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Animal Allergy

Dr. F. W. Wittich*

There is a growing appreciation of the importance of hypersensitivity in animals. Compared to the incidence of allergies in human beings, animal allergy is relatively common.

During the past decade, heretofore puzzling disease syndromes or symptom complexes in animals have been adequately explained, wholly or in part, on the basis of the mechanism of hypersensitivity.

The underlying mechanism in man and animal is the same. Many observers consider experimental anaphylaxis and allergy as basically similar. The fact that animals become sensitive to bacterial antigens such as tuberculin and mallein or show an immediate response to bacterial products such as Brucella polysaccharide, the production of asthma, diarrhea and urticaria to these anaphylactogens suggests that animals reveal a similar response to sensitizing stimuli as do human beings. All of this information indicates the similarity of immunological defense mechanisms throughout the mammalian class and emphasizes that allergy or anaphylaxis or protein sensitization is accountable for many hitherto unexplained disease symptoms in animals.

There are many contributing factors which influence the development, the degree of severity, and the response to measures used to improve the condition. These variables depend on a number of factors — the location of the "shock organs," the nutritional state of the animal, endocrine influences, fatigue, infection, biological, emotional, environmental and other factors. The writer's most allergic dogs were spayed females of the high-strung, intelligent type. The writer also showed that in chick embryo anaphylaxis the anaphylactic response was greater in eggs derived from the Mediterranean source of hens than from those of the more sluggish Asiatic type. The Leghorn is a good example of the former. Diet and gastrointestinal disturbances causing increased permeability also influence the picture. Fatigue, intercurrent illness, infection, toxins, foreign proteins, autonomic instability, chemicals such as proteins, acids, alkalies, drugs, etc., season, weather or pendulation of temperature, barometric pressure and moisture, as well as other physical agents such as heat, cold, sunlight, and smog are all contributing factors. The intensity of exposure, potency of the environmental allergens, and the degree of sensitivity of allergic individuals greatly influence symptoms.

The term allergy can be applied to hypersensitivity occurring naturally in any animal species including man, and the term anaphylaxis to that phenomenon which is artificially induced in man or animal. Allergy and anaphylaxis in their broadest meanings can therefore be used interchangeably to describe the hypersensitive state in either man or the lower animal.

* Dr. Wittich is an eminent authority on allergy and at present is a member of the Board of Directors of the American College of Allergists. He is managing editor of Annals of Allergy. His works include over fifty articles on research and chapters in various medical textbooks. He is a 1913 graduate of Johns Hopkins Medical School.
It is not infrequently that we observe human patients developing accidental anaphylaxis following an injection of foreign serum, foreign protein in glandular extracts, certain drugs, an overdose of aqueous hay fever protein extract, the ingestion of certain foods, etc., to which they are sensitized. Likewise, animals may develop anaphylaxis naturally, and not experimentally, following the injection of a foreign serum, and/or the ingestion of certain foods such as chocolate or milk, etc.

By far the majority of the reactions are immune reactions based upon an antigen-antibody mechanism. Each case is an individual problem based upon the many contributing factors which cause the animal or human to manifest an abnormal physiological response to a normal stimulus. It is unknown why certain animals or individuals develop this pathophysiological response which lowers the threshold and causes an allergic imbalance.

Bray in his textbook Recent Advances in Allergy, as early as 1937 reported the observations of hay fever in England in a herd of purebred cattle whose symptoms promptly disappeared when they were moved to an entirely different pasture.

Reddin and Stever reported contact dermatitis in a horse. This fine animal had been suffering for three years from an annoying skin condition which had failed to respond to any palliative measures. The lesions consisted of thickened, raised areas of the skin with alopecia and desquamation located about the head, neck and saddle region. The harness was suspected. No other animals in the same stable were affected, and they were used as controls when making the contact skin tests. Inunction tests of the materials used to clean the saddlery worn by the horse were applied to the skin. Positive skin tests were obtained by a mixture of the saddle soap and the leather conditioner. Tests with these materials singly gave negative responses. Further study revealed that the substances causing the reaction were sulfonated neatsfoot oil contained in the leather conditioner and "wool yellow dye" contained in the saddle soap. When a saddle soap which did not contain "wool yellow dye" was used there resulted a prompt and complete recovery.

