

The History of Avian Medicine
in the United States

I. Before the Big Changes

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In September 1975, pursuant to a suggestion of Dr. Henry Van Roekel that the AAAP initiate a special project for a 1976 Bicentennial recording "The History of Avian Medicine," Harry W. Yoder, Jr., President of AAAP, was authorized to appoint a chairman to organize such a committee. The general objectives are to spotlight the leaders in the field, together with their major contributions of historical significance. Emphasis will be placed also on the development of pioneer conferences, such as the North-eastern Conference of Laboratory Workers in Pullorum Disease Eradication, now the Northeastern Conference on Avian Diseases (NECAD), and its influence on the origin of other regional poultry disease conferences and the AAAP, the poultry disease sections of the U.S. Livestock Sanitary Association, now U.S. Animal Health Association (USAHA), and the American Veterinary Medical Association (AVMA), and the specific roles of the Bureau of Animal Diseases (BAI) of the United States Department of Agriculture (USDA) and major state university departments in advancing the knowledge of poultry diseases.

The committee consists of :

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Special assignments have been made to certain members of the committee because of the area of their expertise. However, there is no intent to limit the efforts of the committeemen, because useful contributions from all sources, including those not on the committee, are welcomed and encouraged.

General assignments to date are as follows: Dr. C. A. Bottorff will cover the contribution of commercial companies and assist Dr. A. S. Rosenwald in assessing the work of poultry disease workers in the far-western states. Dr. Kenneth Bullis will specialize in the field of pullorum disease control and other Salmonellas. Dr. Tevis Goldhaft will explore the early development of commercial poultry vaccines. Dr. Harold Chute will provide a summary of the study and control of major respiratory diseases and programs of specific-pathogen-free (SPF) flocks. Dr. William Hinshaw, with his outstanding background in poultry diseases and experience as author of Dr. Fred Beaudette's biography, will search the files for historically significant accomplishments of the early days, and the impact of poultry-disease workers' organizations as they developed and functioned over the past century. Dr. Frank Kingsbury will evaluate historical references which come to his attention as he reviews poultry-disease literature. Dr. Ben Burmester will construct a sequential history of research in the area of leukosis and Marek's disease. Dr. Everett Lund will write a brief report on the historical landmarks of avian parasitology. All of those committee workers will appreciate direct contributions from others. Sometimes a personal contact, a letter, or photograph of a person or group will supply an interesting and valuable contribution to this on-going project.

The history of avian medicine should evoke pride in today's achievements and appreciation of the pioneers who, with limited knowledge and inferior tools, paved the way for succeeding gen-

erations. It should guide us away from the mistakes of the past and steer us to more fruitful avenues. History is a compass bearing that gives a sense of direction for a continuing journey over winding roads. A look at the past is not a backward turn; it can lay the foundation of future progress.

American Poultry History 1823-1973, published by the American Poultry Historical Society, Inc., 1974, gives "an anthology overview of 150 years." It includes a chapter on disease by Sivert Eriksen, D.V.M., retired from a lifetime in college teaching and research and top management positions with six commercial companies engaged in the poultry business.

The first generation of American avian veterinary microbiologists included such outstanding scientists as Veramus A. Moore, Cornell University; Leo F. Rettger, Yale; D. E. Salmon, Theobald Smith, H. W. Graybill, and Cooper Curtice, all of USDA, BAI; A. R. Ward, of California; and Leland D. Bushnell, of Kansas. Perhaps no single teacher in the U.S. had more influence on the training of leaders in avian disease research and teaching than did Dr. L. D. Bushnell, who graduated from Michigan State College in 1905 and became head of the department of bacteriology of Kansas State College, in which there was a division of poultry bacteriology. Outstanding among his students were J. G. Jackley, Fred R. Beaudette, William R. Hinshaw, E. H. Barger, Carl A. Brandly, Charles B. Hudson, James Black, George E. Cottrel, and Sivert Eriksen. It is of interest that Dr. Bushnell started his work on poultry diseases because the Veterinary College (he was in General Science) would have nothing to do with chickens.

