
F O W L P O X

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FOWL POX, canker, or avian diphtheria of fowls occurs most often during the fall and winter months and is manifest in most infected flocks by yellowish diphtheritic patches in the mouth and throat. This type of the disease is commonly known as canker or avian diphtheria. The comb and wattle, mouth, and eye types may all occur in the same flock. The cause of the different types is identical.

Potent fowl- and pigeon-pox vaccines properly administered to healthy fowls produce a measurable degree of immunity against fowl pox. Fowl-pox vaccine produces a stronger immunity than pigeon-pox vaccine, but may be accompanied by a systemic reaction and may temporarily lower egg production. Pigeon-pox vaccine, tho it gives only a modified protection, may be used with less risk than fowl-pox vaccine. It is important that fowls to be vaccinated be in a vigorous condition and free from other disease. Flocks that have never suffered from fowl pox or appear unlikely to contract it should not be vaccinated.

Both fowl-pox and pigeon-pox vaccines are living viruses of their respective diseases. Ten days to two weeks following vaccination it is advisable to examine the vaccinated fowls for "takes." A "take" is characterized by the development of one or more scabs at the point at which the vaccine was applied. Immunity develops in four to six weeks following vaccination. Susceptible fowls that have been properly vaccinated with potent vaccine and failed to register "takes" should be carefully revaccinated. A high percentage of "nontakes" from a single vaccination may indicate that the flock is immune or that the vaccine is nonpotent.

Pullets on infected premises should be vaccinated before they begin to lay. Reaction to fowl-pox vaccination may check egg production in laying fowls. Fowl-pox vaccination should therefore be avoided except in an emergency to check the spread of the malady. Pigeon-pox vaccine can be used even in a badly infected flock without decreasing egg production and without danger of further spreading the disease.

FOWL POX

By ROBERT GRAHAM and E. H. BARGER¹

FOWL POX, also known as chicken pox, avian diphtheria, canker mouth, contagious epithelioma or sore-head, is an infectious disease of poultry, particularly of chickens and turkeys. Other species of fowl, however, including pheasants and quail, may suffer from fowl pox or a disease clinically resembling fowl pox. Pigeons suffer from pox, but pox in fowls is not readily communicable to pigeons; while pigeon-pox infection is incapable of producing typical fowl pox in chickens.

The cause of fowl pox is a living microscopic infectious agent known as fowl-pox virus. Pox virus is present in the scabs on the comb and wattles and in the yellow throat patches of affected birds. The causative agent is very resistant to drying. Following the appearance of the disease in a flock, the virus may persist on the premises and cause pox in pullets year after year.

Fowl Pox May Occur Wherever Poultry Is Raised

Fowl pox is of general occurrence and is capable of causing serious losses. The disease in young chicks may assume a rapid and fatal form, tho in pullets coming into lay and in older fowls the disease often runs a slow course accompanied by unthriftiness and lowered egg production. It may occur at any time of the year, but is more frequent during the fall and winter months. The greater frequency of the disease in winter is probably due to the closer confinement of fowls during the colder months, and the consequently greater opportunity for the transmission of the disease from bird to bird. The virus is known to survive for many months in chicken houses.

Pullets Most Susceptible

Chickens and turkeys of all ages are susceptible to fowl pox, but the effects are more serious in young cockerels and pullets than in mature fowls. The death rate in affected young stock may be high

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in some outbreaks, while fowls that recover are often retarded in growth and development. In pullets in lay and in older laying stock production is lowered by the disease and in severe cases ceases entirely.

Flocks in low vigor from any cause, or flocks poorly housed, are often more severely affected with pox than flocks properly managed.¹

Different Types of the Disease

Fowl pox occurs in different forms. Pox nodules on the comb and wattles indicate the skin type of the disease (see cover illustration). Diphtheritic yellowish patches, commonly called canker, on the mucous membrane of the mouth, throat, and upper windpipe (Fig. 1) are known as avian diphtheria. The eye form of the disease, as the name implies, attacks the eyes and the eyelids (Fig. 2). It is not uncommon to find the nodular type on the comb and wattles and the diphtheritic form on the mouth of the same bird; while involvement of the eye, tho less common, often accompanies skin and diphtheritic types of fowl pox. Nodular lesions of pox may occasionally be found on the skin over the neck, body, and legs.