Recently Povar reported allergy due to foods in eight dogs observed in his practice. Food allergy was definitely established to be the cause in all. Three cases suffered from urticaria. Two of this series were due to eggs with the clinical offenders determined by elimination experiments. The other dogs' hives were caused by a commercial baked food (Kibbles). In five of this series hemorrhagic colitis was seen and was of such seriousness as to cause death in one. One case also suffered from chronic eczema. In three of this series the elimination of horse meat and in one the elimination of Kibbles produced a clinical cure. The fifth animal died before the causative factor could be determined, but his diet had consisted of beef and Kibbles. An autopsy of this dog revealed an acute colitis with hemorrhage and thrombosis of the underlying blood vessels. Povar noted that six of the eight animals observed were purebred. Since several of the animals with hemorrhagic colitis had a concurrent intestinal parasitic infestation the writer questions whether this factor may not have hastened absorption through increased permeability of the intestinal wall just as it sometimes occurs in human gastrointestinal allergy.

Vaughan in his book Practice of Allergy mentioned hay fever symptoms apparently due to pine pollen in an Irish wolfhound. He also reported on two dogs who promptly developed vasomotor rhinitis, which lasted several hours, each time they were sprayed with Flit (pyrethrum).

Through personal communication Rinkel recently reported on a female dog which had been placed in an animal hospital because of allergic symptoms. Within several minutes after returning home the dog had a recurrence of symptoms and was returned to the hospital and skin tested by the skin titration method of Rinkel. The dog reacted to house dust and orris root. Her owner used a known brand of face powder containing large amounts of orris root. Patch tests with various laundry soaps were all negative.

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Treatment was commenced, and the dog ceased itching within 8 hours. This is the first case recorded of a dog being titrated with house dust and orris root and successfully treated by extracts of these antigens. This case will be reported in detail by Rinkel after the dog has been controlled over a period of time.

Clinical demonstrations of spontaneous allergy were subsequently noted by Thomas in 1943. He reported that “The dog suffered repeated asthmatic attacks, limited to the ragweed season, for 3 years. The onset of symptoms would occur between Aug. 14 and 17 and continue throughout the hay fever season. This animal was a shorthaired Scotch terrier crossed with a Spitz.” The dog’s owner stated that the seasonal symptoms were relieved by Dr. Tucker’s Asthma Inhaler and that the dog had also experienced relief from ephedrine. The animal also had hay fever with considerable itching and watery rhinorrhea, and developed asthmatic bronchitis when he had acute respiratory infections. Upon lying down on ragweed plants in the owner’s yard he immediately developed allergic symptoms. The dog lived to be 14 years of age, and his death was not in any way related to allergy as it occurred out of the pollen season. There was no opportunity to make immunological tests on this dog.

A few of these cases have been mentioned in detail in an effort to stimulate more fundamental investigations of the subject of animal allergy by veterinarians.

The first reports on spontaneous clinical hypersensitiveness in animals were on dermatologic allergy.

Twenty-nine years ago (1922) Phillips proved foods to be the allergic offender in causing angioneurotic edema in dogs by both feeding experiments and cutaneous tests. Ten years later Schnelle reported his observations on eczema in dogs and offered evidence of their allergic nature. The same year Burns reported “Allergic reactions in dogs” which was limited to eczema as was also a paper by Pomeroy a year later on “Allergy and allergic skin reactions in the dog.”

In 1941 the writer was the first to offer proof of spontaneous respiratory allergy (atopy) in the lower animal manifested by typical seasonal hay fever in a dog. This was established by skin tests, passive transfers to a dog of a different species and to the human skin, positive nasal and ophthalmic tests, as well as successful hyposensitization and the demonstration of thermostable antibodies by means of the passive transfer and precipitin method. Since these observations of spontaneous allergy (atopy) of seasonal hay fever in dogs followed many unsuccessful experimental attempts to produce the same, the first case furnishing conclusive evidence that dogs might have hay fever was reported in some detail. A number of authentic reports on hay fever in dogs have subsequently substantiated these observations.

A dog may manifest multiple allergies just as human beings do. In all the cases observed by the writer the greatest sufferer from seasonal hay fever and perennial rhinitis in a dog was 5-year-old spayed, female Scotch terrier. Spayed females seem more susceptible. When a puppy, she had eczematous-like skin lesions and edema about the face and eyes during the ragweed pollinating season. The following season she developed typical hay fever symptoms of stuffy nose, a thin, watery nasal discharge, and marked lacrimation. This was accompanied by a severe itchy dermatitis about the face and mouth with swelling and “weeping.” Her whiskers came out, and she scratched until she lost most of her hair. Two reputable veterinarians were consulted, and they excluded mange and other parasites. She was taken to the north shore of Lake Superior which is relatively free from weed pollens. There her symptoms disappeared, but they reappeared on her return home during the season. Following a heavy frost in September her skin became normal and she had no nasal symptoms. The following season she suffered a recurrence of all symptoms and was again placed with friends living on Lake Superior.