Dr. Leonard Pearson graduated from Cornell in Agriculture and one summer worked in Illinois with Dr. James Law, eradicating contagious pleuropneumonia of cattle. He became interested in veterinary medicine and graduated from the University of Pennsylvania veterinary school in 1890. He studied in Europe under the renowned Dr. Robert Koch and brought tuberculin back with him, with which he made the first tuberculin tests on cattle in America. He was appointed Professor of Medicine, soon became Dean of the veterinary school, and was appointed State Veterinarian, making Pennsylvania the first state to have such an office. Dr. Pearson and Dr. B. H. Warren published a book in 1897 on "Diseases and Enemies of Poultry." The large volume, of 749 pages, has a profusion of color plates. One chapter on tape worms was written by

Dr. C. W. Stiles, well known parasitologist at that time with the USDA. Dr. Pearson arranged for a state scholarship for Evan L. Stubbs when he came to the University of Pennsylvania as a student in 1908, but "died in the Spring of 1909 from overwork," according to Dr. Stubbs. Dr. Stubbs graduated from that veterinary school in 1911 and assumed the responsibility of being the poultry pathologist, largely because no one else on the staff was interested in this field. He worked with Dr. J. Furth in pioneer work on leukosis in the early thirties.

Contemporaries in poultry microbiology and medicine during this first quarter of the twentieth century included J. R. Beach of California, F. B. Hadley and B. A. Beach of Wisconsin, E. E. Tyzzer of Harvard, Raymond Pearl, Frank Surface, and M. R. Curtis of Maine, G. E. Gage of Massachusetts, L. VanEs of North Dakota, Philip B. Hadley of Rhode Island, and B. F. Kaupp of North Carolina. H. J. Stafseth of Michigan State was better known as a microbiologist and as a great teacher who influenced many students who subsequently worked in poultry diseases and microbiology. *Poultry Science* (Vol. 37, 1958) published his "Advances in Knowledge of Poultry Diseases Over the Past Fifty Years." His leading sentence is, "Most of what we know about poultry diseases has been learned in the last fifty years." That assessment will undoubtedly be reflected in the work of this AAAP history committee.

The era of those earliest teachers dated back to the last quarter of the 1800's, the height of the small farm flock, when each farmer felt obliged to keep a flock of chickens and a few other farm fowl such as turkeys, ducks, geese, and guinea fowl. There were few poultry houses, and the birds ran free about the farm yard, roosting on the farm machinery, picking up most of their food from the environment, and living to a ripe old age. The "setting hen" would lay her clutch of eggs in a secluded spot under the corn crib or the wagon shed and eventually emerge with her brood of chicks to face an environment full of the perils of predators on the ground and in the air, to mingle with adult carriers of disease, which had over the years seeded the area with parasites and pathogenic fungi, bacteria, and viruses. No wonder that mortality was as high as 80%, or that it was such a treat for the entire farm family on those Sundays when the minister came to a dinner featuring chicken and hot biscuits covered with gravy.

As late as 1900, poultry diseases were poorly classified and little understood. Eriksen cites from a book by William E. Lewis published in 1871, which lists such poultry diseases as apoplexy, rheumatism, vertigo, curly toes, and roup. The Pennsylvania State Department of Agriculture Bull. No. 17, on "Diseases and Enemies of Poultry," by Leonard Pearson, State Veterinarian, and B. H. Warren, M.D., State Zoologist, printed in 1898, gives some excellent drawings of poultry parasites and describes "pneumonia caused by moulds of three varieties of *Aspergillus* and one of *Mucor*." I. K. Felch, in his book "Poultry Culture," in 1902, refers to aspergillosis as "mycosis of the air passages. The fungus grows on dead and decaying matter, moldy grain or litter and is inhaled."

