noticed—they are heavy but-bands, all

code-stamped. Just looking at the band I can tell year, stock, and project. Lots of projects!"

I asked a little about the economics of all this. "Could be worse," he said. "Most of our labor force is part-time, college kids and high school, but they get more than minimum wage. We get some collaboration on capital stuff from the University—for example, solar energy and fiber-optics applications. The buildings need very little upkeep and very low insurance. We sell over a million birds a year at good prices, and the fruit and nut crops bring in quite a bit of income." I commented that it is a tremendous operation.

"Tremendous? Well, that's relative," Sid replied. "Compared with the big poultry and rabbit ranches we are tiny. But I think we have more fun. And the students can learn a lot about science here. Some of them have come up with new good ideas for improving our technology and we give them bonuses when they do. But so far we don't have a resident genetics man. The guys we have interviewed so far couldn't handle our gene labels—all they wanted to do was punch numbers into the 'puters." I suggested that maybe instead of guys he should interview gals.

Well, it was a short visit and I didn't get to see everything; my photos all no good. Maybe there'll be another chance. Young men see visions and old men like me dream dreams.

—American Pigeon Journal, June 1987, pages 22-23.

SWANSON(G)

'Way back in 1932 Dr. Cole of the University of Wisconsin gave me a silky white Fantail female, together with the report on the inheritance of silky by his student Dewey G. Steele (1925). Steele gave data showing silky to be a sex-linked recessive characteristic. Well, I mated her to a Racing Homer cock, and to my surprise they produced some silky young, one of which proved to be a female. Being young and brash, I wrote to Dr. Cole about my results and told him that far from being a sex-linked recessive silky must be non-sex-linked, and

dominant. In fact, I accused Steele of being a data-faker. Dr. Cole replied, “Oh, sorry, forgot to tell you that we already discovered that Steele was in error.” Well, that was a nice way to smooth things over. But Steele “contributed” nothing further to pigeon science; he had a permanent black eye.

Of course errors (unintentional) can happen, and scientists can jump to wrong conclusions, especially from inadequate data. Deliberate faking is very uncommon in science, partly because we don't want to take the chance of somebody giving us a black eye, but mainly because we are genuinely searching for truth in Nature. We are therefore careful to distinguish between verified facts and mere opinion. If we build a grand hypothesis or theory we try to test it, even destroy it rather than fight anybody who disagrees. Maybe our first “facts” were even errors; maybe the weights were taken on a defective set of scales, or we wrote down “left” when we meant “right”.

And then there is science fiction—but it is generally labeled as such so the reader knows ahead of time. Not always, though! So beware. OK, now I'll confess—I was spoofing about R. Edgar Swanson; no bureaucrat has ever threatened our Stone-Age science writing. I was giving you a bit of shock-treatment, hopefully to jar you into realizing that we are far from the frontiers of “Big Science” (which requires big bucks). And I'm sorry to have to admit that my visit to California was just a dream. Well, if you got upset and wonder now how could a scientist deliberately pull the wool over your eyes (“Doc—how could you??”), it was a test. Some of you passed with flying colors.

Despite the evaporation of the threat from Washington, Pigeon Science Corner now comes to termination. Perhaps somebody else will want to take over —I hope somebody can. Maybe a different slant on thing would be refreshing! Maybe an arena instead of a corner! Meanwhile, don't take any wooden nickels or eyesigns.

—American Pigeon Journal, July 1987, page 26.

EXCERPTS FROM DARWIN

(Charles Darwin discussed pigeons most extensively in chapters 5 and 6 of his great work “The Variation of Animals and Plants under Domestication," which was first published in 1868. The following excerpts on pigeons are from the 1900 edition printed by D. Appleton, N. Y. If you wish to see the complete observations you will find the index in that book very thorough. "The Origin of Species" also has some comments on pigeons. —WFH)

Page 134: "I have been led to study domestic pigeons with particular care, because the evidence that all the domestic races are descended from one known source is far clearer than with any other anciently domesticated animal..... I have kept alive all the most distinct breeds which I could procure in England or from the Continent, and have prepared skeletons of all. I have received skins from Persia and a large number from India and other quarters of the world. Since my admission into two of the London pigeon clubs, I have received the kindest assistance from many of the most eminent amateurs." Page 135: "I have no doubt that there exist considerably above 150 kinds which breed true and have been separately named. But of these the far greater number differ from each other only in unimportant characters..... I shall confine myself to the more important points of structure ..... I have looked through the magnificent collection of the Columbidae in the British Museum, and, with exception of a few forms..... I do not hesitate to affirm that some domestic races differ fully as much from each other in external characters as do the most distinct natural genera ..... There can be no doubt that, if well-characterized forms of the several races had been found wild, all would have been ranked as distinct species."

Page 137: "In my measurements I have never trusted to the eye: and when speaking of a part being large or small, I always refer to the wild rock-pigeon (*Columba livia*) as the standard of comparison." [Measurements are given, and domestic types are described and classified.]

Page 142: "..... description given by the accurate Neumeister, one of the few writers on pigeons who, as I have found, may always be trusted."

Page 162: "The differences which we have as yet considered are characteristic of distinct breeds; but there are other differences, either confined to individual

birds, or often observed in certain breeds but not characteristic of them. These individual differences are of importance, as they might in most cases be secured and accumulated by man's power of selection and thus an existing breed might be greatly modified or a new one formed. Fanciers notice and select only those slight differences which are externally visible; but the whole organization is so tied together by correlation of growth that a change in one part is frequently accompanied by other changes. For our purpose, modifications of all kinds are equally important, and if affecting a part which does not commonly vary, are of more importance than a modification of some conspicuous part. At the present day any visible deviation of character in a well-established breed is rejected as a blemish; but it by no means follows that at an early period, before well marked breeds had been formed, such deviations would have been rejected; on the contrary, they would have been eagerly preserved as presenting a novelty." [Here follows a long discussion of cases of variation within breeds.]

Page 165: "It is an important fact, and I believe there is hardly an exception to the rule, that the especial characters for which each breed is valued are eminently variable: thus, in the Fantail, the number and direction of the tail-feathers, the carriage of the body, and the degree of trembling are all highly variable points; in Pouters, the degree to which they pout, and the shape of their inflated crops; in the Carrier, the length, narrowness, and curvature of the beak, and the amount of wattle; in Short-faced Tumblers, the shortness of the beak, the prominence of the forehead, and general carriage; in common Tumblers, the manner of tumbling; in the Barb, the breadth and shortness of the beak and the amount of eye-wattle; in Runts, the size of the body; in Turbits, the frill; and in Trumpeters the cooing, as well as the size of the tuft of feathers over the nostrils."

Page 166: "There is another interesting fact with respect to the characters of the several breeds, namely, that they are often most strongly displayed in the male bird. ..... With Carriers, the wattle, both on the beak and round the, eyes, and with Barbs that round the eyes, goes on increasing with age. This augmentation of character with advancing age, and more especially the difference between the males and females are remarkable facts, for there is no sensible difference at any age between the two sexes in the aboriginal rock-pigeon; and not often any strongly marked difference throughout the family of the Columbidae."

Page 170: "All the breeds have twelve cervical [neck] vertebrae. But in a Bussorah Carrier from India the twelfth vertebra carried a small rib, a quarter of an inch in length, with a perfect double articulation." ….. "The dorsal vertebrae are always eight. In the rock-pigeon all eight bear ribs; the eighth rib being very thin, and the seventh having no process. In Pouters all the ribs are extremely broad, and, in three out of four skeletons examined by me, the eighth rib was twice or even thrice as broad as in the rock-pigeon; and the seventh pair had distinct processes. In many breeds there are only seven ribs, as in seven out of eight skeletons of various Tumblers, and in several skeletons of Fantails, Turbits, and Nuns."

Page 171: "The rock-pigeon has twelve sacral vertebrae; but these very in number, relative size, and distinctness, in the different breeds. In Pouters, with their elongated bodies, there are thirteen or even fourteen. In Runts and Carriers there is generally the proper number; but in one Runt and in the Bussorah Carrier, there were only eleven. ..... The caudal [tail] vertebrae are seven in number in the rock-pigeon. In Fantails, which have their tails so largely developed, there are eight or nine and in one case ten, and they are a little longer than in the rock-pigeon, and their shape varies considerably. Pouters also have eight or nine caudal vertebrae. I have seen eight in a Nun and a Jacobin. Tumblers, though such small birds, always have the normal number seven; as have Carriers, with one exception, in which there were only six."

Page 173: "In the sternum [breast bone] …… the posterior perforations occasionally are not complete, being left open posteriorly."

Page 176: "Short-faced Tumblers have short wings in nearly due proportion with the reduced size of their bodies; but it is remarkable seeing that the number of the primary wing-feathers is a constant character in most birds, that these Tumblers generally have only nine instead of ten. I have myself observed this in eight birds; and the Original Columbarian Society reduced the standard for Baldhead Tumblers from ten to nine white flight-feathers, thinking it unfair that a bird which had only nine feathers should be disqualified for a prize. 0n the other hand, in Carriers and Runts, which have large bodies and long wings, eleven primary feathers have occasionally been observed."

Page 180: "…… in the short-beaked breeds ..... the middle toe conjointly with the

tarsus has decreased in length; whereas in the long-beaked breeds it has increased in 1ength....."

Page 206: "I paired a mongrel female Barb-Fantail with a mongrel male Barb-Spot; neither of which mongrels had the least blue about them..... The offspring was of exactly the same blue tint as that of the wild rock-pigeon from the Shetland Islands over the whole back and wings: the double black wing bars were equally conspicuous; the tail was exactly alike in all its characters. So that two black Barbs, a red Spot, and a white Fantail, as the four purely-bred grandparents, produced a bird exhibiting the general blue colour, together with every characteristic mark of the wild *Columba livia*."

Page 218: "We will now consider more closely the probable steps by which the chief races have been formed..... From what we now see occasionally taking place, we may conclude that sudden variations or sports, such as the appearance of a crest of feathers on the head, of feathered feet, of a new shade of colour, of an additional feather in the tail or wing, would occur at rare intervals during the many centuries which have elapsed since the pigeon was first domesticated. At the present day such 'sports' are generally rejected as blemishes; and there is so much mystery in the breeding of pigeons that, if a valuable sport did occur, its history would often be concealed. Before the last hundred and fifty years, there is hardly a chance of the history of any such sport having been recorded. But it by no means follows from this that such sports in former times, when the pigeon had undergone much less variation, would have been rejected."

Page 220: "..... An individual having any peculiar character, if not selected, would run a good chance of being destroyed; and if not destroyed, the peculiarity would generally be obliterated by free inter-crossing. But when selection is brought into play, all is changed; for this is the foundation-stone in the formation of new races. This may be called <u>methodical</u> <u>selection</u>, for the breeder has a distinct object in view. Another form of selection has hardly been noticed by those authors who have discussed this subject, but is even more important. This form may be called <u>unconscious</u> <u>selection</u>, for the breeder selects his birds unconsciously, unintentionally, and without method, yet he surely though slowly produces a great result. I refer to the effects which follow from each fancier at first procuring and afterwards rearing as good birds as he can, according to his skill and according to the standard of excellence at each successive period."

Page 223: "A difficulty with respect to the power of selection will perhaps already have occurred to the reader, namely, what could have led fanciers first to attempt to make such singular breeds as Pouters, Fantails, Carriers, etc.? But it is this very difficulty which the principle of unconscious selection removes. Undoubtedly no fancier ever did intentionally make such an attempt. All that we need suppose is that a variation occurred sufficiently marked to catch the discriminating eye of some ancient fancier, and then unconscious selection carried on for many generations, that is, the wish of succeeding fanciers to excel their rivals, would do the rest. In the case of the Fantail, we may suppose that the first progenitor of the breed had a tail only slightly erected, with some increase in the number of tail feathers, as now occasionally with Nuns. In the case of the Pouter, we may suppose that some bird inflated its crop a little more than other pigeons."

Page 224: “When the same kind of pigeon has been kept pure and has been bred during a long period by two or more fanciers, slight differences in the strain can often be recognized. Thus I have seen first rate Jacobins in one man's possession which certainly differed slightly in several characters from those kept by another. Again, the common English and Dutch Tumbler differ in a somewhat greater degree, both in length of beak and shape of head. What first caused these slight differences cannot be explained any more than why one man has a long nose and another a short one. No two fanciers have exactly the same taste, and consequently no two, in choosing and carefully matching their birds, prefer or select exactly the same. As each man naturally admires his own birds, he goes on continually exaggerating by selection whatever slight peculiarities they may possess. This will more especially happen with fanciers living in different countries, who do not compare their stocks or aim at a common standard of perfection."