Pox Infection Enters Thru Break in Skin

A break in the skin or in the mucous membrane of the mouth or throat is necessary for the development of fowl-pox infection. The break or abrasion, tho small, permits the virus to gain entrance and become established. Small abrasions or wounds in comb and wattles produced by fighting, or insect bites, and wounds in the throat caused by the ingestion of coarse food or sharp particles of food and gravel apparently provide the avenues by which the virus can enter. Eyes and eyelids may also be invaded by the infection.

Appearance of Fowl-Pox Lesions

Skin or Nodular Type.—The skin type of fowl pox is characterized by small, raised, blister-like areas on the comb, face, or wattles. The nodular lesions increase in size and appear as grayish, elevated, wart-like enlargements which become dry and brownish in color as the disease progresses. There may be only one or two nodules, or they

¹Pigeon pox has been encountered in Illinois aviaries, tho the economic significance of the disease has not been established in the outbreaks thus far observed. The spontaneous occurrence of pigeon pox, however, has afforded an opportunity to study the relation of pigeon pox to fowl pox, and the Illinois strains of pigeon pox have proved of value in vaccinating fowls against fowl pox. Chickens, however, do not develop lesions resembling pigeon pox.

may be so numerous as to cover a considerable portion of the comb and wattles (Fig. 3). The nodules may even coalesce to form extensive, raised scabs which may persist for three weeks or longer. Death may occur before the lesions are fully developed or even as they recede, tho' a recession of the lesions is generally accompanied by



FIG. 1.—DIPHThERIC TYPE OF FOWL POX IN ROOF OF MOUTH AND UPPER END OF WINDPIPE

This is the same disease that appears on the comb and wattles. The yellowish patches are firmly adherent to the mucous membrane of the mouth and tongue. If the patches develop about the larynx or windpipe, symptoms of laryngotracheitis, evidenced by difficult breathing, may develop. The comb or wattle type of fowl pox may occur in a flock affected with the canker type of the disease.

improvement in general condition. If the disease subsides, the scabs decrease in size and disappear in four to six weeks, leaving a whitish-gray scar.

Diphtheritic or Canker Type.—Pox of the diphtheritic type affects the mucous membrane of the mouth and throat. Small yellowish, adherent membranous patches appear on the mouth and throat (Fig. 1). As the disease progresses, these patches increase in size and thickness

and present a yellowish, cheesy appearance. In severe cases of avian diphtheria the throat and mouth may be covered with yellowish, adherent membranes. These membranes in the corner of the mouth, on the tongue, and in the throat and upper part of the windpipe interfere with eating, drinking, and breathing.



FIG. 2.—EYE TYPE OF FOWL POX

In some flocks fowl-pox tumors develop about the eyes. As the eye lesions progress, impairment of vision and loss of appetite may contribute to emaciation. Fowl pox in any form (on eyes, comb, and wattles, or mucous membranes) is more fatal in pullets than in mature fowls.

Not infrequently diphtheritic patches are found in and about the larynx (upper end of the windpipe) preventing inspiration or intake of air. Fowls so affected may show labored, gasping breathing and stand quietly with the mouth open.

Eye Type.—In the eye type of pox the nodular form often appears on the lids, tho infection may extend over the eye ball, causing blindness. Involvement of the eye is first manifested by redness and swelling accompanied by a watery, clear discharge. The discharge may change to a thick, yellowish adherent material and cover the surface of the eye (Fig. 2). As the exudate accumulates, the eye becomes a swollen mass of firm, cheese-like material. The eye may be eventually

destroyed and the eye cavity filled with a yellow, cheesy exudate. If both eyes are affected, the bird is unable to find food and water and soon starves to death.

Course of the Disease Varies

Mild outbreaks of fowl pox may affect only a small percentage of the flock and may be followed by apparent recovery. In severe cases, death may occur in 10 to 20 days. Young birds which survive the



FIG. 3.—TURKEY AFFECTED WITH FOWL POX

In recent years an increasing number of turkey flocks in Illinois have suffered from fowl pox. Pox may develop in turkeys at any age. The most serious outbreaks have been observed in late October and November, or just preceding the time for marketing.

the disease are frequently stunted and unthrifty; many never regain their full vigor. In affected pullets and older laying fowls unthriftiness accompanied by decreased egg production and loss of weight is common. Pox in chickens or turkeys often results in loss of condition and so renders them unmarketable.