Pearson and Warren describe "Catarrh of the Nasal Passages (pip) as a discharge from the nose, mouth, swelling of eyelids, depression of spirits, head drawn down and feathers ruffled." The earlier book by Lund, referred to by Eriksen and quoting *Aldrovande on Chickens* (1600), describes "pip" as "a flow of liquid or humor from the brain to the nostrils." "Pip" was a widely used term, sometimes facetiously applied to human ills, but usually referring to a common sequel to a catarrhal affliction of the head and nostrils causing the bird to breathe through its mouth. The tongue would dry and harden on its tip, like a horny growth. This was the "pip," and the "horn" was commonly removed with the point of a penknife. Leonard's Pennsylvania bulletin suggested isolating the sick birds, providing "a warm dry coop, clean water in clean vessels and adding a little onion or garlic in the food."

Colds were common and often given symptomatic designations, such as bronchitis and laryngitis, which of course have carried over to be applied to specific viral diseases today. Vague terms such as "lung fever" were used to describe more serious forms of pneumonia.

Roup (croup, diphtheria) was considered a very common and serious malady. Leonard lists "two forms, one caused by bacteria and the other by protozoa—but in all cases it is a contagious, catching disease spread from flock to flock by the interchange of birds." H. H. Stoddard, editor of *Poultry World*, in "Poultry Diseases—Methods of Curing Them," published in 1885, described roup as "a disease of the lining of the beak extending through the tear duct to the eye. After death the gall bladder and liver are full of pus and the flesh has a bad odor and is soft." He considered the

cause "anything that lowers the tone of the fowl," such as bad food, housing, filth, lice, and exposure to cold and wet. It was more common in autumn and winter. He, like writers who followed him, considered roup to be contagious. Diagnostic signs were nasal discharges, swollen facial sinuses, eyes closed, and the fetid odor. Treatments were numerous and varied. "German Roup Pills, Kunkle's Original Recipe" (Stoddard was the sole proprietor in the U.S.) were "well tried and proved. They will cure roup whenever and wherever anything will." The "Douglas Mixture," which originated in England, was highly recommended and used for a variety of ills, including cholera. It consisted of 1 ounce of sulfuric acid and $\frac{1}{2}$ pound of sulfate of iron mixed in two gallons of water in "an earthen crock. Add one or two tablespoonfuls to each pint of drinking water." David W. Judd, in "Profits in Poultry," in 1887, wrote, "The use of kerosene is a handy and sure cure. By holding the bird so it can't swallow and filling the throat with kerosene — later injecting kerosene into the nostrils — the effect is magical." There was much confusion among early poultry pathologists as to the cause of roup. First, it was confused with pox, which often occurred along with roup. Secondly, it was always accompanied by a great variety of secondary invaders (or contaminants) whose isolation and identification added to the dilemma. John G. Jackley, one of Bushnell's first assistants, in his "Study of the Etiology of Roup in Birds" in 1917 (Tech. Bull. No. 4, Agricultural Experiment Station, Kansas State Agricultural College), reported that in Kansas 70% of the poultry diseases were roup, 15% cholera, and 9% white diarrhea. He combined roup and contagious epithelioma (pox) as a single problem, but failed to isolate a specific causal agent. It was not until the twenties that roup was identified as coryza, and the causal agent was not found until the early thirties.

Gout was a common term of that day and was said to occur in "fowls of heavy breeds when kept in high condition and allowed but little exercise." Treatment consisted of "cutting off the joint enlargements with a knife and adding bicarbonate of soda to the drinking water — about a teaspoonful to the pint."

Gape worms were a constant problem in those farm-flock days. Stoddard reported in his book that Dr. Andrew Wisenthal of Baltimore, Maryland, in 1797 "appears to have first published an account of this malady." The worms were removed by introducing into the trachea a "loop made by doubling a horse hair," or a

feather selected for suitable size, or a timothy head. Any of these "instruments" were made more effective by dipping them into turpentine or kerosene. "In some cases it is advisable to place the birds in a closed box and blow tobacco smoke into it from a pipe." Dr. Leonard was years ahead of his time when he added this sage advice, "The worms in this way are stupefied, but unless care is used the fowls will also be stupefied and perhaps suffocated." Stoddard advises in severe cases to "open the windpipe, by cutting into it from the outside, to remove the worms. Sew up the hole taking care to stitch only the external skin." Internal treatment was crushed corn soaked in alum water or kerosene.

