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Source: *Avian Diseases*, Vol. 23, No. 3 (Jul. - Sep., 1979), pp. 745-752

Published by: [American Association of Avian Pathologists](#)

Stable URL: <http://www.jstor.org/stable/1589751>

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Case Report —

Occurrence of Atypical Fowlpox
in Poultry Farms In Kenya

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Received 23 January 1979

SUMMARY

Atypical fowlpox occurred in several poultry farms in Kenya. On two occasions layers had their eyes closed and egg production dropped. Fowlpox virus was isolated from lesions on the inner surfaces of the closed eyelids. Other chickens had lesions covered by yellow caseous necrotic material in the mouth, around the epiglottis, and in the trachea and choanae. Typical proliferative cutaneous lesions were observed in birds of all ages in other flocks examined. Fowlpox virus was recovered from both cutaneous and diphtheritic lesions. The infected chorioallantoic membranes had focal hyperplastic lesions containing pink-staining intracytoplasmic inclusion bodies in most cells. Transmission studies showed that the virus was highly virulent to susceptible chickens.

INTRODUCTION

Fowlpox, one of the oldest known viral disease of chickens, has been eliminated from most commercial poultry farms in many parts of the world through use of the attenuated fowlpox virus vaccine. Since many poultry farms have discontinued the use of the vaccine in their flocks a highly susceptible chicken population has consequently been provided in the event of inadvertent introduction of the virus. In many developing countries, fowlpox is fairly endemic (4). In Kenya, the first case of a disease resembling fowlpox was reported in 1912 (7). By 1927, the disease was a regularly diagnosed syndrome occurring sporadically throughout the country. The disease has since been reported annually from various parts of the country.

Authors differ in what they report as fowlpox. Some describe it as the syndrome with lesions in the mouth, trachea, larynx, and the nasal chambers covered by a diphtheritic membrane (6). Others report it as mild or minor cutaneous lesions on the comb

(11). Brunner and Gillespie (1) believe that both the cutaneous and the diphtheritic syndromes are different facets of typical fowlpox virus infection, although they do not indicate what would be considered atypical. However, Cunningham (3), who shares the opinion of Brunner and Gillespie (1), believes that atypical fowlpox lesions occur on the inner surfaces of the eyelids. Soft yellow diphtheritic materials are seen on shallow ulcers, causing increased lacrimation and inflammation of the eye. There are no external lesions on the eyelids. This communication describes the occurrence in Kenya of all types of atypical fowlpox as described by Jones *et al.* (6), Tripathy *et al.* (11), and Cunningham (3), as well as some typical cutaneous fowlpox lesions.

MATERIALS AND METHODS

Sources of materials. White Leghorn, Rhode Island Red, Light Sussex, Cross-breeds, and some indigenous chicken breeds were brought to the laboratory for routine diagnosis. Others were obtained during visits to layer-holdings, large-scale commercial broiler farms, and back-yard flocks some of which had only 10 birds per unit. Samples were obtained from the lesions on the eyes, wattles and combs, mouth, trachea, legs, and other cutaneous areas

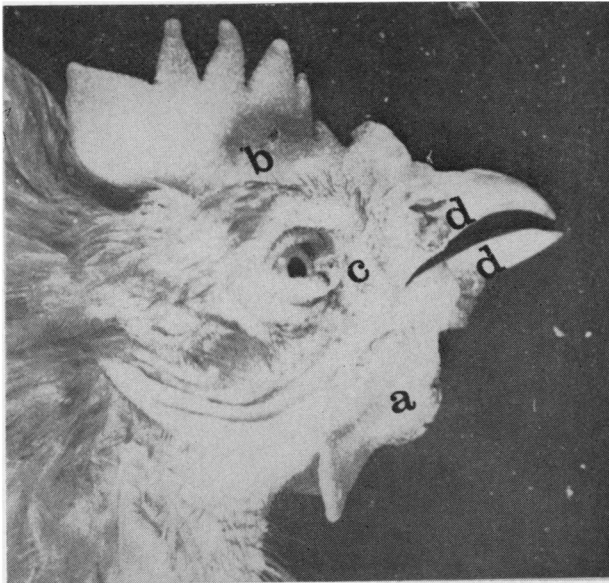


Fig. 1. Cutaneous proliferative fowlpox lesions on the wattle (a), comb (b), lower eyelid (c) and junction of beak (d) with the skin of 15-month-old chicken. There was marked erythema on the comb lesion.

as presented. The materials were placed in transport medium (9) for virus isolation.