Disease Spread by Contact With Affected Fowls

Fowl pox spreads rapidly by contact of diseased fowls with susceptible fowls. Close confinement and unclean houses increase the

opportunity for spreading the disease. While the precise means by which the virus of pox is conveyed from fowl to fowl is not always known, it has been shown that mosquitoes are capable of transmitting it from diseased to healthy birds. Contaminated litter or feed and infected premises may also spread the disease to healthy fowls. The shoes and clothing of persons who have visited infected premises may carry the virus to healthy flocks. Exhibition and breeding birds added to a flock without first being quarantined may also be the means of introducing the infection into healthy flocks. So far as is known, pox infection is not transmitted to baby chicks thru the egg.

Prevention by Sanitation

Fowl-pox virus, tho resistant to drying, may be destroyed in chicken houses by removing and burning the litter and then systematically cleaning and disinfecting the house. If the litter from the houses cannot be burned, it should be spread thinly on ground not used for poultry. Boiling hot lye water (1 pound of lye to 30 gallons of water) is a satisfactory cleaning agent; while 3 percent compound solution of cresol (U.S.P.) or its equivalent should be used as a spray for disinfecting the floor and walls of the house and the roosts, nests, and utensils. Outbreaks of fowl pox, if promptly diagnosed, may be suppressed by proper cleaning and disinfection of the premises and destruction of all infected birds.

Poorly drained yards may play a part in perpetuating and spreading fowl pox. Visitors from infected premises or attendants who care for infected chickens should not under any condition enter houses or yards in which the infection has not appeared. Pox-infected birds, if few in number, should be promptly killed and destroyed by burning. If a large number of fowls are infected, destruction is not so practical a measure as sanitation coupled with vaccination.

Prevention by Vaccination

Vaccination consists of inoculating each fowl with a vaccine of fowl pox or pigeon pox. Potent, properly prepared vaccine carefully applied to fowls in good condition has proved valuable in preventing the spread of fowl pox in chickens and turkeys. Careful attention to such details as the proper dilution of the vaccine, thoroughness of its application, and the condition of the birds at the time of vaccination is essential if satisfactory results are to be obtained.

There are two types of pox vaccine that may be used for immunizing flocks. Each has limitations, and neither should be employed except *in combination with sanitary measures*.

Fowl-pox vaccine consists of the dried, powdered scabs from a pox-infected chicken and contains the living pox virus. The vaccine is generally suspended in water containing from 10 to 20 percent glycerin (Fig. 4). Fowl-pox vaccine produces a definite, characteristic scab lesion in chickens and usually induces a lasting immunity against subsequent exposure.

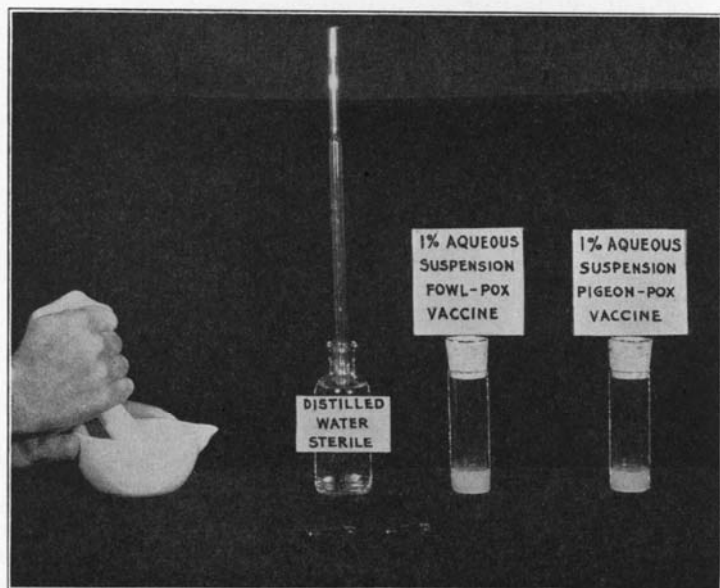


FIG. 4.—MIXING VACCINE IN DISTILLED WATER

Before the vaccine is applied it must be carefully mixed with distilled water in mortar and pestle. This operation, with vials of finished vaccine ready for use, is shown above.