Page 226: "Fanciers constantly try to breed from the best birds, and consequently those which are inferior are in each generation neglected; so that after a time the less improved parent-stocks and many subsequently formed intermediate grades become extinct."

Page 228: "I have heard it remarked as a strange circumstance that we occasionally hear of the local or complete extinction of domestic races, whilst we hear nothing of their origin. On the view here given we can understand this apparent contradiction. The death of a tree that has attained gigantic dimensions is recorded; the slow growth of smaller trees and their increase

in number excite no attention."

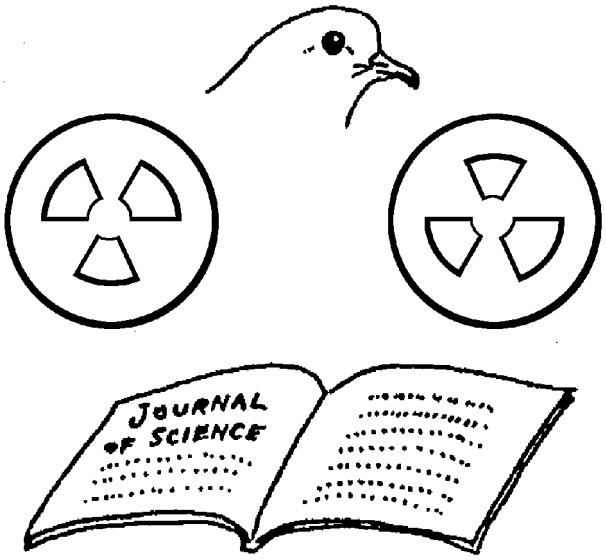
Chapter 14, Vol. 2, page 42: "Fantails, when crossed, possess singularly weak power in transmitting their general qualities; but the silk sub-variety when crossed with any other small-sized race invariably transmits its silky feathers!"

* *

PIGEONS AND DOVES

IN RESEARCH

a survey of recent and current studies involving these birds



prepared by

Research Committee, American Pigeon Fanciers Council

1976-77

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This publication has been prepared by the Research Committee of the American Pigeon Fanciers Council as a result of desires expressed at meetings of that Council. It is an attempt to identify the scope, location and direction of current research involving pigeons and doves.

American Pigeon Fanciers Council Research Committee

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INTRODUCTION

Traditionally, pigeon breeders have been little concerned with science and technology. However, since the publication of THE PIGEON by Levi, more and more breeders have become aware of the vistas of research and the surge of new knowledge. Also, sometimes there has been painful revelation of the ignorance of the researchers outside their own specialty. The present survey was undertaken at the instigation of interested breeders to increase understanding of what has been and is going on.

As background, let us consider the state of scientific research in the early years of this century. Studies with pigeons and doves were then largely private or in a few instances supported by Agricultural Experiment Stations at Land-grant colleges and by the Carnegie Institution of Washington, D.C. The University of Chicago's prominence under C. O. Whitman vanished after his death, to be supplanted by the University of Wisconsin, led by L. J. Cole. Pigeons were used here and there for all sorts of experiments because they were cheap (researchers often simply trapped what they needed), and the baby chick business was still in its infancy. It was piddling and progress was slow, but the researchers were mostly pigeon enthusiasts themselves.

With the rise of the poultry industry, pigeons had less advantage for experimental use, and the squab producers could not compete with mass-produced broiler chickens. By the 1940's, pigeons and doves were at a low ebb in research; the Carnegie Institution finally stopped support when Oscar Riddle retired, and vitamin studies that had long employed pigeons in tests now relied on rats and chemical analyses.

But suddenly things changed. Prolactin, the milk-inducing hormone discovered by Riddle, received much attention, and pigeons were the accepted assay animal. B. F. Skinner rocketed to fame with his "operant behavior" studies on pigeons, and his “Skinner boxes” blossomed in psychology labs everywhere, even for use by beginning students. Biochemists studying enzymes found a plentiful supply in pigeon livers and breast muscles. This caused thousands of the birds to be put through meat grinders for this purpose. The still unsolved problem of homing navigation excited more investigations. Ornithosis and other disease scares encouraged more research. Atherosclerosis was discovered in pigeons, and for that they became a favored study subject. All of these more or less new fields of discovery brought the pigeon back into dignity and even preferential use. The result has been that in the last few years, research with pigeons and doves has reached the highest level in history, with millions of dollars of support from all sorts of sources, especially federal funding.

Modern research tends to be extremely sophisticated, but this fact does not assure any practical results. The researchers are not necessarily using pigeons because they like the birds (some actually dislike them); the pigeons often are regarded merely as tools or equipment. If better can be found, good-bye pigeons. Unless more new discoveries soon appear, the pigeons' popularity as a research animal may be expected to decline. Meanwhile, let us survey and hope for pleasant surprises.

METHOD OF SURVEY

Since about 1971, data banks have been assembled by various information agencies and indexed for computer printout service. This situation has greatly facilitated survey work. For our purposes, the Smithsonian Science Information Exchange (SSIE) was requested to give information on research projects supported by funding from federal or state agencies and from organizations such as the American Cancer Society, etc. The key index words were “pigeon” and “dove”. Over 140 project notices were obtained. However, this net captured only a fraction of the flock, and of course, missed almost all the research outside the USA. Therefore, a wider net was needed, and this was a literature-bibliographic search service provided through the Iowa State University Library. The key index words were pigeon, dove, *Columba*, and *Streptopelia*. From this we obtained a great stack of references covering the years 1972-1975, inclusive, and world-wide scope. We are satisfied with this mass of information for our survey, but must remind the reader that it is still only a sampling. There are many projects and reports which deal with pigeons or doves but do not mention the key index words in the titles and are thus not caught by the net. Also, there is a great deal of research which is not reported at all for one reason or another; particularly in the

commercial laboratories, such as in the case of drug companies where research may be deliberately kept secret. It seems a considerable loss that such information, often of general interest, has been buried; perhaps some large company such as Ralston Purina could be persuaded to start a trend the other direction by releasing some general interest observations to the journals.

With the references in hand, our next step was to examine them and classify according to topics. For the more significant papers and projects, institutional locations and fund support were noted, though it was impossible to get complete information.

The remainder of this survey will consider the material according to topics or subjects, together with some statistical and geographical observations. We have arbitrarily chosen 16 topics or categoria of subjects, and ordinarily a given research report has been indexed in only one of these 16. However, there have been a few exceptions where a report must be given double indexing.

Overall, we have about 750 reports involving approximately a thousand research people. Most commonly, a particular researcher has figured in only a single report and less commonly in two, three, or more. Research teams are common, usually two researchers cooperating but sometimes more. Larger teams signify larger funding.

The category or topic with the greatest number of reports and researchers (about 20%) we have called “Psychology — Behavior”. These people have been operating Skinner boxes primarily with a great variety of tests. Such operant behavior testing seems not to have gained popularity yet in Europe and other parts of the world, but certainly has spread all over the U. S. Questions that have been studied include color discrimination, concept formation, hormone influences, the effects of various drugs, memory, learning reversal, aggression, preferences, and all sorts of training schedules.

Old-fashioned observational studies are still pursued to some extent, as for example, Entrikin's work on rolling or tumbling, and others' tests of flight in zero gravity. Also, we should make special comment here on the increasing use of ringneck doves (*Streptopelia risoria*) in behavior studies. These birds are not so well suited to Skinner-box tests, but lend themselves well to many sorts of experiments on reproductive behavior. At Rutgers University in Newark, N. J. , Dr. Cheng and associates have extensive projects; other laboratories where doves are prominently used include Duke University, Durham, N. C. (Dr. Erickson and associates), and City University of New York (Dr. Silver). If Dr. C. O. Whitman were still living, he would be proud because he started it all.

The second topic we shall take up is called “Navigation”. This mainly

concerns problems of homing, and the researchers have used Racing Homers for most tests. About 20 reports and 23 people have been noted. The big question being studied recently is what role the earth's magnetic field may have as a cue for the birds' orientation. Other questions concern the possible significance of atmospheric pressure variations, polarized light from the sun, and even olfactory cues. The biggest laboratory set-up for such work is at Cornell University, Ithaca, N. Y. (Drs. Keeton, Kreithen, and associates). There is also an active team in Italy. Although the final answers are not yet in, these reports offer much of value to the racing pigeon fraternity and should be closely attended.

Our third topic we have entitled “Neurology” — study of the brain, sense organs, and nerves. Of course, this is closely related to Psychology, and like Psychology, it is a field that has attracted many researchers — about 1/8 of our total. Here the big effort is to understand the normal structure, the patterns of nerve fiber inter- relations, the “fields” in the brain. The pigeon is a wonderful subject for investigations of phenomena of vision, and a large proportion of the studies are delicate electronic procedures for this purpose. The complexity of our birds' control centers is an awesome thing. Among the many laboratories involved in such studies, it is difficult to say which is most prominent, but we will mention several: the University of Virginia at Charlottesville (Dr. Duff and associates); the Laboratoire de Psychophysiologie Sensorielle of Paris, France (Dr. Jassik-Gerschenfeld and associates); and the Institute for Brain Research, Zurich, Switzerland (Dr. Felix and associates). The ear and semicircular canal system are probably the next most studied structure in relation to the brain; the University of Texas Medical School at Galveston (Dr. Landolt and associates) and Rockefeller University, N. Y. (Dr. Rabin and associates) merit mention. Taste and smell fields have also had considerable study.

Our fourth topic is “Endocrinology”. Approximately 10% of the study reports and researchers are involved, but there is a good deal of overlapping with other topics. For example, a study may deal with the effects of male hormone treatment on behavior. Many widely scattered laboratories are concerned, very few having long term projects. Perhaps the most outstanding is the research group at the University of Montpellier, France (Dr. Bouille and associates). Another is at the University of Guelph, Canada (Dr. John and associates). Many studies deal with interrelations among the endocrine glands and with the nervous system or with other “target organs”. Radioactive tracer labeling of a hormone permits following its travels in the body until it is picked up by some tissue or excreted. Thus, prolactin has been found to be preferentially picked up

by the crop sacs, which then respond by developing pigeon milk. Modern refined analytical or assay techniques also enable researchers to measure amounts of hormones in the blood and detect changes, even for different times of day, or in pathological conditions. Tremendous changes have been recorded, for example, with growth hormone from the pituitary. Rather surprisingly, we found no studies at all on the subject of goiter (thyroid trouble), or on the problems associated with molting.

The fifth topic we have called "Biochemistry" and includes especially enzyme studies, but also analyses of various blood components, membranes, and other substances, even the oil produced by the uropygial gland. This general topic was second only to Psychology in popularity; it included roughly 15% of the reports and researchers. Many laboratories are involved, widely distributed. The most outstanding of the enzyme laboratories seems to be the Lipid Metabolism Laboratory at the University of Wisconsin, Madison, with Dr. Porter and associates. As there are myriads of different enzymes, innumerable sorts of research problems are encompassed. For example, the enzyme lactate dehydrogenase is found in the testis of the adult male; in fact, more than one kind of the enzyme occurs in different males — but what does it mean? Liver and muscle are the favorite organs for enzyme study; energy conversion is a big field here.

Closely related to Biochemistry is the sixth topic, "Atherosclerosis", including arterial disease and problems concerning the waxy substance known as cholesterol which may accumulate in arterial plaques large enough to block flow of blood. White Carneau pigeons are the favored subjects because in old age they tend to develop such trouble, while Show Racers do not. (Other breeds have rarely been investigated because not enough old birds are easily purchased.) This field of study is fairly popular, comprising roughly 5% of the reports and researchers. Two laboratories are outstanding in such work: Wake Forest University Medical School in Winston-Salem, North Carolina (Dr. Clarkson and associates), and the University of New Hampshire in Durham, N. H. (Dr. Wight and associates). Much effort has gone into trying to discover the reason for breed differences, methods of preventing or curing or exaggerating the pathology, and the details of cholesterol metabolism. The answers obviously are not simple or complete yet, and the research is considered important because of the relation to heart failure, the leading cause of death for humans in the U. S.

Our seventh topic is "Pharmacology and Physiology", again rather closely

related to the last several topics, but in general, slanted more toward drug problems and non-hormonal functions. This field again is quite popular, with about 7% of the reports and researchers. No doubt in addition much research in the pharmaceutical laboratories is hidden to us. For example, it is desired to know whether a new (or old) drug has side effects which are undesirable. Does oxytetracycline affect the nervous system? What does marijuana alter in the kidneys? Is benzedrine harmful to the liver? These tests may never be reported in print for us to read, but University Medical School experiments are more likely to be published, often quite alarming. And the number of drugs is legion.