Virus isolation. The scabs, biopsy specimens, and caseous materials from the diphtheritic lesions were weighed and ground in a frozen mortar and pestle. Transport medium was added to make a 10% suspension. This was subsequently centrifuged at $850 \times g$ for 15 minutes, filtered through 1.2- μm Millipore membranes (Millipore Corporation, Bedford, Massachusetts 01730 USA) and thereafter used as the inoculum for embryonating hen eggs. The eggs were inoculated through the chorioallantoic route at 12 days of incubation (9). They were candled daily for viability and removed from the incubator if found dead. Those found alive after eight days of incubation were chilled. Chorioallantoic membranes were harvested into sterile petri plates containing sterile saline and examined for pock lesions. Infected membranes were ground for further passages.

Histopathology. Biopsies were obtained from cutaneous, diphtheritic, and chorioallantoic membrane lesions and placed in 10% formol saline. They were embedded in paraffin, sectioned at 4–6 μm , stained routinely with hematoxylin and eosin, and thereafter examined for the characteristic intracytoplasmic eosinophilic inclusion bodies.

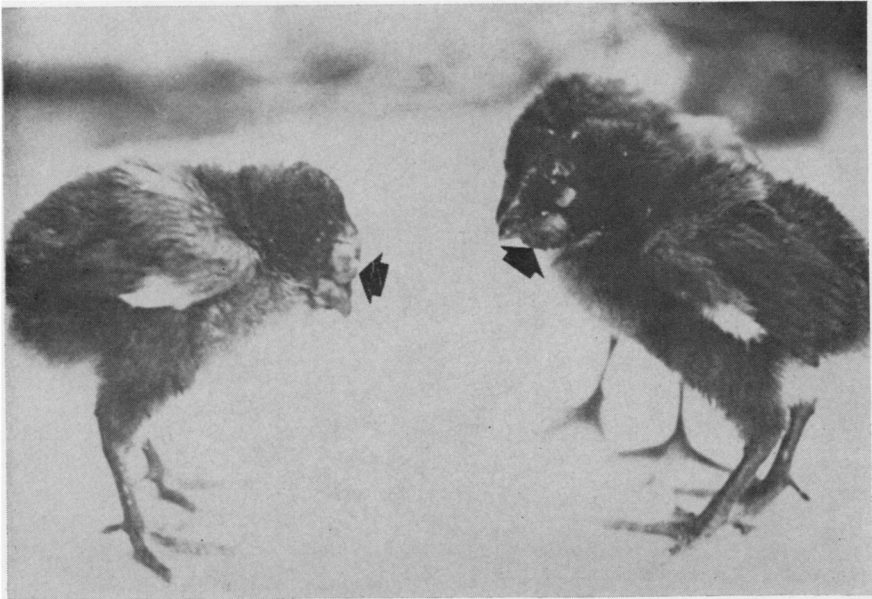


Fig. 2. Cutaneous proliferative fowlpox lesions on the head regions (arrows) of two one-week-old indigenous-breed chicks.

Negative staining. Scabs and caseous materials were emulsified in a drop of distilled water to make a turbid suspension. The suspension was taken on carbon-coated copper grids, stained with alkaline phosphotungstic acid (10) and examined for the characteristic brickshaped viral particles by electron microscopy (Model EM 9A electron microscope, Zeisswerke, Oberkochen Germany).

Transmission studies. To determine the virulence of the viral isolates, suspensions made from the infected chorioallantoic membranes were inoculated onto scarified areas on the combs of 24 four-week-old susceptible chickens. The chickens were observed for the appearance of lesions.

RESULTS

Three forms of fowlpox were observed during the investigation.