Pigeon-pox vaccine is the dried, pulverized pox lesions of the skin taken from pigeons at the height of the disease. The results of experimental work at the Illinois Agricultural Experiment Station indicate that a measurable degree of protection is induced in chickens by pigeon-pox vaccine. The protection provided does not, however, prevent fowl pox from occurring after artificial exposure, but the severity of the disease is markedly reduced (Figs. 8 and 9, page 14). Chickens vaccinated with pigeon-pox vaccine and later exposed to fowl pox may pass thru a modified, or mild, type of the disease, as judged by the character, extent, and duration of the lesions. In chickens vaccinated with pigeon pox and later exposed to fowl pox, the lesions develop

and recede in two or three weeks; while in unvaccinated birds exposed in a similar manner, the lesions may continue for periods of five to six weeks, with or without a fatal termination.

When to Vaccinate

It is not advisable to vaccinate with fowl-pox vaccine flocks in which fowl pox has not occurred and does not appear imminent, altho

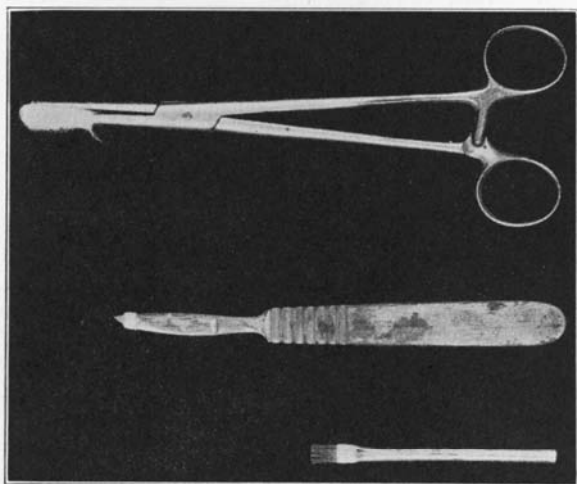


FIG. 5.—A SWAB, KNIFE, OR BRUSH MAY BE USED IN APPLYING VACCINE

The instrument suitable for applying vaccine to fowls varies with the kind of vaccine and the method of applying it. Pigeon-pox vaccine should always be applied by the feather-follicle method, using the cotton swab or brush. Fowl-pox vaccine is preferably applied by the stick method, using the special knife shown above.

close observation should be maintained to insure early detection of the disease. With the appearance of the disease in a flock, all birds should be immediately vaccinated with either pigeon- or fowl-pox vaccine. Flocks on premises where the disease has previously occurred, or on premises where infection is imminent, should be vaccinated before the disease appears.

The best time for vaccinating flocks on infected premises is in late summer, at least two months before the birds begin to lay. Pullets vaccinated with fowl-pox vaccine should have sufficient time in which to recover completely from the effects of handling and treatment before entering production. If the flock is laying, pigeon-pox vaccine

may give the desired degree of protection without producing the severe reaction which sometimes follows vaccination with fowl-pox vaccine.

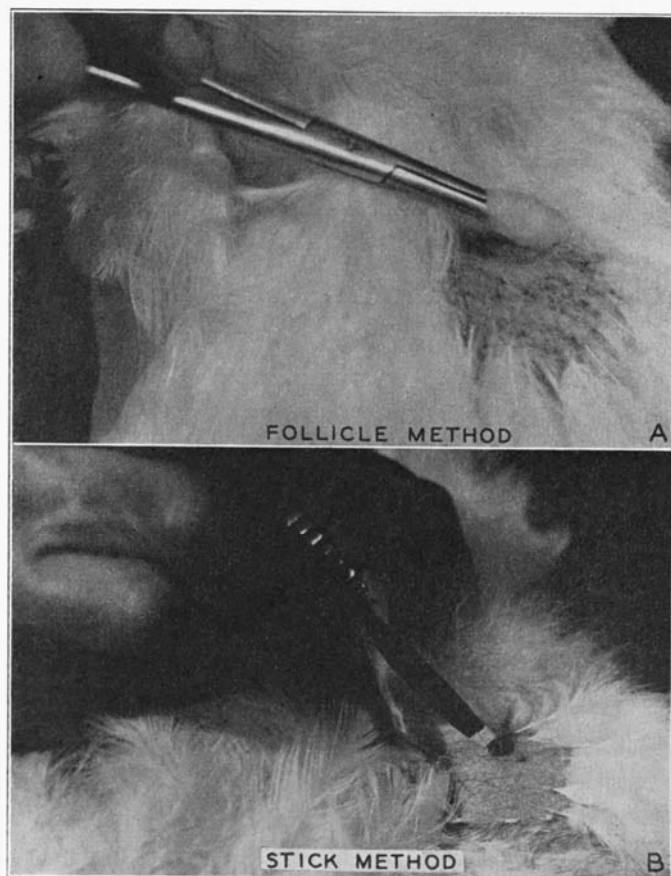


FIG. 6.—METHODS OF APPLYING VACCINE

The follicle method shown in *A* is recommended in the application of pigeon-pox vaccine. The stick method (*B*) is recommended in the application of fowl-pox vaccine.

