Resistance to *Mycoplasma synoviae* is Bursal Dependent

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Bursectomizing small bursa line birds produced susceptibility to *Mycoplasma synoviae*. This suggested that *M. synoviae* is B cell dependent, but does not rule out a T cell effect.

Maturation of the immune system in the chicken is dependent on the bursa of Fabricius and the thymus (3, 12). The bursa controls development of humoral immunity (8, 11), and the thymus controls cell-mediated immunity (1). Two lines of chickens have been selected for the development of large bursa and small bursa (SB) (9). In a recent series of experiments, SB line of chicks surgically bursectomized (BSX) at hatch failed to produce hemagglutinins to an intra- venous injection of sheep red blood cells (K. S. Landreth, M.S. thesis, Mississippi State Univ., 1972). The apparent elimination of antibody-mediated immunity in BSX SB line chicks offers the investigator a model to assess the role of antibody in protecting the chicken against a variety of pathogens. We chose for our initial studies *Mycoplasma synoviae* which is involved in airsacculitis of chickens (10, 13). Bursectomy removal should markedly reduce or eliminate antibody to *M. synoviae*. Then, if resistance to *M. synoviae* is antibody mediated, extensive lesions of the air sacs should be noted in the BSX birds. Failure to observe an increase in air sac lesions would suggest that resistance to *M. synoviae* is thymic dependent.

Thirty-two SB line chicks were bursecto- mized at hatch (6), raised in battery brooders to 3 weeks of age, and then transferred, with an equal number of control SB line chicks, to modified Horsfall-Bauer type isolation cabinets (4). They were immediately exposed to an aerosol of a broth culture of *M. synoviae* 1331. The *M. synoviae* aerosols were generated by a standard nebulizer (Vaponefine no. 4656, USV Pharmaceutical Corp., New York) operating at 1.05 N/cm² air pressure for 5 min. Four hours later they were vaccinated with a combination of Newcastle disease and infectious bronchitis virus via drinking water. Serums were collected at 5, 6, and 7 weeks of age and preserved by freezing (-15°C). Serial twofold dilutions beginning with 1:10 were made on the same day for all sera, and the titer was determined by the hemagglutination-inhibition test (15). After the last bleeding, all birds were sacrificed and the air sac lesions were scored by the method of Dunlop et al. (5). Spleens were removed and stained with hematoxylin and eosin.

Surgical bursectomy at hatch delayed the appearance of antibody to *M. synoviae* and significantly depressed the antibody response to *M. synoviae* 4 weeks after the exposure to the pathogen (Table 1). The anterior and posterior air sacs were impacted with caseous exudate (4+ lesion score) in 21 of 32 BSX SB line birds (Table 1). These extreme lesions of the air sacs were observed in only three control SB birds. Spleens from the BSX SB line birds lacked germinal centers and were deficient in plasma cells (Fig. 1 and 2).

The significant reduction in antibody titer of the BSX SB chicks to *M. synoviae* accompanied by extreme lesioning of their air sacs suggest the necessity of antibody for protection against exposure to *M. synoviae* and the dependence of resistance to *M. synoviae* on the normal maturation of the bursa of Fabricius. The addition of Newcastle disease and infectious bronchitis vi- ruses to the water should not have influenced the resistance of the BSX birds since it is known that BSX will not interfere with immunity to Newcastle disease virus (2, 7).

Although resistance to *M. synoviae* in the chick is bursal dependent, we cannot rule out a role for the thymus. The thymus may supply helper cells (T cells) which interact with the antibody-producing cells (B cells) of the bursa.
### Table 1. Response of bursectomized small bursa line (SBL-BSX) and control small bursa line birds (SBL-C) to *M. synoviae*

<table>
<thead>
<tr>
<th>Time after infection</th>
<th>Hemagglutination inhibition test</th>
<th>Lesion score (no. of birds in each group)</th>
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<tbody>
<tr>
<td></td>
<td>No. positive total Titer&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4+ 3+ 2+ 1+ 0</td>
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<tr>
<td>2 weeks</td>
<td></td>
<td></td>
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<tr>
<td>SBL-BSX</td>
<td>0/32</td>
<td></td>
</tr>
<tr>
<td>SBL-C</td>
<td>4/32</td>
<td></td>
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<tr>
<td>3 weeks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBL-BSX</td>
<td>4/31</td>
<td></td>
</tr>
<tr>
<td>SBL-C</td>
<td>26/31</td>
<td></td>
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<tr>
<td>4 weeks</td>
<td></td>
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</tr>
<tr>
<td>SBL-BSX</td>
<td>27/28</td>
<td>2.39 ± 1.10</td>
</tr>
<tr>
<td>SBL-C</td>
<td>30/30</td>
<td>4.26 ± 0.87&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Dilutions 1:10, 20, 40, 80, 160 and 320 converted to numbers 1, 2, 3, 4, 5, and 6.

<sup>b</sup> *P* <.01.

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**Fig. 1.** No germinal centers and few plasma cells are present in this spleen from a 7-week-old small bursa line, bursectomized chicken. ×200.
or may supply cells which are capable of being sensitized to *M. synoviae* and of elaborating a cytotoxic substance for future protection.

**LITERATURE CITED**