Ocular form. This was the most insidious and atypical type of fowlpox seen. In 2 farms, layers were seen with closed eyes, lacrimation, and dry exudate along the eyelid margins. The inner surfaces of the eyelids were inflamed and covered with necrotic material. The eyeballs were usually spared. There were no pock

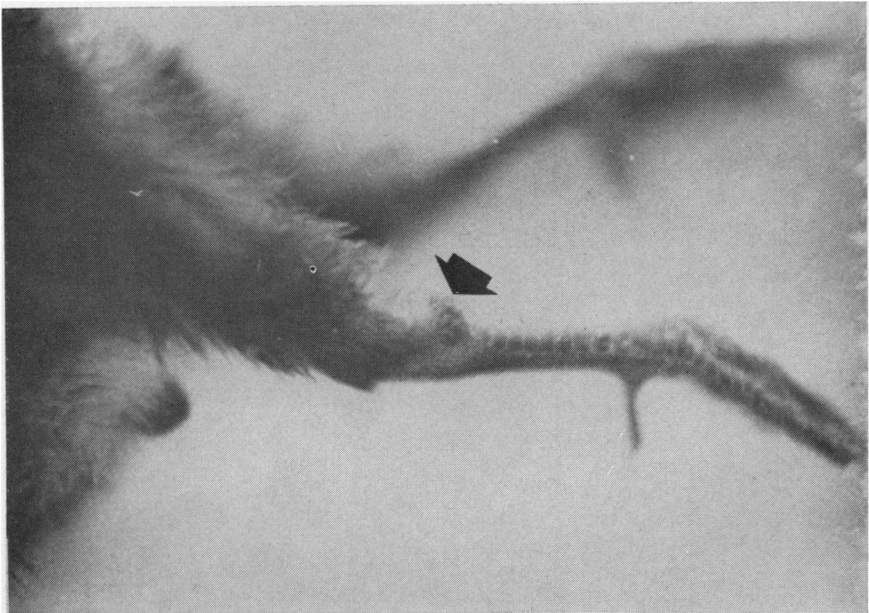


Fig. 3. The leg of a one-week-old indigenous-breed chick showing a proliferative cutaneous lesion (arrow).

lesions on the exterior skin surfaces of the eyelids or elsewhere on the body of these chickens.

Diphtheritic form. This syndrome was encountered in many chickens on one broiler farm and one breeding farm, and some chickens from backyard holdings. The chickens were coughing and gasping, reminiscent of infectious laryngotracheitis. Mortality was low but there was marked drop in egg production in the layers and retarded weight gain in the broilers. Grossly, some yellow caseous plugs were found obstructing the larynx and trachea. Necrotic lesions with similar material were seen around the epiglottis and on the choanae. No eye or cutaneous lesions were observed in these chickens.

Cutaneous form. Wartlike proliferative nodular lesions were seen on the combs and the wattles of adult birds (Fig. 1) from 4 farms. On one farm where chickens were showing ocular lesions, birds in the same flock were seen with only healed scars on their combs while others had one or more nodular active lesions. Birds in the other farms had typical cutaneous fowlpox lesions. Nine one-week-old chicks from a backyard holding had proliferative lesions at the base of the beak, on the outside surface of the eyelids, and