Fowls of low vitality from faulty breeding, improper rations, or inadequate housing, and flocks affected with pox and other diseases or with heavy parasite infestation are poor subjects for vaccination with fowl-pox vaccine. Pigeon-pox vaccine, under such circumstances, is less likely to produce unfavorable results, tho it is also likely to produce a less firm degree of immunity.

Methods of Applying Vaccine

In vaccinating fowls, a suspension of the vaccine is applied to the broken skin. Various methods have been used, but the "follicle" and "stick" methods appear to be the most satisfactory. The "follicle" method (Fig. 6), recommended in the application of pigeon-pox vaccine, consists of applying the vaccine to a few (15 to 20) follicles from which the feathers have been plucked. The outside of the thigh is commonly selected for this purpose, altho any convenient place may be used. If the same area is selected for all birds, the subsequent examination for "takes" will be rendered much easier. The vaccine is applied by means of a stiff-bristled brush or a cotton swab (Fig. 5),

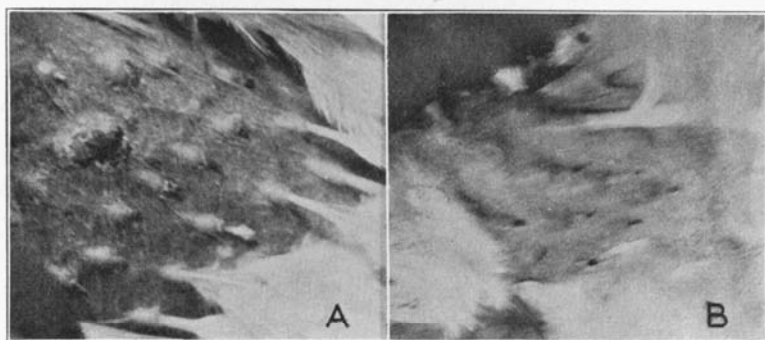


FIG. 7.—VACCINE "TAKES" TEN DAYS FOLLOWING VACCINATION

(A) Fowl pox "takes" are characterized by inflammation and scab formation and are easily detected. (B) Pigeon pox "takes" are not pronounced. A mild inflammation of the feather follicles receiving the vaccine is noted. Inflammation is marked by a pinkish discoloration, with slight enlargement of the follicle. There is no scab formation.

which is readily made by wrapping a small amount of cotton around one jaw of a forcep and closing both jaws of the forcep to hold the swab firmly in place.

The "stick" method of vaccination (Fig. 6), recommended for fowl-pox vaccine, is done by puncturing the skin on the lower, outside, feathered portion of the leg, or the unfeathered area under the wing, with a knife blade which has been dipped in the vaccine. A small, narrow-bladed, sharp-pointed knife is well suited to this purpose. A narrow band of adhesive tape wrapped around the blade about $\frac{1}{8}$ inch from the point prevents too deep penetration and assures uniformity in the size of the puncture wound. A single puncture is enough. It is necessary only that the skin be penetrated and that enough of the

virus be carried on the tip of the instrument to contact the vaccine with the broken skin.

Determining Results of Vaccination

Successful vaccination is evidenced by the presence of a reaction, or "take," at the area where the vaccine was applied. The nature of the reaction depends upon the method of vaccination and the vaccine employed. Reactions, or "takes," to fowl-pox vaccine applied by the stick method are indicated by small, definite, scabs and a moderate swelling at the point of puncture (Fig. 7-A). If pigeon-pox vaccine has been employed, a reaction is indicated by mild swelling and inflammation of the follicles to which the vaccine was applied (Fig. 7-B). Seven to ten days following vaccination each vaccinated fowl should be examined, and those not showing "takes" should be revaccinated.