Cholera had been recognized in Europe since the late 18th century, and its transmissibility had been demonstrated before Italian and Russian workers described a bacterium found in the tissues of infected fowl. That was confirmed by the French veterinarian, Toussant, in 1879, and in 1880 Pasteur performed his classic experiments in attenuation of the fowl cholera organism. Dr. Daniel Elmer Salmon of the BAI, USDA, in 1880 is said to be the first to study this disease in the U.S., although earlier reports of outbreaks were recorded in the USDA Monthly Reports of 1867. Pearl, Surface, and Curtis, in "Poultry Diseases and Their Treatment" (Maine Agricultural Experiment Station, Feb. 1911) reported that Dr. Salmon, "owing to the lack of proper bacteriological methods at the time, was not able with certainty to identify the disease with European Cholera." A. W. Ward, California Agricultural Experiment Station, published Bulletin 156 on Fowl Cholera in 1904. Confusion between fowl cholera and fowl typhoid was indicated in "Fowl Typhoid, A Disease Sometimes Mistaken for Cholera," Bulletin 87 from the Rhode Island Experiment Station, 1894, by R. Curtice and Smith. Philip B. Hadley, Rhode Island Experiment Station, published Bulletin 144, "Fowl Cholera and Methods of Combatting It," in 1910. He attempted to protect fowls inoculated with fowl cholera organisms by injecting them with 2-4 cc of 5% solution of carbolic acid. "This did no harm and it protected the artificially infected birds." Judd, in "Profits In Poultry," in 1887, wrote that fowl cholera got its name from human Asiatic cholera because it was "accompanied by violent diarrhea and is rapidly fatal." Stoddard, in "Poultry Diseases" in 1885, was not aware of Salmon's work (five years earlier), for he referred to the cause of cholera as "a specific poison generated on the

premises." Treatments included all the usual household chemicals: camphor, cayenne pepper, pulverized rhubarb, laudanum, castor oil, and Douglas' Mixture with scalded sour milk.

Dryroup, canker, or "chicken pox" was associated with the roup complex. Judd described his treatment of an exhibition bird with its "mouth full of canker, head swollen, eyes closed, face and comb broken out with dry canker — chicken pox. By use of a large syringe I injected the bird's crop full of milk. I then gargled the mouth and throat with kerosene." The treatment lasted four days, and the bird finally opened its eyes and began to eat. F. B. Hadley and B. A. Beach reported research on "Controlling Chicken Pox, Sorehead, or Contagious Epithelioma by Vaccination" in the Proceedings of the American Veterinary Medical Association Vol. 50, pp 704-712, 1913.

In 1895 Drs. Theobald Smith and Veramus A. Moore (Bull. No. 1, Circ. No. 5, BAI, USDA) described the cause and symptoms of blackhead (infectious enterohepatitis) of turkeys, long recognized in the New England states. The designation "blackhead" was not considered a good choice even then, yet has persisted to this day. Dr. Smith thought the causal agent was an *Amoeba* and named it *A. meleagridis*, which Tyzzer changed to *Histomonas* in 1920 after he verified that the parasite was a protozoan. P. B. Hadley and William F. Kirkpatrick of the Rhode Island Experiment Station contended that the cause was a coccidium. In 1907 Cooper Curtice of the USDA wrote one of the first bulletins on the rearing of turkeys "With Special Reference to 'Blackhead' Disease." The transmission of blackhead by *Heterakis* embryos was reported by H. W. Graybill and Theobald Smith in the *Journal of Experimental Medicine*, 1920, Vol. 31, pp. 647-655. That discovery was fundamental to the implementation of successful control programs of this most devastating of turkey diseases.

Tuberculosis was a very common disease in fowls, and "higher animals" were not considered able to acquire it from fowls. It was some 30 years before the spread of avian tuberculosis to swine was verified. The avian tuberculin wattle test was never considered practical as an adjunct to a national control program. The demise of the farm-flock system and the fast turnover of modern flocks has almost eliminated this disease. Now it is found most commonly in aged fancy birds kept for exhibition.