Studies of general functions are usually non-controversial. Muscle action —its energy mechanisms and coordination—has been an important area of study with pigeons for many years under the leadership of Dr. J. C. George, now at the University of Guelph, Ontario, Canada. Another subject of considerable study is respiration. A laboratory in Basel, Switzerland, is active in this. Thermoregulation has been receiving a good deal of attention, especially in Germany. A paper from Australia deals with metabolic adaptations to desert habitat in the genus *Lophophaps*.

Topic number eight is entitled "Nutrition". Compared with the popularity of this subject in pigeon experimentation some 40 years ago, there is a pitifully small number of researchers and reports now. Of course, not a single feed-manufacturing concern has put out a report. We think nutrition studies should be boosted for the future, especially practical tests. A vast amount of research is carried on and reported every year for poultry, especially the chicken and turkey interests, and we can learn a lot from such studies that may apply also to pigeons; but there are essential differences and pigeons have definitely been neglected. What do you know for example about the dietary significance of tryptophane for development of show red color? What is the difference between different varieties of the same sort of grain, such as flint corn and dent corn? Can agricultural limestone be substituted for shell? Several of the studies in our printout deal with diets of wild doves and pigeons and a couple (from India) give analyses of pigeon milk.

The ninth topic is "Toxicology". There are a couple of dozen reports here involving about 40 researchers. Again there are probably many hidden. So many toxic substances have got into our environment in recent years that tests are imperative. Pigeons and doves have proved of considerable value in some cases. Pesticides may reveal their presence by disturbance of Skinner-box

performance. DDT and polychlorinated biphenyls (PCB's) have been accused of interfering with the processes involved in eggshell formation. Wild doves and pigeons can be analyzed for lead, mercury, and other toxic residues picked up. The tests are carried out in many laboratories routinely. Perhaps the best that can be said here is that, "all is not well".

Our tenth topic is "Genetics" and includes also chromosome studies. Next to Nutrition, this is apparently the least popular area. The more ordinary genetics investigations include mosaic effects (by Hollander), atherosclerosis susceptibility, lactate dehydrogenase differences, transferrin differences, and segregation of the dilute factor. A scattering of reports on chromosome counts and structures has appeared from laboratories in India, Italy, and Houston, Texas. There are still many mysteries.

Topic number eleven is "Veterinary". This again is a large one, including about 10% of the reports and researchers. A very wide range of topics is included here, as might be anticipated, and also a very broad geographic distribution. The trends of the times are apparent; salmonellosis and ornithosis which were the big scares some years ago now occupy very few reports. Did they run out of steam? Herpes virus now gets attention. Tetramisole is being touted as the answer to all sorts of worm infestations. Dr. Tudor's group at Rutgers University, New Brunswick, N. J. , is still studying pox. Quite a number of reports deal with pathogenic fungi, especially Cryptococcus, a troublemaker for people too. And then for the veterinarian there are a couple of reports on methods of anesthesia.

The twelfth topic is "Parasitology", which of course tends to overlap the previous one. A couple of dozen reports by about three dozen researchers are listed, again very diverse and geographically scattered. Several deal with Haemoproteus (malaria) and other blood parasites and a couple with coccidia. Trichomonas had no reports; is it no longer of scientific concern? A report from Brazil on a parasitic fluke is interesting, as is a paper on a tapeworm in India. Lice, mites, ticks, etc. are taken up in several reports, and the pigeon fly in a couple. It should be noted that most of these studies are academic and have little concern for the unfortunate hosts.

Topic thirteen we have entitled "Human Disease". Some 20 reports involving about 40 researchers fall in this category. Again the trends of the times are apparent, hardly a mention of salmonellosis or ornithosis. Now the

stage center is occupied by “pigeon breeder's disease”, an allergic-type problem. And next most popular is Cryptococcus, a fungus-like organism that commonly grows in pigeon manure. Whether these two disease problems may be related seems not to be considered. The American laboratory headquarters for studying pigeon breeder's disease is in the Veterans' Administration Center at Wood (near Milwaukee), Wisconsin (Dr. Fink and associates).

Our fourteenth topic is “Anatomy”. This is surprisingly popular, including about 5% of the reports and researchers; there is some overlapping with our third topic, Neurology, because of the interest in the structure of the brain and sense organs. The eye and the ear have received a large share of attention. Artery structure (in relation to atherosclerosis) also occupies several reports. The pancreas and the testis got a little attention but nothing on the female reproductive system. A single study concerned feather growth and structure and another the microstructure of the pigeon's egg shell.

Topic fifteen we have entitled “Domestic”. This includes squab production, fancy-pigeon problems, laboratory care, and other practical matters, together with historical studies. Hardly any of our reports in this category are really scientific, and very few of the researchers have deigned to get into this untidy area. We get the impression that the squab-production investigations are zero in the U. S. but gaining in Hungary and Italy. Who or what is responsible? Or have we possibly overlooked pertinent studies?

Our final topic is “Wildlife”. Here we include taxonomic studies, reports on game birds, ecology, and control of street pigeons. A number of states game or conservation agencies support studies of our wild species, especially the mourning dove. About three dozen researchers (at a minimum) are involved in the states where the species are resident or migrant. White-winged doves are only found along the Mexican border and band-tailed pigeons only from the Rocky Mountains to the Pacific. One important reference work has been published, Reeves' Annotated Bibliography on Wild Doves and Pigeons of North America, 1975, by the National Technical Information Service, Springfield, Virginia.

Street pigeons are a perennial problem, and several studies deal with control methods. Temporary sterilization is being attempted by additives in the feed and on grit. On that sad note, we come to the end of our overview.

DISCUSSION

As noted earlier, practically none of the research surveyed has been undertaken at the instigation of pigeon or dove breeders or for their benefit. Nevertheless, the information is so diverse and abundant that almost any fancier can learn something from it—if he has access to it—which will be of great interest and perhaps other value, if not immediately, at a later time. The main problem is access; few fanciers know where to find the reports even if they become aware of their existence. Almost all such material is published in technical journals, few of which are available except in Universities or other large libraries. If a fancier has a special technical interest, for example navigation (homing), and if he is not too distant from a suitable library, he can spend a great deal of time exploring there. He may get a good batch of leads in Biological Abstracts or Psychological Abstracts. Then he can investigate the original reports in the journals. If he gets really excited, he may try writing to the leading researchers; sometimes they have reprints of their studies and will donate them.

If a fancier has difficulty in getting a foothold on some topic or other or needs advice or suggestions, the Research Committee members may be able to provide, within reason. We suggest that such requests include a stamped return envelope.

We have said nothing about research done by breeders and fanciers themselves. Trying to find such reports in the pigeon journals is tedious because there are no indexes and the tables of contents are not very clear. But occasionally a significant article or item gets in; for example, "The History of the Trumpeter" by Bob Nolan in the November, l976, American Poultry Journal. Interested fanciers would do a service by culling through the magazines and publishing index reference lists on particular subjects, say feed tests.

Also in recent years, Colin Osman edited a more or less scientific periodical in England, "Pigeon Pictorial", and in the U. S. , David Rinehart is editing "Pigeon Science and Genetics Newsletter"—attempts to boost interest in scientific research. No doubt such endeavors will tend to expand. Semi-scientific sessions sometimes are held along with the larger pigeon shows; perhaps in the future there will be space provided for research exhibits like "Science Fair" projects. And, of course, the American Pigeon Fanciers Council Conventions in St. Louis have been a forum for research. Also there has been an

annual Conference on Pigeon Diseases, etc. , held at Rutgers University in New Brunswick (Dr. Tudor), with published reports.

Fanciers should not be too bashful to make the acquaintance of researchers in their area. Often mutual benefit results: the fancier may learn things of interest and possibly make valued friends, while the researcher may get his eyes opened about the amazing things fanciers already know, and also he may be happy to obtain the fanciers' surplus birds.

GEOGRAPHICAL NOTES

The accompanying map information must be recognized as only a beginning. We have probably located the major places where research has been going on, but many more have escaped us. Moreover, researchers may change locations, new ones may pop up, and so on.

We have found no evidence of any research activity in Alabama, Alaska, Arizona, Idaho, Kentucky, Louisiana, Nevada, Utah, Montana, South Dakota, Vermont, West Virginia, Washington and Wyoming. (Perhaps readers in those states can discover some.) At the other end of the scale, considerable pigeon and dove research has been going on recently in California, Florida, Iowa, Massachusetts, North Carolina, New Hampshire, New Jersey, New York and Pennsylvania. The remaining states have only one or very few researchers listed at this time.

Regarding foreign countries, we have found no reports from a majority, especially the “Third World”. China, Turkey, the Arab countries, Argentina, Venezuela and others are blank. There is apparently very little activity also in the U. S. S. R. , most of Africa, Australia, Brazil, Mexico and Japan. The greatest part of foreign research comes from the western European countries, Hungary and India.

Probably our conclusions regarding geographic distribution reflect the general climate of research. Science has been a “Western” activity for quite a time. Also, research tends to become costly when buildings are devoted to it, personnel hired, and new equipment purchased. It would be expected that New York would be ahead of West Virginia in such activity, and England ahead of

Burma. Another factor is publication. The pressure to report research studies is greatest in universities and research institutes, and these are most prevalent in the “West”.

THE PIGEON'S ROLE IN ANIMAL RESEARCH

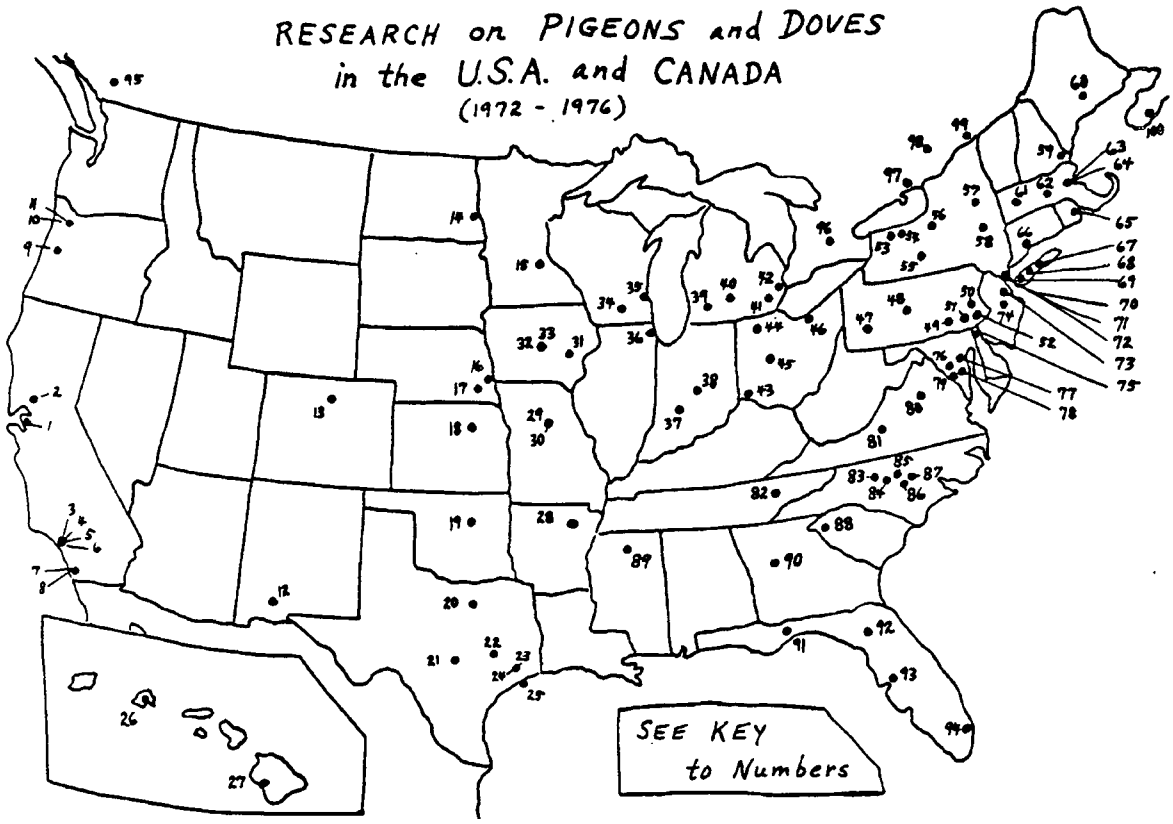
Among the species of animals purchased or otherwise obtained for laboratory use, pigeons and doves are still low in the ranks. Compared with mice and rats (white), they amount to almost nothing. Rabbits, hamsters, guinea pigs, chickens, and even Japanese quail are far more likely to be found in most labs. There are supply companies which do a tidy business in supplying such animals for medical laboratories, especially. Thousands of dogs and cats are obtained from pounds also.

