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# This Week's Citation Classic™

**Cole R K.** Studies on genetic resistance to Marek's disease.
*Avian Dis.* 12:9-28, 1968.
[Department of Poultry Science, Cornell University, Ithaca, NY]

Genetic selection for resistance was demonstrated to be an effective way to control Marek's disease in chickens. The derived resistant (N) and susceptible (P) lines differ genetically mainly in easily identified genes located in the major histocompatibility complex, as subsequently proved by others. [The *SCI*® indicates that this paper has been cited in over 115 publications since 1968. It is, therefore, one of the five most-cited articles ever published in this journal.]

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**"Close professional association with F.B. Hutt at Cornell University, over a period of nearly 50 years, can have only one consequence—appreciation of the role of heredity in an animal's resistance to a disease. The chicken has been our favorite species. Its reproductive ability permits genetic studies that would be difficult were we working with horses, cattle, or even dogs.**

**"Unlike plant breeders who utilize genetic resistance to disease, those seeking to improve domestic animals rely on vaccines, drugs, and eradication where feasible. Such procedures permit the least fit to survive and to produce more of their kind!**

**"A major disease problem of unknown cause, the leukosis complex, plagued the poultry industry for years. The promised solution was always just around the corner! Selection for resistance or susceptibility to this complex began at Cornell in 1935 and continued for 35 years. Progress was clear *albeit* slow.[1] Hindsight tells us why. The complex consisted of two diseases—leukosis and Marek's—for which the viral agents, one RNA and the other DNA, are now known to spread by different routes.**

**"When Sevoian *et al.*[2] discovered how to produce and transmit an agent (JM) that caused the neural form of lymphomatosis and demonstrated marked differences in response by the Cornell strains,[1] the beacon light came on. Why rely on uncontrollable natural exposure when a uniform dose of an agent could be used to demonstrate a bird's resistance in the short period of eight weeks?**

**"The use of controlled exposure by inoculation to evaluate potential sires and dams, by testing their progenies, permitted very rapid and marked changes in resistance or susceptibility after only two generations of selection. Two subsequent generations of selection added the icing on the cake. Subsequently, it was shown that selection had really been for different alleles at the B-G region of the major histocompatibility complex (MHC).[3,4] Proven association of the $B^{21}$ allele with resistance[4,5] permits it to serve as an indicator or marker.**

**"The major consequence of this study was the development of two lines—a very resistant N and a very susceptible P—which have proved to be of exceptional value to those doing research on Marek's disease. In addition, the proven association with genes in the MHC has greatly stimulated the field of immunogenetics as applied to the chicken."**

1. **Hutt F B & Cole R K.** Genetic control of lymphomatosis in the fowl. *Science* 106:379-84, 1947. (Cited 70 times since 1955.)
2. **Sevoian M, Chamberlain D M & Counter F.** Avian lymphomatosis. Part I. Experimental reproduction of the neural and visceral forms. Part II. Experimental reproduction of the ocular form. *Vet. Med.* 57:500-1; 608-9, 1962. [See also: **Sevoian M.** Citation Classic. *Current Contents/Life Sciences* 28(1):18, 7 January 1985.]
3. **Pazderka F, Longenecker B M, Law G R J, Stone H A & Ruth R F.** Histocompatibility of chicken populations selected for resistance to Marek's disease. *Immunogenetics* 2:93-100, 1975.
4. **Briles W E, Stone H A & Cole R K.** Marek's disease: effects of B histocompatibility alloalleles in resistant and susceptible chicken lines. *Science* 195:193-5, 1977. (Cited 60 times.)
5. **Longenecker B M, Pazderka F, Gavora J S, Spencer J L & Ruth R F.** Lymphoma induced by herpes-virus: resistance associated with a major histocompatibility gene. *Immunogenetics* 3:401-7, 1976.

 