

Infections of Poultry with Arizona Paracolon in Alberta

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The paracolon bacteria are a group of organisms resembling other members of the enteric group. They occupy a position intermediate between normal coliforms and the paratyphoids. (1) Complete classification of the paracolon organisms has not yet been completed. So far they are divided into two main groups, those that produce hydrogen sulfide and those that do not. The hydrogen sulfide producers are thought to be the most important from a pathogenic point of view and these have been further classified into three main groups, the Arizona group, the Bethesda group, and the Diphasic group. (2)

Edwards, West and Bruner (3) have classified the Arizona group according to antigenic formula and have evolved a diagnostic schema for it. They define this group as "motile, coliform bacteria which produce abundant H₂S, but fail to form indol; are methyl red (MR) positive and Voges — Proskauer (VP) negative; produce acid and gas from glucose; do not utilize D-tartrate or ferment sucrose, dulcitol or salicin; ferment lactose with varying avidity and liquify gelatin." (4)

Over the past ten or fifteen years many references in the scientific literature have been made to Arizona paracolon as the cause of infections in a wide variety of animal species. Crossley (2) quoting Edwards, West and Bruner indicated that Arizona paracolon isolations had been made from turkeys, snakes, canaries, guinea pigs, chickens, gila monsters, swine and man.

The pathogenicity of the Arizona paracolons for turkey poults has been reported in Veterinary literature. Wil-

liams (1) quoting Hinshaw and McNeil, 1944 and Edwards, West and Bruner, 1947 concludes the "Paracolons especially those of the Arizona group are capable of infecting fowl, especially poults. As in Salmonella infections, the younger birds are more susceptible and losses vary widely. Paracolon infections in adult birds do not seem to be a problem although such birds may serve as carriers of the organism." Edwards, West and Bruner (4) indicate that the paracolon infections in turkeys may be egg borne. This is confirmed by Goetz, Quortrup and Dunsing (5) who indicated also that Arizona paracolon infections of turkeys are enzootic in Southern California.

References to the variability of mortality caused by the Arizona paracolons are indicated by Williams (1). Goetz and Quortrup (6) in their investigations in California indicated that mortality ranged from 0.5% to 50%. They were also of the opinion that Arizona paracolon was an opportunist organism which became pathogenic only in the presence of some adverse management factor.

ALBERTA ISOLATIONS

During the spring of 1956, 7 isolations of Arizona paracolon were made at the Alberta Veterinary Laboratory, 6 from turkey poults and one from chicks. These came from six different farm premises, two isolations being made at different times from poults originating from the same farm. (One further Arizona paracolon isolation was made from an adult chicken dead of arsenic poisoning in December, 1956).

TRACING OF POSSIBLE SOURCES

Like the Salmonella group, the antigenic formula is of importance when

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tracing sources of infection with Arizona paracolons. All cultures, including the adult hen isolation, were typed by Miss Margaret Finlayson of the Enteric Laboratory, Ontario Department of Health as Arizona 7: 1, 2, 6. This typing was confirmed by Dr. P. R. Edwards of the National Salmonella Typing Centre, Georgia. Information also received indicated that this particular type had become very prominent in California within the last few years.

As these were the first isolations of Arizona paracolon at this laboratory a common origin was suspected. To check this, histories from the six infected premises were collected. These revealed that birds from five of the six premises (four poult and one chick flock) originated at one hatchery setting turkey eggs obtained only from Southern California. The sixth isolation was traced to poult from another hatchery setting eggs only from Oregon.

HISTORY HATCHERY 1

It was found that two isolations each were made from poult hatched March 18th and May 7th, 1956 at Hatchery No. 1. The eggs from both hatches came from one supply source in Southern California. The individual supply flocks were each identified and two of these (No. 1 and No. 9) were common to each hatch in varying proportions. The operator of Hatchery No. 1 had experienced "trouble" with both of these hatches. The following information on the hatches were compiled:—

- 1) *March 18th hatch* — 7080 eggs set from supply flocks numbers 1, 5, 9, and 14; number of saleable poult not given.
 - (a) 808 poult sent to one farm, lost 400 in 4 weeks. *Arizona paracolon* isolated.
 - (b) 660 poult sent to another farm, no following history. *Arizona paracolon* isolated.
 - (c) An undetermined number sent to another farm; upon complaint of

losses owner received 100 poult as adjustment.