Where do the labs obtain pigeons? Cornell breeds its own. Rutgers psychology group in Newark breeds its own doves. The Wake Forest University group breeds a large share of its needs. Many of the other labs, however, obtain birds from local fanciers or buy from a squab farm, especially Palmetto Pigeon Plant. This is a particularly convenient outlet for the thousands of over-age breeders that must be disposed of every year at such farms.

Researchers generally learn how to use pigeons from other researchers. Problems of caging, feeding, cleaning up dust and feathers, etc., have become familiar to them. Fanciers' methods may be better but not necessarily. In northern areas, heated buildings are indispensible for most winter work, even though the birds can tolerate frigid weather. The difficulty many people have with pigeons is flapping wings—a hamster doesn't do that. On the other hand, hamsters may inflict quite a bite and pigeons don't do that.

FUTURE OF THE RESEARCH COMMITTEE

It is our opinion that the function of this committee was primarily to survey and report. This has been accomplished, we hope, satisfactorily and we propose that no further formal assignment be undertaken at this time.



KEY TO MAP

1. Berkeley, Univ. of Calif.: Psychology — Riley (memory).
2. Davis, Univ. of Calif.: Avian Sciences — Entrikin (behavior).
3. Los Angeles, Univ. of Calif.: Biology — Singer (antibodies).
4. Los Angeles, Univ. of Calif.: Medical — Rausch (neurology).
5. Los Angeles, Univ. Southern Calif.: Medical — Brodie (atherosclerosis).
6. Pasadena, Calif. Inst. Technology: Biology — Frelinger (blood).
7. San Diego, Univ. of Calif.: Medical — Mayer (neurology).
8. San Diego, Scripps Clinical Research Foundation: — Lewis (hormones).
9. Corvallis, Oregon State Univ.: Wildlife — Jarvis (Bandtail pigeon).

10. Portland, Univ. of Oregon: Medical — C. A. Smith (neurology).
11. Portland, Reed College: Psychology — Neuringer (learning).
12. Las Cruces, New Mexico State Univ.: Wildlife — Davis (mourning dove).
13. Boulder, Univ. of Colorado: Psychology — Thomas (behavior).
14. Fargo, North Dakota State Univ.: Psychology — Maki (memory).
15. St. Paul, Univ. of Minnesota: Medical — Subbiah (atherosclerosis).
16. Omaha, Univ. of Nebraska: Medical — Hard (neurology).
17. Lincoln, Univ. of Nebraska: Chemistry — Vidaver (blood).
18. Manhattan, Kansas State Univ.: Veterinary — Kelley (diseases).
19. Stillwater, Oklahoma State Univ.: Wildlife — Sturgeon (mourning dove).
20. Ft. Worth, Texas Christian Univ.: Biology — Winokur (behavior).
21. Austin, Univ. of Texas: Zoology — N. Burley (behavior).
22. College Station, Texas A & M: Wildlife — Truett (wild doves).
23. Houston, Univ. of Texas School of Biomedical Science: Neurology — Wright (color vision).
24. Houston, M. D. Anderson Cancer Hospital: Cytology — (chromosomes).
25. Galveston, Univ. of Texas: Medical — Landolt (neurology).
26. Honolulu, Univ. of Hawaii: Nutrition — Young (atherosclerosis).
27. Kailua, U. S. Navy: Biosystems Research — Horwath (behavior).
28. State University, Arkansas State Univ.: Biology — Hanebrink (general).
29. Columbia, Univ. of Missouri: Wildlife — Baskett (mourning dove).
30. Columbia, Univ. of Missouri: Sinclair Medical Farm — Patton (atherosclerosis).
31. Iowa City, State Univ. of Iowa: Medical Pharmacology — Long (drugs).
32. Ames, Iowa State Univ.: Genetics — Miller (ring doves, blood).
33. Ames, National Animal Disease Center: Virology — Page (ornithosis).

34. Madison, Univ. of Wisconsin: Lipid Metabolism Laboratory — Porter (enzymes).

35. Wood (Milwaukee), Veterans Administration Center and Medical College: Allergy — Fink (pigeon breeders disease).

36. Chicago, Univ. of Illinois: Medical — Cracraft (anatomy).

37. Bloomington, Indiana Univ.: Psychology — Hearst (behavior).

38. Indianapolis, Indiana Univ.: Medical — Zimmermann (behavior).

39. Kalamazoo, Western Michigan Univ.: Psychology — Lyon (behavior).

40. East Lansing, Michigan State Univ.: Physiology — Meites (prolactin); Psychology — Stehouwer (behavior).

41. Ypsilanti, Eastern Michigan Univ.: Biology — Volz (fungi).

42. Detroit, Michigan, Sinai Hospital: Research — Tung (pancreas).

43. Cincinnati, Univ. of Cincinnati: Medical — Bryant (muscles).

44. Bowling Green, Ohio State Univ.: Mathematics — Graue (navigation).

45. Columbus, Ohio State Univ.: Zoology — Haseltin (ring dove, toxicology).

46. Cleveland, Case Western Reserve Univ.: Zoology — Sterling (malaria).

47. Pittsburgh, Univ. of Pittsburgh: Psychology — Zentall (behavior).

48. University Park, Pennsylvania State Univ.: Wildlife — Lindzey (mourning dove).

49. Millersville, PA, Millersville State College: Psychology — Vomsaal (behavior); Biology — Klei (malaria).

50. Bryn Mawr, PA, Bryn Mawr College: Psychology — Hoffman (behavior).

51. Swarthmore, PA, Swarthmore College: Psychology — Schwartz (behavior).

52. Philadelphia, Univ. of Pennsylvania: Psychology — Williams (behavior); Medical — Langer (atherosclerosis); Johnson Research Foundation — Ohnishi (enzymes).

53. Brockport, New York State Univ.: Biology — Brannigan (behavior)

54. Rochester, N.Y., Univ. of Rochester: Physiology — Laties (behavior, toxicology).

55. Ithaca, N.Y., Cornell Univ.: Biology — Keeton (navigation).; Poultry Science — Peakall (ring dove, toxicology).

56. Syracuse, State Univ. of New York: Medical — Hsu (enzymes).

57. Saratoga Springs, N.Y., Skidmore College: Psychology — Lumia (behavior).

58. Albany, New York State Psychiatric Inst.: Research — Gibbon (learning).

59. Durham, Univ. of New Hampshire: Psychology — Nevin (behavior); Animal Science — Wight (atherosclerosis).

60. Orono, Univ. of Maine: Psychology — Farthing (behavior).

61. Amherst, Univ. of Massachusetts: Psychology — Kamil (behavior).

62. Worcester, Univ. of Massachusetts: Medical —- Purtilo (pigeon breeders disease).

63. Boston, Mass., Northeastern Univ.: Psychology — Cohen (behavior).

64. Boston, Boston Univ.: Biology — N. S. Brown (ectoparasites).

65. Providence, R.I., Brown Univ.: Psychology — Blough (vision).

66. New Haven, Connecticut, Yale Univ.: Medica1—Vantwyver (sleep).

67. Stony Brook, State Univ. of N.Y.: Psychology — Rachlin (behavior).

68. Hempstead, N.Y., Hofstra Univ.: Psychology — Levine (learning).

69. Brooklyn, City Univ. of N.Y.: Psychology — Heinemann (learning).

70. N.Y., City Univ. of N.Y.: Psychology - Silver (ring dove).

71. N.Y. City, Rockefeller Univ.: Neurology — Rabin (brain, etc.).

72. N.Y. City, Columbia Univ.: Psychology — Terrace (behavior).

73. Newark, New Jersey, Rutgers Univ.: Psychology — Cheng (ring dove).

74. New Brunswick, New Jersey, Rutgers Univ.: Animal Science — Tudor (pox).

75. Newark, Univ. of Delaware: Psychology — Granda (vision).

76. Bethesda, Maryland, National Inst. for Mental Health: Pharmacology — Siggins (drugs).

77. Baltimore, Univ. of Maryland: Psychology — Catania (behavior).

78. College Park, Univ. of Maryland: Psychology — Hodos (vision).

79. Washington, D.C., Georgetown Univ.: Medical — Carter (drugs).

80. Charlottesville, Univ. of Virginia: Medical — Leonard (neurology).

81. Blacksburg, Virginia Polytechnic Inst.: Biology — McNabb (nutritional physiology).

82. Knoxville, Univ. of Tennessee: Forestry — Dimmick (mourning dove).

83 Greensboro, Univ. of North Carolina: Psychology — Brownstein (alcohol and behavior).

84. Chapel Hill, Univ. of North Carolina: Psychology — Hemmes (behavior); Medical — McMillan (marijuana effects).

85. Durham, North Carolina, Duke Univ.: Psychology — Erickson (ring dove).

86. Raleigh, Univ. of North Carolina: Zoology — Bradbury (malaria, mourning dove).

87. Winston-Salem, N.C., Wake Forest Univ.: Bowman Gray Medical — Clarkson (atherosclerosis).

88. Clemson, Univ. of South Carolina: Poultry Science — Hughes (squabbing).

89. University, Mississippi State Univ.: Psychology — Topping (behavior).

90. Atlanta, Georgia, Emory Univ.: Biochemistry — Mills (prolactin).

91. Tallahassee, State Univ. of Florida: Psychology — J. C. Smith (behavior, smell).

92. Gainesville, State Univ. of Florida: Veterinary — White (Salmonella).

93. Tampa, Florida State Univ.: Psychology — Rashotte (behavior).

94. Miami, State Univ. of Florida: Psychology — Davidson (behavior).

95. Burnaby, British Columbia, Simon Fraser Univ.: Psychology — Burstein (behavior).

96. Guelph, Ontario, Univ. of Guelph: Zoology — George (muscle, hormones).

97. Kingston, Ontario, Queen's Univ.: Psychology — Frost (vision).

98. Ottawa, Ontario, Univ. of Ottawa: Medical — Young (neurology).

99. Montreal, Quebec, McGill Univ.: Zoology — Sittmann (Genetics).

100. Halifax, Nova Scotia, National Research Council of Canada, Laboratory: Toxicology — Hutzinger (PCB effects).

TRENDS IN RESEARCH ON PIGEONS AND DOVES

Talk by W. F. Hollander at American Pigeon Fanciers' Council Convention
St. Louis, Missouri, July 25, 1980

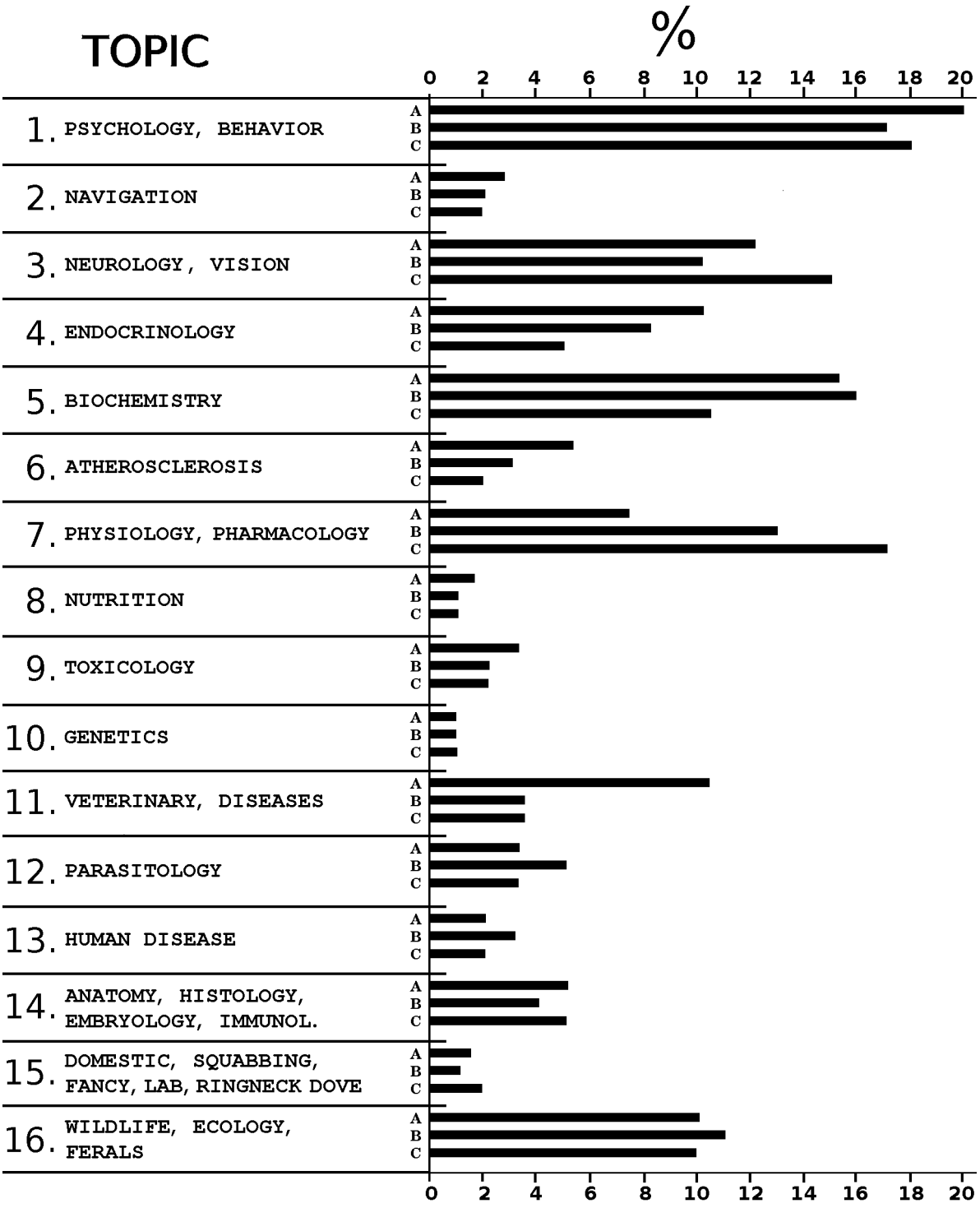
The A P F C Research Committee report “Pigeons and Doves in Research”, published in 1977, covered the period 1971 - 1975 inclusive. Although the project was concluded, I decided that further bibliographic printout data would be very useful, and therefore obtained two more batches: for 1976 - 1977 and 1978 - 1979. These total over a thousand new references, indicating that the tide of research is still high. Breakdown by topics shows minor changes: an apparent reduction in studies of atherosclerosis and veterinary problems, and a surge in physiology and pharmacology. Genetics remains the least popular topic, with nutrition not much better. Fanciers and commercial laboratories continue to be little represented in the reports; for example, I found zero from Purina.