After-Effects of Vaccination

Healthy, vigorous birds usually show little or no disturbance following vaccination with fowl-pox vaccine. They may, however, appear droopy and show diminished appetite, and their egg production may be lowered. The reaction may be noted two to three weeks following vaccination. In flocks of low vitality severe after-effects, such as loss of condition and complete cessation of production, sometimes occur. For this reason, vaccination of laying fowls with pigeon-pox vaccine may be preferred even tho the immunity may not be so long nor so strong as from fowl-pox vaccine.

Duration of Immunity

An attack of fowl pox followed by recovery produces lasting immunity. Fowls successfully vaccinated with fowl-pox vaccine develop a solid immunity which may last for several months or even for the life of the fowl. This immunity manifests itself three to six weeks following vaccination.

Fowls successfully vaccinated with pigeon-pox vaccine appear to possess a modified form of immunity, which may be demonstrated as soon as two weeks following vaccination (Figs. 8 and 9) and may endure for six months or longer, altho the length of the modified immunity induced by pigeon pox is not known. Furthermore, fowls vaccinated with pigeon-pox vaccine, upon artificial exposure to fowl pox, develop benign lesions of the disease which begin to recede in ten to fourteen days and often completely disappear in three weeks (Fig. 8).

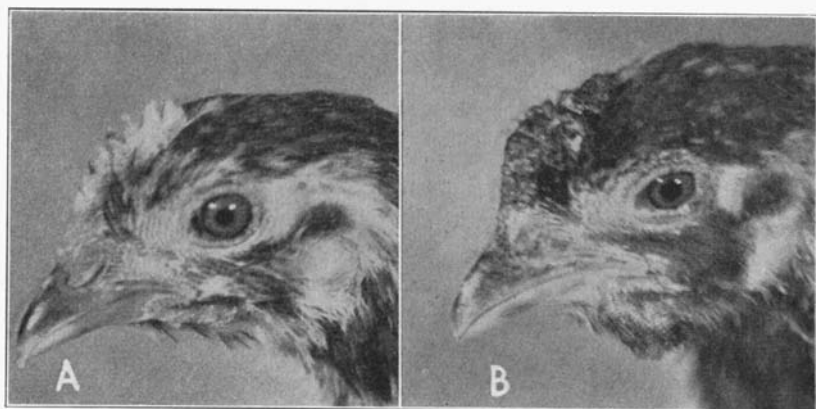


FIG. 8.—COMBS OF VACCINATED AND UNVACCINATED BIRDS
22 DAYS AFTER EXPOSURE TO FOWL POX

The fowl in *A* was vaccinated with 1 percent pigeon-pox virus, follicle method, at four weeks of age; the fowl in *B* was not vaccinated. Two weeks later both birds were exposed to fowl pox by scarification of combs and wattles by daubing with 1 percent fowl-pox virus. The vaccinated fowl showed benign lesions which subsided after the fourteenth day and no lesions 22 days following exposure. The control showed severe lesions.

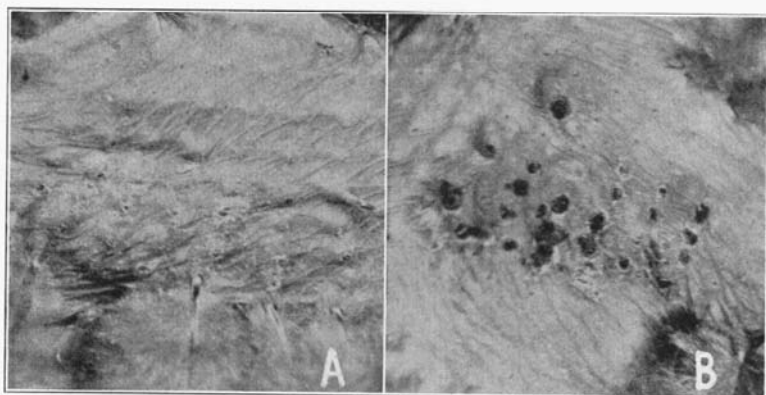


FIG. 9.—EFFECT OF VACCINATION AS SHOWN BY CONDITION OF FEATHER
FOLLICLES IN VACCINATED AND UNVACCINATED BIRDS

The thigh area shown in *A* was photographed six months after the bird was vaccinated by the follicle method with 1 percent aqueous suspension of pigeon-pox vaccine and two weeks after exposure to fowl pox. The same area on an unvaccinated bird of the same age and group kept under the same conditions and exposed to fowl pox at the same time is shown in *B*. The unvaccinated bird shows typically progressive lesions as compared with small, benign lesions on the skin of the vaccinated bird.

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