- 2) *May 7th hatch*—4200 saleable poult hatched out of 7000 eggs set from supply flocks numbers 1, 7, 9, and 21.
 - (a) 1104 kept in battery brooders; in four days 109 birds died so remainder placed in isolation in a separate building; in one month a total of 704 birds had died. *Arizona paracolon* isolated.
 - (b) 1000 sold to another hatchery.
 1. 250 of these sold to one customer; all died; received 100% adjustment.
 2. 200 placed in battery brooders but after 20% deaths, all were destroyed.
 3. 550 sold to other customers; no complaints.
 4. 500 sold to yet another hatchery; 100 sold to customer who claimed 40% loss; 400 sent to another farm; lost 162 plus 54 blind in one eye; *Arizona paracolon* isolated.

The excellent records and co-operation of the California egg supplier permitted checking of the supply flocks No. 1, 7, 9, and 21 on May 15 (8 days after the second "problem hatch"). Five day-old poult hatched from each flock were submitted for pathological examination — no *Arizona paracolon* were isolated (7). Ten poult hatched from each flock were held for 3 weeks in battery brooders with only one death (accidental). Checks were made on the supply flocks No. 1, 7, 9, 21 and brooder houses containing poult from these flocks. No evidence contributing to mortality was found. Records of Jackson (7) showed no evidence of *Arizona paracolon* or *Salmonella* isolated from poult or adults from these flocks.

From the flocks common to both "problem" hatches, the egg supplier had shipped 14,900 eggs (No. 1-57000, No. 9-92,000) to many other hatcheries including ones in Saskatchewan and Ontario with no other reports of mortality. Seven other shipments to Hatchery No. 1 between January 17 and April

16 also include eggs from supply flocks No. 7 and 9, with no evidence of excessive mortality.

HISTORY HATCHERY II

The operator of Hatchery II reported no other complaints except for the one *Arizona paracolon* isolation made. He had imported eggs from Oregon for six years without trouble except that this year he did have a number of eggs "explode" in the incubator. History on this isolate indicated that of 155 started poults purchased, 32 died in two weeks. *Arizona paracolon* was isolated.

SYMPTOMS

The symptoms pieced together from histories of six infected farm flocks appeared similar for both poults and chicks involved. In baby birds, the picture indicated a sudden death preceded for an hour or two by shivering, huddling and anorexia. In birds of two to three weeks of age, diarrhoea, droopiness, closed eyes, twisted heads and evidence of blindness in some cases involving one or both eyes were noted up to two days prior to death. The heaviest mortality occurred up to four weeks of age. This varied from 10% in the affected chick flock up to 50% in the poult flocks.

POST-MORTEM FINDINGS

Necropsy revealed a varied picture depending upon the age of the birds. In cases where death appeared to be sudden, distention of the gall bladder appeared to be common and caseation of the caeca was noted in some similar to that found with paratyphoid infections. In one case there were tiny lung abscesses, similar to those found with pullorum infection. Blindness appeared in birds two weeks of age or older.

We had the opportunity to carefully examine the eye lesions. Each revealed what appeared to be a normal cornea but with a deep opacity of the lens as illustrated by Figure I.

Necropsy of blind birds revealed very few visceral abnormalities, but close examination of the internal structure of

affected eyes revealed the lenses to be normal but with a heavy yellowish-white cheesy exudate covering the retinae,

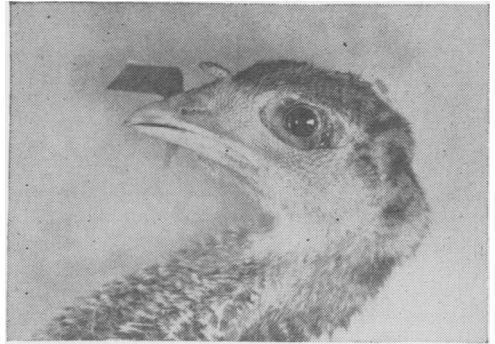


Fig. I

which often assumed a thickness of approximately 1/8 of an inch.

Histories indicated that birds blind only in one eye had a fairly high survival rate. We held one such bird in a battery brooder for two weeks. It did not die but the affected eye became quite desiccated as indicated by Figure II.



Fig. II

The affected eye failed to grow normally and the cornea was shrivelled as indicated by Figure III.

Figure IV shows the internal structure of the affected eye revealing that the caseous material covering the retina had also become desiccated to form a shell-like covering over the retina. It will be noted that the cornea and the lens are both clear in this case.