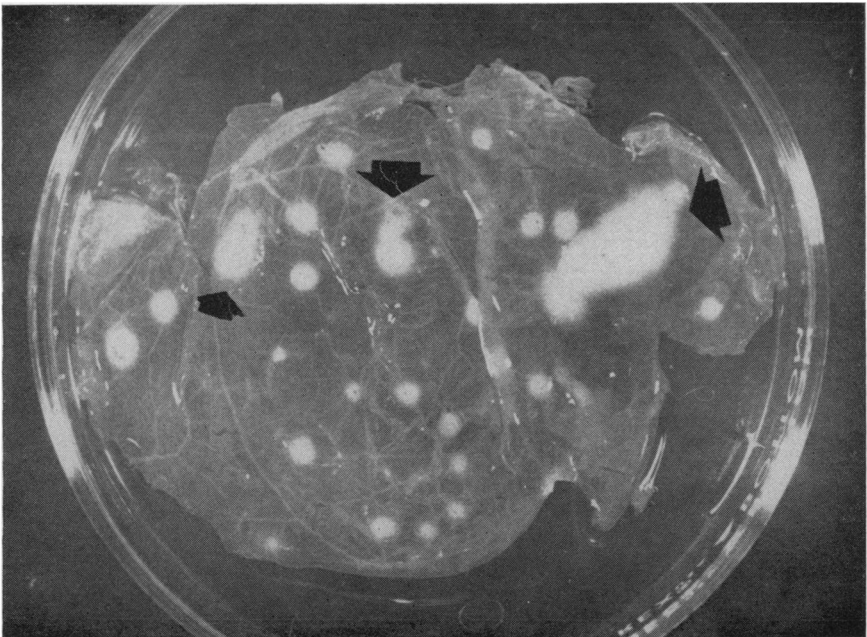


Fig. 4. Infected chorioallantoic membranes showing pock lesions (arrows).

on the flexor surface of the knee joint (Figs. 2, 3). There were scabs on the eye lesions but not on the leg lesions.

Virus identification. Negative staining of the materials obtained from fresh lesions showed typical brick-shaped viral particles under the electron microscope. Pock lesions were formed on the chorioallantoic membranes of inoculated embryonating eggs (Fig. 4). The lesions were hyperplastic and exhibited eosinophilic intracytoplasmic inclusion bodies similar to those seen in stained biopsy specimens (Fig. 5).

Transmission studies. Twenty-four 4-week-old chickens infected experimentally with suspensions prepared from the infected chorioallantoic membranes developed lesions typical of cutaneous fowlpox on their combs within 5 days of infection (Fig. 6). Negatively stained preparations made from the materials obtained from these lesions showed brick-shaped viral particles similar to those seen in the preparations made from the original specimens.

DISCUSSION

The two most alarming syndromes observed in this study were the ocular and the diphtheritic forms (3). The birds which had the ocular form showed no other lesions elsewhere on the body. Consequently, this syndrome could easily be confused with ammonia

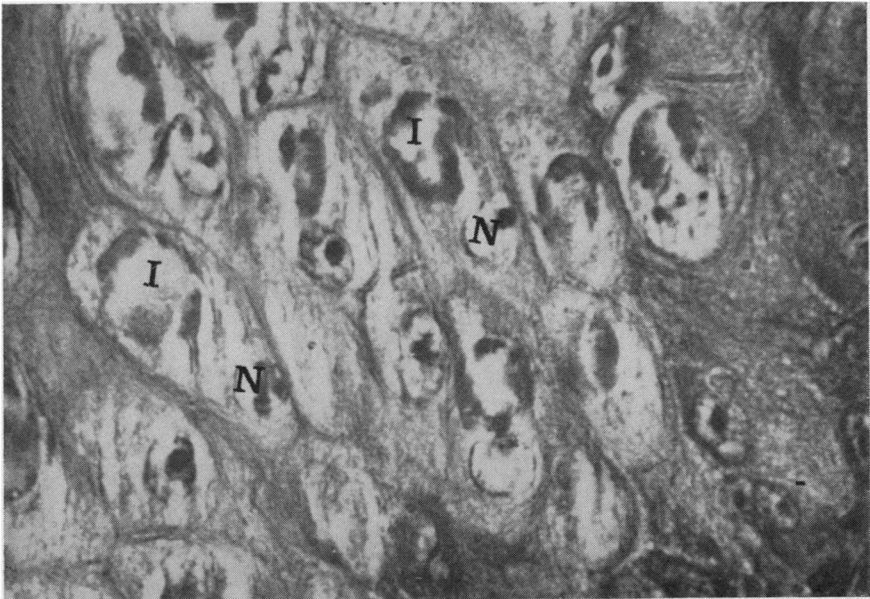


Fig. 5. Large eosinophilic intracytoplasmic inclusion bodies (I) in stained biopsy specimens from nodular cutaneous lesion; N-nucleus.

burns (2). All the poultry farms visited use the deep-litter system. Under certain circumstances, that system of keeping poultry is associated with ammonia burns (2). Although Khogali (8) reported the ocular form of fowlpox in Sudan, no lesions were specifically ascribed to fowlpox virus infection in his report. Nonetheless, ammonia fumes, bacteria, and fowlpox virus were associated with the syndrome.