During the fall season of 1939 she was placed in an air-conditioned, pollen-free room in a small animal hospital in St.
Paul, and skin tested with a 1:1000 dilution, by weight, of the various ragweed pollen extracts native to Minnesota. Twenty minutes following injection marked skin reactions and a generalized urticaria developed. The dog went through all the characteristic motions of obtaining relief by lying on her side and rubbing her nose through the grass describing a circle, and then turning to the other side and repeating the same performance (Figures 1 and 2). She obtained immediate relief upon the injection of 1 cc. of a 1:1000 solution of epinephrine. Skin-sensitizing antibodies were demonstrated by the Prausnitz-Küstner technic in a dog of a different species.

The following year in the middle of December she suddenly had a return of her allergic symptoms. Elimination diets were tried with some success. For some reason the owner suspected that the aluminum vessels in which some of the dog's food was cooked might be responsible. The food (beef, beef liver, kidneys and milk) was cooked in an iron dish, and in a few days her symptoms again disappeared.

Vaughan mentions "The cure of cases of long-standing refractory colitis following the change from aluminum cooking utensils to enamel or glass vessels," as observed by Tchejevschy and Tcheijevskaya of Moscow.

In 1944 the writer first demonstrated immune (neutralizing) antibodies in the dog. This animal was a 6-year-old male of mixed breed with a marked strain of fox terrier. He had an eczema due to sensitivity to the dog food — "Pard." The dog was under the care of reputable veterinarians, and no mites or skin parasites were demonstrated at any time. Upon eating dehydrated "Pard" he developed eczema on the belly with loss of hair. This eczema existed over other portions of the body without loss of hair. Rabbit antisera were developed against the various ingredients of "Pard" — beef, pork, codfish, sardine, wheat, barley, soybean, yeast and karaya gum. Precipitin tests carried out by the method of Hampton et al., demonstrated neutralizing or immune antibodies against pork, barley and yeast. In early August with the commencement of our ragweed season the dog developed lacrimation. His conjunctivitis, nasal blockage, and discharge disappeared after a heavy frost. Precipitin tests demonstrated immune antibodies to ragweed. When he was placed on horse meat, carrots and spinach his skin condition cleared up in about 3 weeks' time. Feeding dehydrated "Pard" would again produce typical eczematous lesions. His skin remained clear on 90 percent horse meat, stale bread, carrots, spinach, celery and milk.

The symptoms of animal allergy are quite similar to those of humans. Any symptoms which may be explained on the basis of smooth muscle contraction, arteriolar dilatation, increased capillary permeability, edema and increased mucus secretion strongly suggest an allergy. Kaplan, when enumerating numerous cases of allergy seen by him in small animals, lists "summer itch," serum sickness, "Boston terrier" asthma, 'dry" eczema, food reactions (gastrointestinal intoxication), drug allergies, hives, localized edema and fever due to allergy and urticaria. Fever is also a relatively common accompaniment of allergies in humans, particularly children.

At present there are many occasional ailments in animals with an obscure pathology whose etiology and pathogenesis are controversial. Unless proven otherwise, allergy should be considered, rather than attempting rationalization on another basis, devoid of scientific facts. Sufficient evidence has been furnished and pub-
lished to warrant listing the following diseases in animals on an immunological basis in which hypersensitiveness plays a role in one species or another: angioedema; urticaria; hemorrhagic colitis; hay fever (pollinosis); perennial allergic rhinitis; gastrointestinal allergy; bronchial asthma; stomatitis; certain cases of so-called gastrointestinal toxemia characterized by bloating, fermentation, diarrhea and colic; heaves; serum allergy or shock and serum sickness; photodermatitis and other skin allergies due to cold or heat; drug allergies; mortal asphyxia due to anoxia; anaphylactic states and bacterial allergies of tuberculosis; glanders, etc. Other syndromes mentioned as possibly being due to an allergy are founder, periodic ophthalmia, azoturia, pulmonary edema, vascular allergies, and ‘blue nose” disease in cows.

References
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