BACTERIOLOGY

Arizona paracolon was isolated di-

rectly from the caseous material covering the retina of affected eyes. The other isolations were made during the

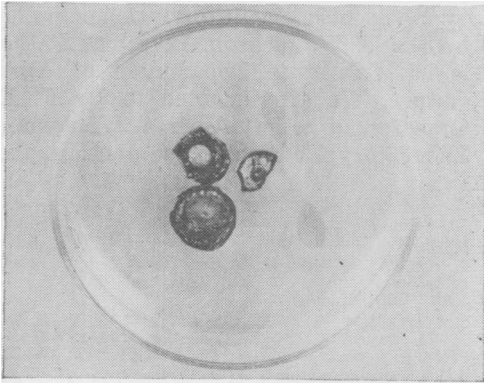


Fig. III

process of routine bacteriology. Cultures were made from the heart, liver, lung and gall bladder and unabsorbed yolk sac when present. In our hands the organism gave acid and gas in maltose,

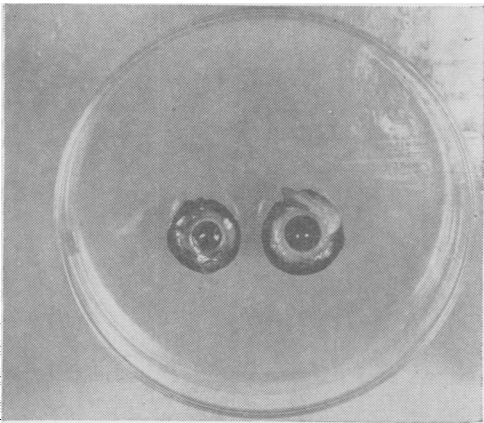


Fig. IV

dextrose and mannite, negative dulcitol and lactose, negative indol, positive H_2S , positive MR and negative VP. Some of the cultures gave partial agglutination with positive pullorum serum on rapid slide testing.

DISCUSSION

Considering the fact that five isolations of *Arizona paracolon* were made from groups of poultts originating from hatcheries setting eggs only from

Southern California or Oregon, circumstantial evidence does point to the possibility of this organism being introduced from the United States. Despite careful checking by our American colleagues who are directly working with the most suspicious flocks — this circumstantial evidence could not be proven.

Goetz et al (5) (6) who were working with *Arizona paracolon* typed Ar 7: 1, 7, 8. indicated that this organism may only be an opportunist depending upon some fault in management to precipitate infection. The above work on *Arizona paracolon* typed Ar 7: 1, 2, 6. appears to indicate that trouble could occur when the organism is present even under very good methods of poultry management. For example, several cases were involved from similar hatcheries, most likely involving variations in management including battery brooding by two experienced hatchery operators.

For the poultry diagnostician, *Arizona paracolon* can produce symptoms simulating other conditions. For example, on post-mortem examination some of the cases had caseous caeca and distended gall bladders much like those found with paratyphoid infections; at least one case had abscessation of the lungs similar to that found with pullorum. The picture of blindness too, could be confused with post-mortem change or eye infections with *Aspergillus fumigatus*. The routine bacteriology too can be puzzling in that, biochemical reactions can closely simulate paratyphoid Salmonella if MR and VP readings are not conducted routinely.

The several references to these organisms affecting humans (2, 4, 8) indicate their public health importance.

SUMMARY

1) Eight isolations of *Arizona paracolon* typed Ar 7: 1, 2, 6. from poultts, chicks and an adult hen are reported. The majority of the isolations were made from poultts hatched from eggs imported from Southern California and Oregon although information received from colleagues in the United States indi-

cated that no troubles with *Arizona paracolon* was prevalent in the supply flocks.

2) Flock histories indicated sudden deaths in baby birds with blindness and twisting of the head involving birds 2-4 weeks of age. Mortalities ranged from 10% to 50% in birds up to 4 weeks of age.

3) Necropsies revealed distention of the gall bladder, caseous caeca and abscesses on the lungs in baby birds with blindness in older birds. The blindness caused by caseous material covering the retina and from which *Arizona paracolon* was isolated is illustrated by photographs.

4) The public health significance of *Arizona paracolon* is mentioned.

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Abstracts

Gorham, J. R. and Farrell, K. Diseases and parasites of chinchillas.

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Article deals with common diseases of chinchillas, covering symptoms, lesions, transmission and treatment.

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J. Hyg. Camb. 54:153-171, 1956.

Four litters of new-born piglets with haemolytic disease were observed. In mild cases there were no clinical symp-

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Baker, R. F. Some complications incidental to swine production.

Vet. Med. 51:416-418, 1956.

Author gives a comprehensive review of all abnormal conditions and recommendations to relieve them. Starvation, cannibalism (cured through new, tranquillizing drugs) and affections common during nursing period are thoroughly analyzed.