The diphtheritic form could have been confused clinically with infectious laryngotracheitis because the coughing and the gasping respiration were not accompanied by typical cutaneous or other fowlpox lesions. Jones *et al.* (6) made similar observations on chicken flocks in Britain. This syndrome appears to be an insidious, slow-spreading disease producing only low mortality and a drop in egg production in layers, which may not attract attention.

Wartlike nodular lesions typical of cutaneous fowlpox infection were seen in most cases of the cutaneous form. The lesions occurred on the comb, wattles, eyelids, featherless areas of the body, and defeathered parts on the back and tail of layers.

The purpose of this communication is to draw attention to the

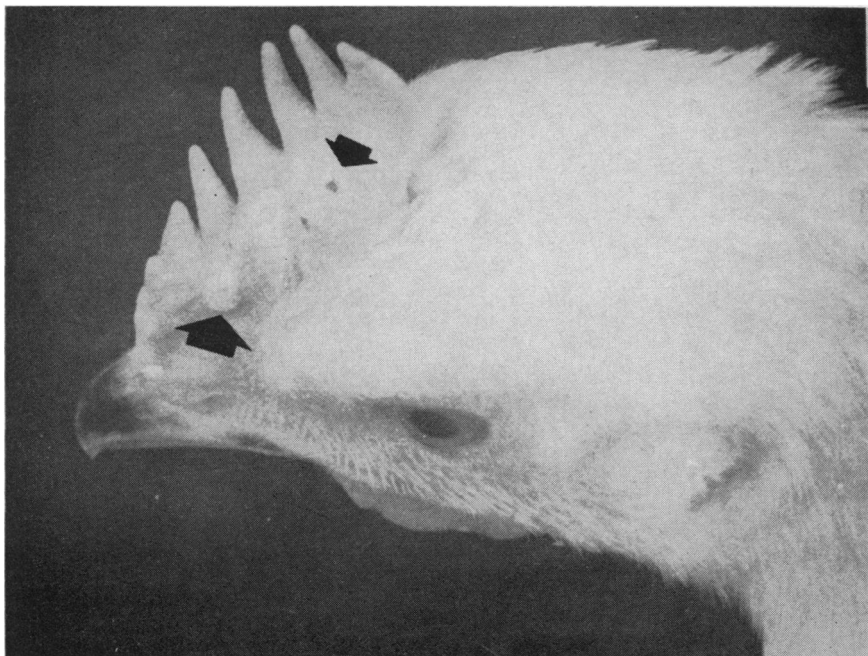


Fig. 6. Fowlpox lesions (arrows) induced experimentally on the combs of 4-week-old chickens.

current insidious nature of fowlpox, particularly the ocular, diphtheritic, and mild cutaneous forms. In retrospect, Griesdale (5) recalls noticing the diphtheritic form from poultry originating from many parts of Britain, soon after Jones *et al.* (6) published their findings. Vaccination had either been stopped or had never been instituted in the farms where atypical fowlpox occurred in the Sudan, (8), USA (11), and Britain (6). In the Sudan, there had been no vaccination against fowlpox in the whole country.

In Kenya, atypical fowlpox occurred in unvaccinated flocks although vaccination against fowlpox in this country is widespread. On one occasion, atypical fowlpox occurred in a flock vaccinated 8 months before. Wild birds mingled freely with the chickens in several of the flocks where atypical fowlpox occurred. However, it was not possible to determine the initial source of the virus. This investigation clearly illustrates the danger that might arise when the manifestations of a disease change and the new form of the disease appears years after professional personnel have stopped encountering the so-called typical cases. Under such circumstances the disease could exist unnoticed for a long time. Veterinarians and personnel involved in diagnosis and disease control should be on the lookout for such unusual cases.

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ACKNOWLEDGMENTS

The authors gratefully acknowledge the technical help from Dedan Kahara, J. Waweru, J. Gicho and F. Njoroge. This work was supported by the University of Nairobi Deans' Grant No. 670-364.