Projections are discussed, such as the possible role of A P F C in stimulating and guiding future research.

Anyone desiring reference material on particular topics may obtain aid from me.

Histograms: A = 1971 - 1975, B = 1976-1977, C = 1978 - 1979

Approximate total index references: A = 750; B = 700; C = 550



THE BRAIN AND THE EYE

In June 1977, an international conference was held at the University of Delaware, and the 22 papers were published 1979, under the editorship of Drs. A. M. Granda and J. H. Maxwell, as a 436-page book entitled "Neural Mechanisms of Behavior in the Pigeon." (Plenum Press, New York; $42.50.) Actually a couple of the papers did not deal with the pigeon (one on chick, the other on Japanese quail), but the pigeon is front and center most of the time. Our friends Dr. Keeton and Dr. Kreithen of Cornell each gave a paper on navigation (Racing Homers, of course), and Drs. Martin and Muntz of England also used Homers in a study of the retina of the eye. Most of the others used Carneaux pigeons, for some illogical reason.

This book is symptomatic of the present ferment in research on psychology and vision mysteries. Literally hundreds of reports have been pouring out of many dozens of labs in the Western world in recent years—on pigeons. The people who are doing the research mostly are not acquainted with the pigeon fancy at all, and get their pigeons from lab supply companies or sometimes from traps. The birds are being studied to elucidate all sorts of behavior and brain and eye phenomena. Well, no, not all sorts, but various sorts. Anyway, the research is so feisty because of tremendous financial input from federal agencies. Nothing is final in these reports: everything is about progress. We can only conclude that the pigeon is a mighty complex critter, for sure!

Racing people may find this book decorative for their libraries, but of little practical importance otherwise. The research people never heard of eyesign, anymore than racing people heard of retinal oil droplets containing carotenoid pigments. Keeton and Kreithen confuse us rather than clarify. Nobody mentions heredity. For that matter, despite hundreds of references in the bibliographies, there is not a word of tribute to the pigeon behavior pioneers, Darwin and Whitman. Nor to Levi (nor to me!) Well, that's psychology—no communication except inside the group. But maybe by the time the next book comes out, things will change?

—American Racing Pigeon News, July 1980, page 14.

ANOTHER TOME ON THE INNER MACHINERY

On page 14 of the July 1980 issue of the ARP News, I reviewed a big (436 pages) symposium that was supposed to be the last word on the nervous system of the pigeon (Granda and Maxwell, editors, 1979). Like many another last word, it wasn't. So here's another. This one is edited by Professor Michael Abs of the Zoölogy Department, Ruhr University, Bochum, Germany: "Physiology and Behavior of the Pigeon," 1983, Academic Press, 360 pages. Fanciers generally are unaware of the really extensive scientific research that is going on in laboratories scattered around the world, and these books provide an in-depth introduction. Very likely over your head.

Prof. Abs dedicates this book to the memory of the late Dr. William T. Keeton of Cornell, whom all racing pigeon people should revere.

There are 17 chapters, prepared by 14 authors. I'll list them and briefly note what is covered:

1. by Prof. Abs, on growth and maturation.
2. by P. Griminger of the Nutrition Department of Rutgers University on the digestive system and nutrition, and including information on choice of foods, pigeon milk, and studies on atherosclerosis.
3. by Ms F. M. A. McNabb of Virginia Polytechnic Institute, Blacksburg, on excretion (the kidney system).
4. by Ms A. Chadwick of the Zoölogy Department, University of Leeds, England, on the endocrinology of reproduction. Prolactin and crop milk are also included.
5. by Frank L. Powell of the University of California Medical School in La Jolla, on respiration, including high altitude response.
6. by Powell, on circulation, including blood composition and heart function.
7. by A. Aulie of the Veterinary College of Norway, Oslo, on the wing-muscle system and flight. (Should Homer folks be interested in that?)
8. by W. Rautenberg of the Ruhr University, Bochum, Germany, on thermoregulation. This treats mainly of adult pigeons.

9. by Ms B. M. Wenzel of the Physiology Department, U.C.L.A. Medical School, Los Angeles, on the chemical senses (smell, taste).

10. by R. Necker of the Ruhr University, Bochum, Germany, on the "somato-sensory system" —the sensory nervous system of the skin and beak.

11. by Necker on hearing, but not including the semicircular canals of the ear.

12. by Jacky Emmerton of the Ruhr University, Bochum, Germany, on the structure of the visual system (eye-brain relations).

13. by Emmerton on vision, including color sensitivity.

14. by Klaus Schmidt-Koenig of the University of Tübingen, Germany, on orientation and homing. (Homing Pigeons, of course.)

15. by Derek Goodwin of the British Museum of Natural History, Tring, England, on "Behavior", mostly normal-natural.

16. by L. E. Baptista of the Science Museum, Golden Gate Park, San Francisco, and Prof. Abs, on voice, including study of Trumpeters, etc.

17. by Juan D. Delius of the Ruhr University, Bochum, Germany, on "Learning". This is a good overview of the burgeoning psychology studies (Skinner-box experiments particularly).

The book concludes with a 4-page index which is pretty spotty. For example, it doesn't include aggression, crop-milk, thiamin, thyroxine, or even homing!

Each chapter has its own list of references, most of which omit titles. There are also some surprising omissions of whole references, and I was especially disappointed that the 1981 article by me and W. J. Miller on "Heredity variants of behavior and vision in the pigeon" (Iowa State Journal of Research 55: 323-331) was ignored. In fact, there is almost no recognition of genetics or pathology other than in connection with atherosclerosis. Well, so this book isn't the last word either, but if you have 65 bucks to fling around for decorating your library, I recommend it.

—American Racing Pigeon News, June 1986, page 36.

IMPORTANT BOOK NOTICES

"Die Taube: Biologie, Haltung, Fütterung". (The Pigeon: Biology, Care, Feeding.) by Dr. Med. Vet. Kurt Vogel, Dr. Carlheinrich Engelmann, Ph.D., Hermann Vogel, and Dr. Erich Weiss, Ph.D. 319 pages. Published 1980 by VEB Deutscher LandwirtschaftsVerlag (National Agricultural Press), DDR 1040 E. Berlin, Reinhardtstr. 14. Price 29 DDR marks. Excellent paper, cloth binding, numerous illustrations.

There are 8 divisions:

(1) The pigeon as Fancy, Sport, and useful bird. (2) Anatomy and Physiology. (3) Genetics. (4) Breeding practice. (5) Behavior. (6) Care and loft design. (7) Hygiene. (8) Nutrition and feeding.

This book contains a wealth of information, and should be in every pigeon reference library.

"Taubenkrankheiten" (Pigeon Illnesses) by Dr. Med Vet. Kurt Vogel. 4th (revised) edition, 432 pages plus 16 color plates. Published 1983 by VEB Deutscher LandwirtschaftsVerlag (see address above), price 34.50 DDR marks. Excellent paper, cloth binding, numerous illustrations.

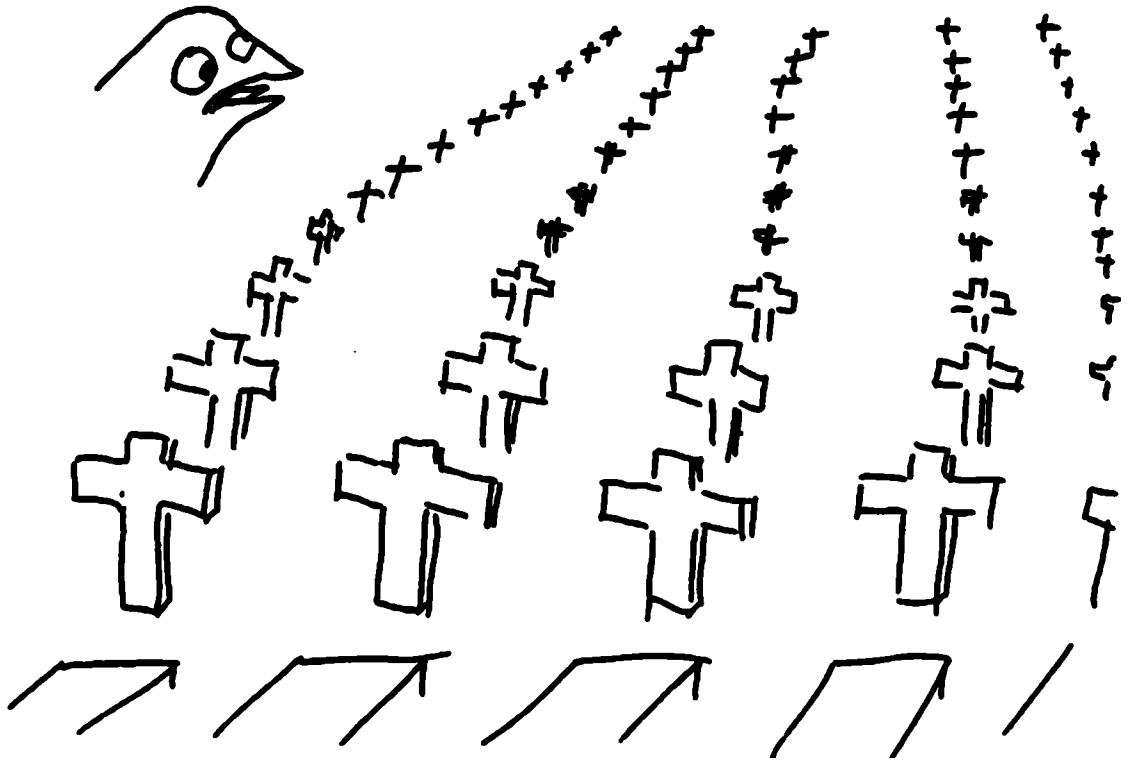
Dr. Vogel is head of the Poultry Health Service of the Veterinary Research and Animal Health Office in Halle, East Germany, and has dealt with disease problems in thousands of pigeons, including his own birds.

For the present revision of his book he has enlisted the aid of dozens of specialists of various countries in the world, so that it is without question the most comprehensive and up-to-date treatise available. It is divided into 13 chapters: (1) Basic concepts. (2) Viral diseases. (3) Bacterial diseases. (4) Diseases caused by fungi. (5) Diseases caused by Protozoa. (6) Ectoparasites. (7) Worms. (8) Nutritional deficiencies and metabolic disturbances. (9) Poisons. (10) Tumors. (11) Hereditary defects and other genetical phenomena. (12) Surgery. (13) Zoönoses and human illnesses from pigeons.

This second book is technical and intended especially as a reference work for veterinarians and other specialists. I think both books should be in any

modern pigeon library, for example, that of a pigeon clubhouse, even if you can't read German.

—American Racing Pigeon News, June 1984, page 52.