There was much sentiment about the value of exhibition birds. Stoddard wrote, "We believe the sorrow that a person feels at the loss of a valuable bird is much greater than for a large animal. . . . Common dung hill fowls are not valued highly, but an exhibition bird may sell for as much as a horse." There is no question but that the bird fanciers set the standards for individual bird treatments. It was a trial-and-error system of home-remedy use, not very different from the practice of physicians at that time. The popular trend was to treat with every known household remedy. There was very little science in the use of these remedies. Cayenne pepper was supposed to stimulate birds to lay better in winter. Stoddard wrote, "gum camphor is worth trying for the reason that it may perhaps give the needed fillip to the liver and put an end to the congestion of that organ." Paradoxically, each author of the old texts would write a convincing paragraph that all poultry ills are "preventable." "It is almost useless and rarely ever worthwhile to treat sick poultry," D. W. Judd asserted in "Profits in Poultry" 1887. Then in the next paragraph he listed the usual treatments of the day for all the ailments of poultry he contended could be prevented.

In those times only a few bacterial pathogens were known. Many of the common parasites were identified but their life histories were vaguely understood, and viruses and useful vaccines were unknown. Veterinarians were not concerned with poultry-disease problems, and the only sources of help were the BAI, USDA, and the state colleges and experiment stations. Unfortunately, that situation continued well into the thirties.

Yet there was much common sense in many of the recommendations of the day. In 1898 Leonard Pearson wrote that "contagious diseases and parasites are usually introduced by new fowls brought into the flock and it is worthwhile to place all new acquisitions in quarantine from the flock for a few days until it has been shown that they present no evidence of disease." Thorough physical cleaning, followed by disinfection, was recommended procedure — all sound principles that represent the nucleus of modern techniques for specific-pathogen-free flocks.

The enormous mortality in chicks and adult poultry stimulated the use of many remedies. In 1915, Rettger, Kirkpatrick, and Card, in Connecticut, made a comparative study of the value of sweet and sour milk on growth and mortality in chickens. In 1924 Kaupp and Dearstyne, in North Carolina, were experimenting with the

use of lactic acid on disease-producing germs in fowls. Milk, buttermilk, and sour milk were used extensively as "flushes" to treat digestive upsets and coccidiosis up until the advent of the sulfa drugs, in the forties. Epsom salts and sodium bicarbonate were used as "flushes" to control a wide variety of diseases. Copper sulfate was frequently recommended for intestinal disorders. The rapid growth of the poultry industry in the twenties stimulated a tremendous demand for remedies to reduce mortality. Family formulas were passed on to entrepreneurs, who, supported by national advertising campaigns and armed with a good sales pitch and a secret formulation, could sell almost anything to poultrymen who had no better source to turn to for help. Walko Tablets, consisting mostly of potassium permanganate, were added to the drinking water, and the attractive purple color convinced many a flock owner that chicken health hinged on faithful application of this treatment. Eriksen cites several companies and their favorite products which poultrymen bought and used in lieu of more effective methods of control. Some of the products had distinct merit, such as those which helped to control parasites. However, as knowledge of the cause and prevention of poultry diseases increased, and effective vaccines, sulfa drugs, antibiotics, and insecticides came into use, most poultry-remedy companies were either dissolved or absorbed by the big drug and biologic corporations.

Much of the progress in avian medicine has been made since the early twenties. That period saw the beginning of the use of large incubators, a change in U.S. Post Office policy allowing parcel-post shipment of baby chicks, and success in developing pullorum-free flocks for producing hatching eggs and chicks.

The use of chickens in research has contributed many historical "firsts" which have been valuable to both medical science and nutrition. Landmarks include discovery of the B vitamins, the unveiling of the missing links of human malaria transmission, the use of chick embryos for growing viruses and for vaccine production, transmission of the first tumor virus, and immunization against viral tumors.

Succeeding reports of this AAAP history committee will highlight accomplishments of the past fifty years and the poultry pathologists who did the work. We hope thereby to increase veneration for those responsible for our heritage, and stimulate current scientists to higher standards of achievement.