BOOK NOTICE

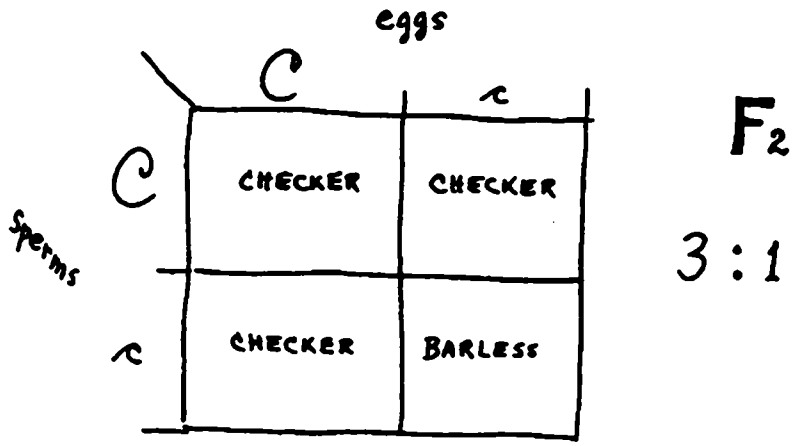
"HANDBUCH DER TAUBEN, Band 1 (Handbook of Pigeons, volume 1): ZUCHT und VERERBUNG bei TAUBEN (Breeding and Heredity in Pigeons)", by Axel Sell. Published 1986 by Schober Verlags-GmbH, D-8355 Hengersberg, Donaustr. 23, Postfach 4, West Germany. Price 59.50 DM. ISBN 3-88620-032-9.

Axel Sell has written articles for APJ, notably on his favorite fancy breed

the Schaukappe (Pomeranian Eye-Crest Highflier), and in 1980 he authored a small book "Vererbung bei Tauben" (Heredity in Pigeons) for German-reading fanciers. Now comes this much larger treatise—200 pages, with over 150 colored photos, most by Karl Stauber. It is the same format as volume 2, "Fancy Pigeons", by Müller and Schrag, which is already in English translation, very handsome works.

German readers will find this a thorough introduction to Genetics of pigeons, as well as a sound analysis of breeding practices. Perhaps it will fire up the German genetics amateurs to start their own newsletter like what we have had in USA?

—American Pigeon Journal



LETHAL GENES—DEAD AND ALIVE

As pigeon fanciers and squab producers know all too well, our birds have mortality problems. How much of this can be traced or suspected to be of genetical origin? My comments on the theoretical side depend largely on research that has been done with other species, especially *Drosophila* and the laboratory mouse. The subject is dealt with extensively in most textbooks of

genetics.

There is always a question of where to draw the line between “natural” versus “premature” (or induced) mortality. Sometimes only statistical analysis can clarify, but that usually requires large numbers and good data, desiderata which fanciers rarely can provide. For example, in a squab farm it may be of importance to know whether white pigeons have a higher death rate at any given age than non-whites. We already know that some white pigeons can live to advanced age, but that doesn't quite answer the question. In the absence of a solid answer, the breeder usually goes on hunches.

On the other hand, we do have examples of mutant genes and other genetical aberrations which are unequivocally fatal at early age. My first encounter with one of these was in a family of White Kings: I opened the unhatchable eggs and found live squabs with extremely short limbs and beak. This abnormal type proved to be a simple recessive and is named achondroplasia, meaning failure of cartilage growth. I couldn't get such squabs to live, but I did keep the gene going in heterozygotes and I still have it (shifted over from King to Homer stock). Probably anybody but me would have “depopulated” the stock and said “good riddance”, but fool that I am, I think this mutant is fascinating and may ultimately reveal some hidden secrets of bone growth. After another 50 years or so I'll have it figured out.

The second lethal (fatal) mutant which I studied was discovered in Silver Kings at the Palmetto Pigeon Plant. This type often hatched but had a whole syndrome of abnormalities: extra toes, undershot beak, ragged feathers, blindness, fatness, breathing difficulty. Death occurred usually before the age of one month. Levi and I called the mutant “recessive sublethal polydactyly.” As with achondroplasia, I have held on to it by breeding from heterozygotes, and shifted it into mixed (mainly Homer) stock. In recent years some of the “*py*” squabs have shown less severe abnormality, even gaining vision. Two males have not only survived to maturity but mated normally. I do not think that the mutant gene has changed but rather that the “residual heredity” is somehow better able to promote normal development than in the original King stock. I hardly need to mention that the folks at Palmetto have not been excited about such research, and they have culled this gene out of their production stock ruthlessly. But suppose that in the next 50 years I discover what that powerful residual heredity is doing—maybe boosting the adrenal cortical hormone level? (That gland is a mighty midget.)

The two examples of lethal genes just given are simple Mendelian recessives. To have them expressed requires that both parents were heterozygous and probably rather closely related. The pros and cons of inbreeding may usually depend on whether such recessive deleterious factors exist in the stock in question. One "weak" mutant may be enough to account for poor quality of young, but more likely there are more, and combinations of two or three weaknesses could well be lethal.

Some "desirable" mutants show more or less dominant inheritance but when homozygous may be lethal. The classic example of this is the short-limbed "Creeper" type of chickens. Homozygous creepers always die in the egg, with extremely reduced legs and wings, plus other defects. In pigeons we seem to have an analogous situation with the dominant-opal color factor. Generally the homozygotes die in the egg, but some may hatch and survive for a while as miserable runty shaky specimens, nearly white. Lester Paul Gibson has been selecting for better livability of the homozygotes and apparently in Archangel stock he has got some to mature and even breed. What is the special vigor factor in Archangels???

Recently Dr. Wilmer J. Miller and I have been studying a sex-linked mutant which we call "web-lethal." This was discovered in a Racing Homer stock. The feet are more or less webbed, notably the hind toe to the inner toe, and the iris of the eye is deformed (though the birds see pretty well). The web-lethal birds often die in the egg, and if they hatch they are typically runty. This is the first well-demonstrated sex-linked mutant that affects structural development in the pigeon; nearly 50 years ago (1937) Lienhart in France claimed to have found a sex-linked lethal in the Rosy Gier breed, but he failed to give adequate evidence and Rosy Giers imported to the U.S. have not yielded any yet. (David Rinehart has bred them.)

When we examine the many known mutants in the pigeon, it becomes obvious that the majority are defects or handicaps which would result in death in the wild state. The mutants which are found in feral stocks are relatively rare: checker, T-pattern, smoky, dirty, S-factor, ash-red, pied variants, pearl eye, grouse foot-feathering, and occasionally others. These mutants are not advantageous, probably, but simply neutral. In our lofts, even a condition so disadvantageous as extremely short beak, or a hood obstructing vision, or parlor-rolling, can be not only non-lethal but an advantage, with our help.

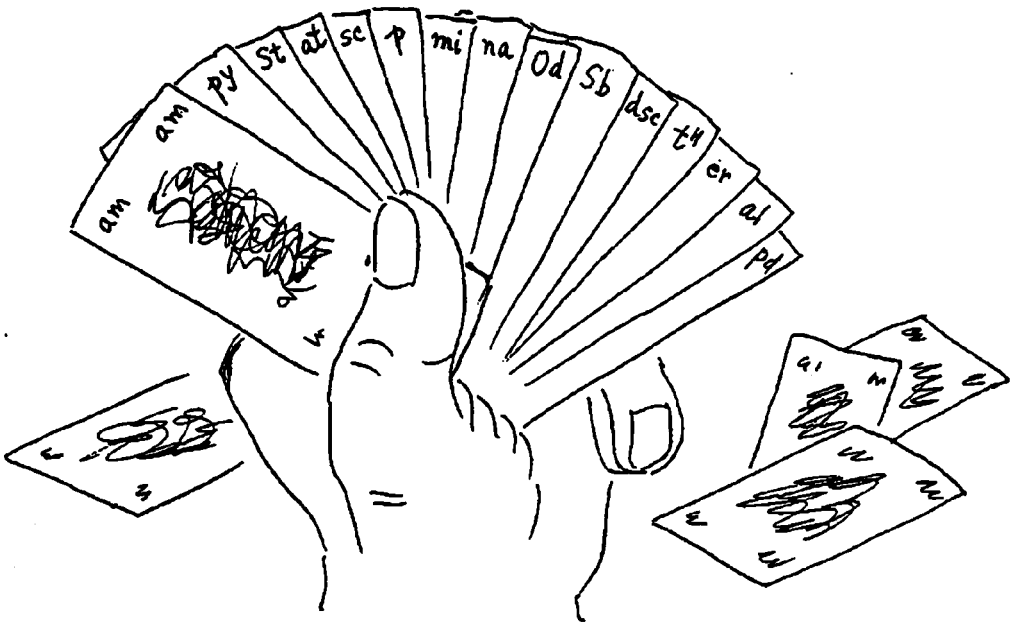
What causes lethal mutations? Apparently the great majority of all mutations are lethal, and the causes of mutations are now fairly well understood. Ionizing radiation, such as X-ray, atomic-fission radiation, and cosmic radiation, is important. Heavy dosing of ionizing radiation causes a variety of damage to the chromosomes, but I do not think we have had much exposure to such doses. Another mutagenic (mutation-producing) source is chemical; many substances are now known to be more or less effective, and pollution of air, food, and water is now common. Keeping the chromosomes in perfect condition is less and less easy.

How can we get rid of lethal heredity? Well, it is normally self-eliminating, though not always quickly or surely. If I didn't select for heterozygous achondroplasia, polydactyly, and others, I'd soon lose those lethals. Would life be more exciting without them? Not for me.

There is still another source of lethal effects which is easily tapped: hybridization of species. When a fancier first sees one of the gorgeously colored fruit pigeons, he is likely to think, “Oh boy, that should be crossed into Fantails” or some such obvious improvement on what we have in domestic breeds. Maybe some day a wide cross like that can be engineered, but it will take some doing—getting those different chromosomes to work together isn't backyard breeding. Incompatibilities usually spell death. Another example which has often been tried is the cross of male pigeon with female ringneck dove: male hybrids are not hard to produce and they are quite vigorous (though rather sterile), but female hybrids almost always die in the egg; those that do hatch have been unable to live to maturity and may show abnormalities such as absence of rear toes. No inbreeding to blame for such here!

If you are interested enough to look for lethals in your own of other stocks, you have a pretty good chance of finding one. I will be pleased to answer letters and phone calls about how to study and report new types. Or how to speed up getting rid of them, if you must. But for myself, the big question is how to learn more about these elusive lethals for the next 50 years. Morituri te salutamus.

—American Pigeon Journal, October 1985 pages 30-31.
—American Racing Pigeon News, October 1985 pages 15-16.



RESEARCH, PROGRESS, AND REVOLUTION

Once upon a time there was a very ambitious young man who thought that a man should not wait for time and tide to sweep away all the flotsam and jetsam of accumulated ignorance and jelled habit in this pigeon fancying business. Whereupon he came unto me, and spake thus: “Doc, what do you think is the proper way to make color classes in the shows?”

Unaccustomed as I am to such interrogation, I pulled my beard and twiddled my mustaches for a minute in silence. Then I said, “Do you want my official or my personal opinion?”

“Both, naturally,” he replied, much to my dismay. I put on my spectacles and tossed in the upper plate. This boy was entirely too persistent.

“In writing or by the spoken word?” I growled.

“Oh, just tell me,” quoth the lad. Now I breathed easier and loosened the old toupee. The sweat wasn't good for the adhesive.

"Well, son," quoth I, "my official comments are too profound for me to burden your young auricular orifices with their cacophonic lucubrations. Consequently let me limit my statement to letters of four words or less; or to put it otherwise, I shall simply reduce the caliber of my inculcation to the plateau of the common intelligence quotient." I cracked my arthritic knobby knuckles silently.

"Yes," said the boy, still enthusiastically.

"Ah yes. Well, in the first place, you must realize that there are—ahem—quite a few genes. You know, those are the tiddlywinks of heredity. Ah yes, probably thousands of different genes. Is that clear?"

"Sure, I knew that."

"Oh. you did? Well, there are also a lot of these genes which are responsible for color development, and pattern. It has been estimated that as many as fifty are of this category."

"Sure, but does that mean we should have 50 classes in shows?"

"Of course not. You must realize that these genes may be combined in all possible ways also. That permits a total number of different classes in the neighborhood of two to the fiftieth power; zillions, in short."

"Zillions?" At last the cocksureness of my visitor began to wilt. "But isn't that ridiculous? We could never have that many classes in a show—not even the National!"

"Facts are never ridiculous. Only people are. Except me." I bulged out my bay window and snapped my galluses.

"Then you are no help at all. I thought a man in your position would be more interested in using research for progress."

"You malign me, friend," I said. "I gave you the results of research, but it did not agree with your preconceptions. You thought I might give you a nice simple solution to your dilemma. Well, there isn't any. Either you use genes and have zillions of classes, or you don't use genes, and classify as usual."

"But there must be—there's got to be some happy medium. Don't you believe in compromise?"

“No, but you could kill off all the inconvenient genes.”

“You are kidding.”

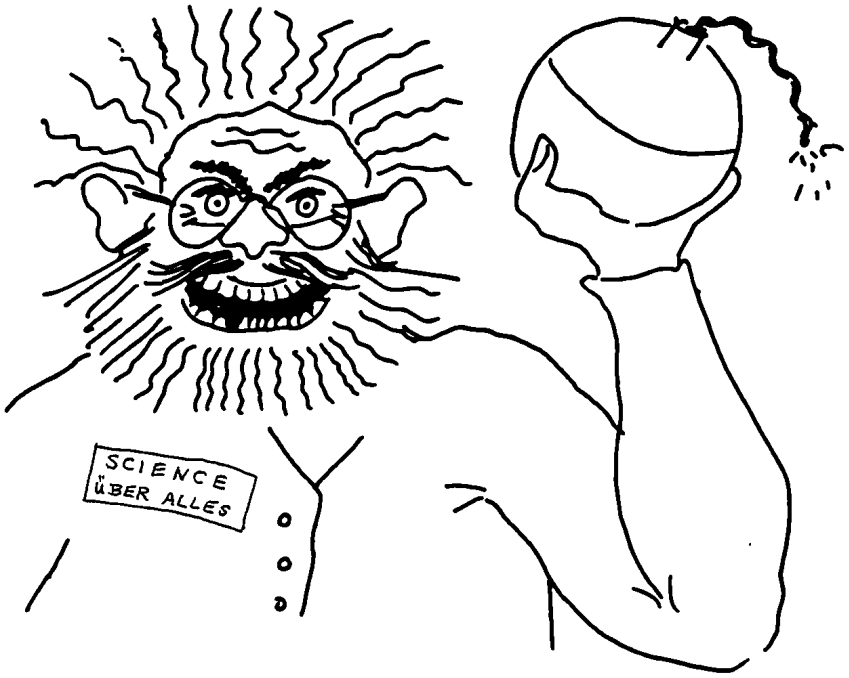
“Not at all. It is done all the time.”

“I see it all now,” said my guest, with sibilant voice and narrowing eyes. “You are a saboteur, a revolutionary. You are just trying to change all our good old methods.”

He grabbed his coat and swept out of the house without even a sideways glance as I reached to buckle on my wooden leg and escort him.

Well, that's the way of progress in this universe of curves.

—National Pigeon Association News Letter, January 6, 1956, page 2.



CAN YOU PASS THIS TEST?

The following 10 quizzes were printed in the American Pigeon Journal beginning November 1980. The rules were simple: Use any books or similar aids, and try to limit your answering for each test to 30 minutes. The correct answers (according to WFH) are given on the last page.

What good are these quizzes? Well, that's debatable. Maybe you will find them fun. Maybe you will be infuriated (at WFH or yourself?). Maybe you will learn or unlearn something. I hope that they will stimulate some self-education about our feathered friends. Among the books that you should find helpful in getting answers don't overlook the dictionary, the encyclopedias, and especially THE PIGEON by Wendell M. Levi. And if they are no help. you may have to rely on common sense, reasoning, or as a last resort just guessing. Tough!

If you get a score of 90% or better, it shows that you agree with my answers. We'll hope that we are not both wrong. If you get 80%, I say good. 70% seems only fair to me; 60% not good but most people would say is passing. If you get only 50%, I'd say you are in pretty sad shape, and 40% or less is terrible. Of course you can then say I am the one who is in trouble. Maybe so, but please try to back up your opinion! Anyway, no tears, please.

After passing these tests with flying colors, you next go on to Mother Nature's School of Life, where the testing is continuous and grading is harder to figger. And perhaps you pass there too—but maybe not.

Well, if things get too discouraging, make up your own tests!

TEST NO. 1

1. Columba means (a) pigeon (b) free country (c) barred.

2. Hemp seed, which pigeons love to eat, is produced by (a) female marijuana plants (not male) (b) an African species of large grass (c) the plant from which Manila rope is made.

3. Pigeon milk normally has (a) homogenized fat globules (b) less protein than cow's milk (c) no milk sugar.

4. The visual-receptor structure in the pigeon's eye is (a) the pecten (b) the lens (c) not the iris.

5. A pest that can eat and digest dry feathers is (a) Pseudolynchia (b) the larva of a moth (c) Menacanthus.

6. Pigeon red blood cells normally contain (a) nuclei (b) leucocytes (c) hemostats.

7. A short-downed squab from a pair of "faded"-color pigeons in an individual breeding coop is probably (a) an almond (b) a male (c) an Andalusian female.

8. A pigeon embryo normally (a) turns its head only to the right (b) has a right and a left allantois (c) uses up the yolk by hatching time.

9. A hormone which induces maturation of the testes is named (a) prolactin (b) somatotropin (c) follicle-stimulating hormone.

10. If pigeons eat pillbugs they may become ill from (a) proventricular nematodes (b) arthropoditis (c) schistosomiasis.

—American Pigeon Journal, November 1980, pages 14, 59.

TEST NO. 2

1. The pectoral muscle of a Racing Homer is (a) the seat of "eye sign" (b) made up of striated fibers (c) not visible in squabs.

2. One reason corn is an inadequate breeding feed is because it has little (a) vitamin B_1 (b) xanthophyll (c) niacin.

3. The structure of a health pigeon's air sacs is (a) diaphanous (b) cartilaginous (c) a dense capillary network.

4. Examples of a pair of different species are (a) Fantail & Roller (b) Jacobin & Carrier (c) ringdove & stockdove.

5. A mite commonly living near or on the thyroid gland is (a) responsible for thyroidectomy (b) a hypodectes (c) Pterophagus

6. If a pair of champion show-type French Mondains in an individual breeding coop produces a crested squab (a) it could be called a Giant American Crest (b) this is a mutation (c) there probably was hanky panky.

7. *Streptopelia risoria* (a) is a good pet (b) can be a fatal intestinal parasite (c) fortunately does not live in USA.

8. Moldy feed can be harmful because of (a) aflatoxin (b) Salmonella (c) vertiginous nymphomania.

9. Operant behavior studies employ (a) electroscopes (b) Kaleidoscopes (c) Skinner boxes.

10. The American King breed (a) is not a pure breed (b) was derived from crossing other breeds around 1910 (c) was the start of auto-sexing.

—American Pigeon Journal, April 1981, pages 15, 25.

TEST NO. 3

1. Digestion of cellulose in pigeons is (a) normally completed in the caeca (b) dependent on pancreatic enzymes (c) not a gastric function.

2. Remiges and rectrices are (a) defects in Racing Homers' plication (b) plurals of words ending in x (c) nerve endings in the right and left digits.

3. The name Zitterhals refers to (a) shaking neck (b) laughing dove (c) the breed that came from that German city.

4. The white powder in pigeon plumage is produced by (a) powder down (b) epidermal denudation (c) the contour feathers.

5. A Fantail hen typically (a) has no right ovary (b) has extra barbules in her caudal vertebrae (c) has a normal gall-bladder.

6. Squab is considered gourmet food because (a) it is traditionally eaten by rich people (b) it is all white meat (c) it contains delicious acronyms.

7. Examples of apropos appellations are (a) Jacobin and Nun (b) L. F. Tumbler and Runt (c) Archangel and Blondinette.

8: A property of aluminum which makes it preferred for bands is (a) it can't corrode (b) it is malleable (c) it is calligraphic.

9. In Middle-East countries non-fancy pigeons are valued for (a) message carrying (b) guano production (c) their taxonomic status.

10. The vocal repertoire of pigeons and doves (a) is gradually learned by the age of about 4 months (b) is produced by their syringes (c) indicates that the larynx has good cords.

—American Pigeon Journal, June 1981, pages 24, 64.

TEST NO. 4

1. Pigeons were important in early nutritional studies of (a) scurvy (b) beri-beri (c) scoliosis.

2. The pigeon's humerus bone is unusual in being (a) air-filled (b) solid (c) pointed.

3. Intestinal coccidiosis damage is caused by (a) Staphylococcus bacteria (b) Streptococcus bacteria (c) Sporozoa.

4. The Bokhara. breed was so named in reference to (a) an Asiatic city (b) the very staccato voice (c) the Russian term for the circular rose.

5. A pigeon that is naturally red-feathered on the right side and blue-barred on the left would properly be termed (a) a hermaphrodite (b) the result of inebriation (c) aberrant.

6. "Pigeon City" is (a) the title of a book by L. F. Whitney (b) Vienna (c) an old painting by Norman Rockwell.

7. The "widowhood method" in pigeon racing (a) was invented by Wendell M. Levi (b) is based on the fact that females whose mates have been removed will home faster (c) exploits jealousy.

8. The first flight molted by a pigeon is normally (a) after the tail has molted (b) the outer one (c) replaced within a month.

9. Shell or limestone is included in pigeon grit mixtures (a) for gizzard stones (b) to provide phosphate for bone growth (c) because it contains a carbonate compound.

10. From a mating of a cock having the sex-linked ash-red color with a blue hen (a) only the sons will show ash-red (b) only the daughters will be blue (c) both sons and daughters can show ash-red.

—American Pigeon Journal, August 1981, pages 27, 58.

TEST NO. 5

1. If you get two males in the first clutch of eggs from a young pair of pigeons, the next clutch should be (a) two females (b) one of each sex (c) a gamble.

2. *Dermanyssus* (a) is the scientific name for pigeon pox (b) causes feed spoilage (c) has eight legs.

3. The pigeon that saved Rome was (a) a movie (b) the Sottobanca (c) the Romagnoli.

4. European dovecotes were built for (a) Wood Pigeons (b) Stockdoves (c) landed gentry.

5. The bleeding heart is (a) malarial hemorrhage (b) damage from the larvae of Cardiovascula (c) from the Philippines.

6. The basis for crest development in domestic pigeons is (a) feather reversal (b) a hernia in the skull (c) ossification of the nuchal dermis.

7. The aftershaft (a) is obvious in chicken feathers but not on pigeon feathers (b) is a feature of the baby down (c) is often called the bastard wing.

8. The black flecking which increases with age in almond-colored cocks (a) shows sex-linkage (b) is indicative of an unstable gene (c) does not appear in almond hens.

9. The name Brünner (a) refers to the name of a city in old Austria (b) is the Czechoslovakian term meaning "brown-red" (c) is the Hungarian word for pigmy.

10. The usual source of protein to balance the amino-acids of cereal grains is (a) offal (b) legume seeds (c) nitrogenous albumenoids.

—American Pigeon Journal, February 1982, pages 52, 59.

TEST NO. 6

1. A peculiarity of the Passenger Pigeon was (a) the forked tail (b) single egg per nest (c) extreme shyness.

2. In squabs the thymus is (a) behind the gizzard (b) not yet well developed (c) in the neck.

3. Color-sexing the young from a khaki-colored hen (a) is impossible (b) is possible if she is mated to a reduced-color cock (c) requires epistatic dominance of the *d* factor.

4. Hard-boiled pigeon eggs (a) have translucent albumen (b) always burst (c) are bitter-flavored.

5. Unlike humans, pigeons (a) do not require ascorbic acid in their diet (b) have a cerebellum (c) have prolactin.

6. The Eggleston system (a) is a method of classifying eye-sign in Racing Homers (b) is an improved method of judging in shows (c) was not originated in England.

7. In France and Germany our Runt breed is called (a) le Spanier (b) el Hugo (c) the Roman.

8. Fruit pigeons are native to (a) South America (b) Africa (c) the Southwest Pacific area.

9. Egyptian pigeon towers are made with (a) sandstone blocks (b) rattan sheets (c) earthenware jugs.

10. During extreme cold weather, pigeons (a) need more protein and drinking water than usual (b) need less drinking water and more calories than usual (c) need protection or their toes will freeze off (gangrene).

—American Pigeon Journal, August 1982, pages 34, 59.

TEST NO. 7

1. Overheating of the pigeon's body is typically mitigated by (a) integumentary sweat glands (b) internal ventilation (c) the cryovac.

2. In a year a flock of 50 Racing Homers will consume about (a) 2.7 tons of feed (b) 365 lb. of feed (c) 20,000 ounces of grain and grit.

3. In pigeons the cervical vertebrae (a) are located in the thoracic region (b) are more than 7 in number (c) are absent.

4. The Cauchois breed is (a) a French Pouter (b) a Swiss Toy (c) Mondain-like.

5. Reproductive activity of pigeons and doves is promoted by (a) shortening the daylight hours (b) restriction of caloric intake (c) provision of attractive nests.

6. Female hybrids from crossing male ringneck dove X female ash-red common pigeon (a) are impossible (b) should not be ash-red (c) show sex reversal.

7. *Ornithostrongylus quadriradiatus* (a) is a common tapeworm of pigeons (b) is fortunately not yet in America (c) is rare in the plumage.

8. The African Triangular-spotted Pigeon (a) is a jungle species (b) is a breed developed in northern Egypt (c) has forked neck feathers.

9. The White-winged Dove (a) is another name for the Dresden Trumpeter (b) is a new mutant discovered by Derek Goodwin (c) is Mexican.

10. Umbilical canker in squabs (a) is a form of trichomoniasis (b) is a common affliction of the throat (c) is really a carcinoma.

—American Pigeon Journal, January 1983, pages 35, 40.

TEST NO. 8

1. A bug that is harmful to pigeons is (a) Cimex (b) Celotex (c) Paradox.

2. The basis for whiteness of a feather is (a) reflective guanine pigment in the barbules (b) air spaces and lack of pigment (c) the S factor.

3. One of the most important reasons for beginning fanciers' quitting is (a) peer pressure (b) lack of money (c) depredation by predators.

4. An ancient goddess associated with doves was (a) Nefertiti (b) Cleopatra (c) Astarte.

5. Fantail pigeons typically lack (a) supernumerary rectrices (b) the hallux (c) the uropygial gland.

6. The pulse rate of a normal resting pigeon is (a) about 83 / minute (b) about 18,000 / hour (c) very irregular.

7. If a pigeon becomes lame with softened bones (a) it probably needs more vitamin D (b) it probably has Salmonella infection (c) this is a classic sign of psittacosis.

8. To become a successful show judge requires (a) political perspicacity (b) accreditation by the NPA standards committee (c) erudition.

9. An important scientist who studied problems of evolution in pigeons and doves was (a) Oscar Riddle (b) Charles Whitman (c) E. R. B. Chapman.

10. Racing Pigeons cannot home from 200 miles if (a) their ears are plugged (b) one eye is absent (c) there is severe emaciation.

—American Pigeon Journal, February 1983, pages 24, 44.

TEST NO. 9

1. A serious blood-sucking parasite of pigeons is (a) *Tenebrio* (b) Argas (c) Dracula.

2. The Hollander pigeon (breed) is really (a) a Hamburg Tumbler (b) the Dutch Slenk (c) the auto-sexing sideburns Mish-mishi.

3. In military sieges of great cities before the advent of radio, pigeons were employed (a) for liaison (b) to communicate with the enemy (c) to carry comestibles.

4. White or light-colored pigeons are preferred for commercial squab production because (a) their integument is not dark (b) they do not have any filoplumes (c) they are the largest.

5. A rich source of vitamin B-12 for pigeons is (a) wheat (b) cod-liver oil (c) unsterilized dung.

6. Flatworms commonly infest pigeons (a) that ingest small molluscs (b) living in arid climates (c) if they eat contaminated grain.

7. A male pigeon's insurance against his mate's infidelity is provided by (a) the nest call (b) her surge of estrogen (c) driving.

8. The pure indigo color-factor in pigeons (a) is usually called “Andalusian” blue (b) is likely to be mistaken for ash-red or opal (c) has never been produced.

9. A common type of housing for pigeons in northern India is (a) large masonry towers (b) stacked gasoline cans (c) wells.

10. Split or twin feathers in the tail (a) are not replaced after plucking (b) are caused by too much manipulation in Fantails (c) can not be made to grow like normal rectrices.

—American Pigeon Journal, July 1983, pages 22, 24.

TEST NO. 10

1. The Latin word for pigeon is (a) Peristeron (b) Paloma (c) Columba.

2. The 1982-7 chairman of the American Pigeon Fanciers' Council is (a) Joe Quinn (b) Clair Hetland (c) Jim Lairmore.

3. The American Pigeon Journal (a) originally catered mainly to racing (b) was founded by Carl Naether (c) has got to volume 76.

4. The pancreas gland in the pigeon (a) is located next to the kidney (b) has no digestive function (c) does not regulate body temperature.

5. The name Modena (a) refers to a town in England (b) means stylish (c) is not related to Mondain.

6. If a cross of two pure breeds gives squabs that look like the wild Rock Pigeon, (a) the cause is reversionary mutation (b) the parental genes underwent atavism in meiosis (c) the breed characters are different recessives.

7. A sometimes fatal disease agent transmitted by the bite of a flying insect to pigeons is (a) Plasmodium (b) Haemoglobius (c) Tetrameres.

8. Deficiency of iodine may result in (a) loss of all body fat (b) poor hatchability of eggs (c) premature molting.

9. In his studies of pigeons, Charles Darwin had aid from his expert friend in England (a) John Moore (b) Sir John Sebright (c) W. B. Tegetmeier.

10. A squab produced from a mating of a half-brother X half-sister (a) is immoral (b) has only three grandparents (c) should have its blood calculated in thirds.

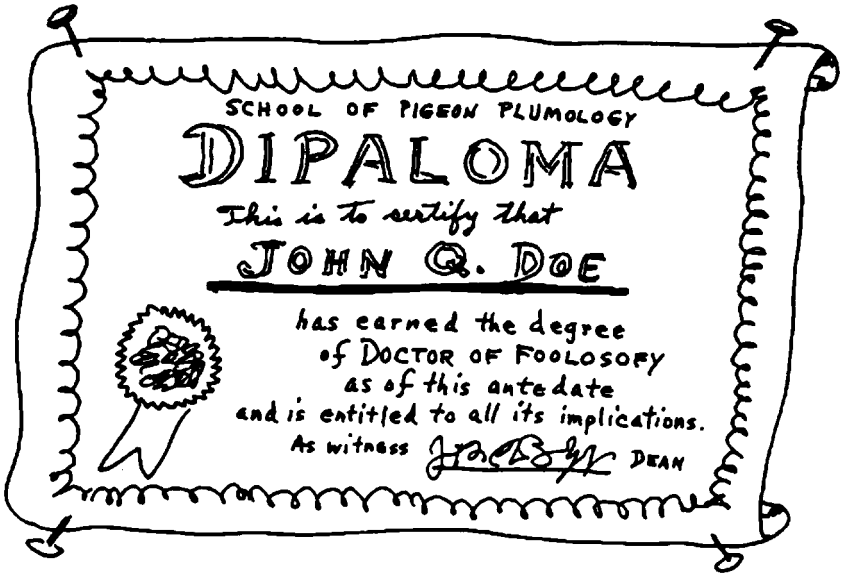
—American Pigeon Journal, September 1983, pages 28, 42.

WFH'S BEST CHOICE ANSWERS

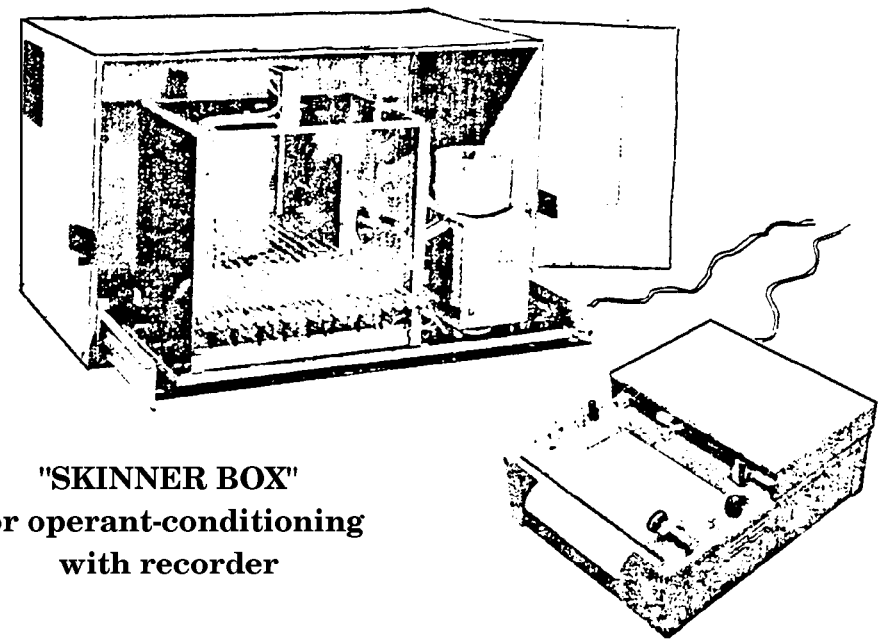
TO QUESTIONS

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	Score
Test 1.	a	a	c	c	b	a	b	a	c	a	
Test 2.	b	c	a	c	b	a	a	a	c	b	
Test 3.	c	b	a	a	a	a	a	b	b	b	
Test 4.	b	a	c	a	c	a	c	c	c	c	
Test 5.	c	c	a	c	c	a	a	b	a	b	
Test 6.	b	c	b	a	a	c	c	c	c	b	
Test 7.	b	c	b	c	c	b	c	c	c	a	
Test 8.	a	b	c	c	c	b	a	a	b	c	
Test 9.	b	a	a	a	c	a	c	b	c	c	
Test 10.	c	a	c	c	c	c	a	b	c	b	
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	

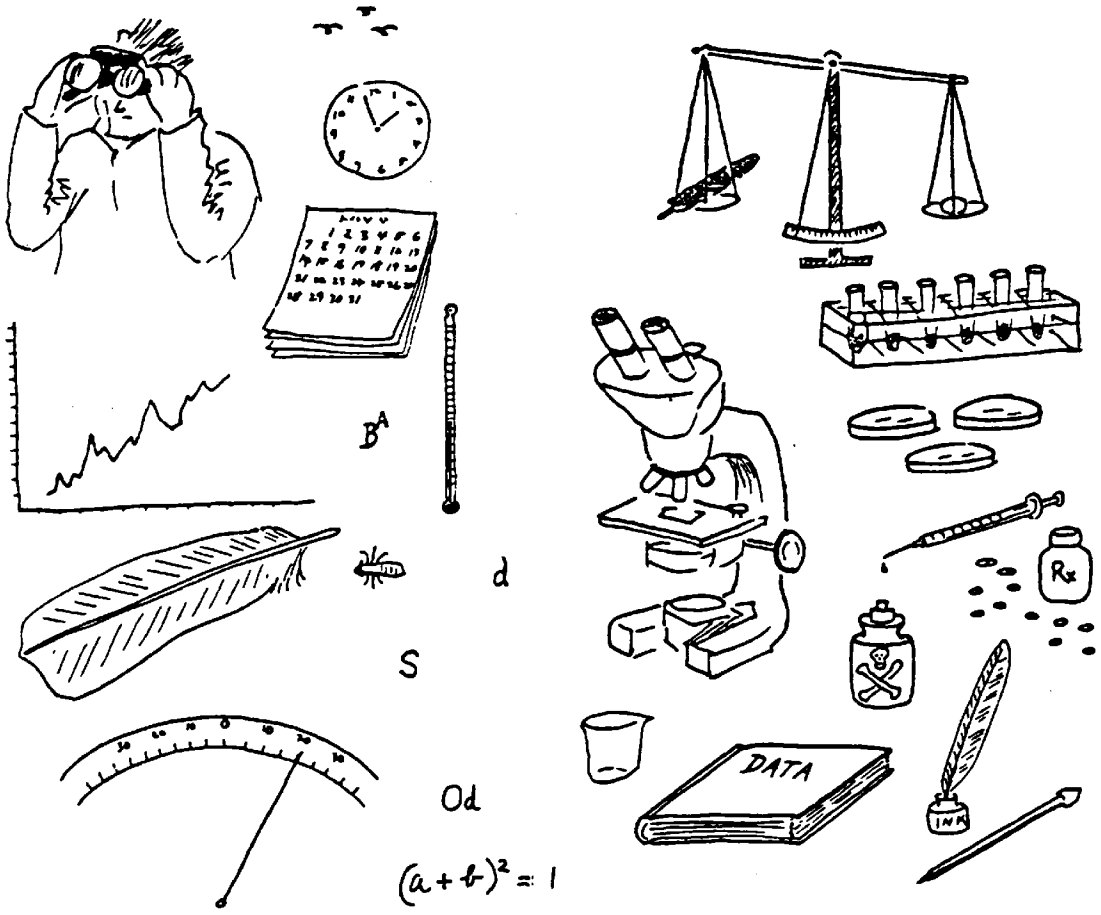
Total = _____



NOTES



"SKINNER BOX"
for operant-conditioning
with recorder



Other books edited by W. F. Hollander

NPA Project on Genetics 1951

Doo Tell Doc 1965 (NPA)

Dictionary of Ornithology 1979

Pigeon Squib H*A*S*H 1980

Origins and Excursions in Pigeon Genetics 1983

Some of these books are available from Foy's Pigeon Supplies:

http://www.foyspigeonsupplies.com