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Immunoglobulin (Ig)-containing plasma cells in the Harderian gland in broiler and native chickens of Bangladesh

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Abstract

The distribution and frequency of immunoglobulin (Ig)-containing plasma cells, their variations due to sex, and the mode of secretion of Ig cells into the duct system of the Harderian gland was investigated in broiler and native chickens of both sexes in Bangladesh. The Harderian gland is covered by a capsule, and the connective tissue septa divide the gland into numerous unequal-sized numerous lobes and lobules. The Ig-containing plasma cells were located in the interstitial space, interacinar space, apical part of the lobule, and lumina of the lobules of the Harderian gland in both broiler and native chickens. The population of these Ig-containing plasma cells varied in between broiler and native chickens, and also between male and female broiler and native chickens. In the broiler, the number of IgM-containing plasma cells was higher; in contrast, in the native chickens, the population of IgA-containing plasma cells was larger. In the broiler, there were more IgA- and IgG-containing plasma cells in the male; in contrast, there were more IgM-containing plasma cells in female. In native chickens the frequency of IgA-containing plasma cells was greater in the female than male. When the data for broiler and native birds were compared, it was found that there were significantly more IgA- and IgG-containing plasma cells in the native male and female chickens than in the broiler males and females. The secretory Igs were located in the lumina of acini and the duct system of the Harderian gland. In the present study Ig-containing plasma cells were observed to be released in the lumina of the lobules of Harderian gland by the breakdown of acinar tissues in broilers, and by holocrine mode of secretion in the native chicken. These results suggested that the Harderian gland, even though it is not a lymphoid organ as a whole, but acts as an immunopotent organ in chickens, and that the gland in native chicken contains more Ig-containing plasma cells due to their scavenging.

Keywords: Harderian gland; Immunoglobulin-containing plasma cells; Broiler; Native chickens; Mode of secretion

1. Introduction

The avian Harderian gland is a peripheral lymphoid organ located at the variable aspect of the orbit of the chicken, and plays an important role in immunological defense of the paraocular region in addition to its primary functions of producing lacrimal fluid, photo protection and acting as a source of pheromones and thermoregulatory lipids, as well as a site of osmoregulation (Payne, 1994; Shirama et al., 1996; Ashok et al., 2000).

The histology and cytochemistry of this gland have been thoroughly described by many authors for a variety of mammals and birds (Burns, 1975; Payne, 1994; Altunay and Kozlu, 2003). Harderian glands of these mammals and birds produces or participates in the transmission of three classes of immunoglobulins (IgA, IgG, and IgM) (Baba et al., 1990; Korbel et al., 1997; Ohshima and Hiramatsu, 2002), and present macrophages, lymphocytes, granulocytes in the subepithelial layer and lumina of the lobules for the local immunity of the eye orbit (Baba et al., 1990). It is also

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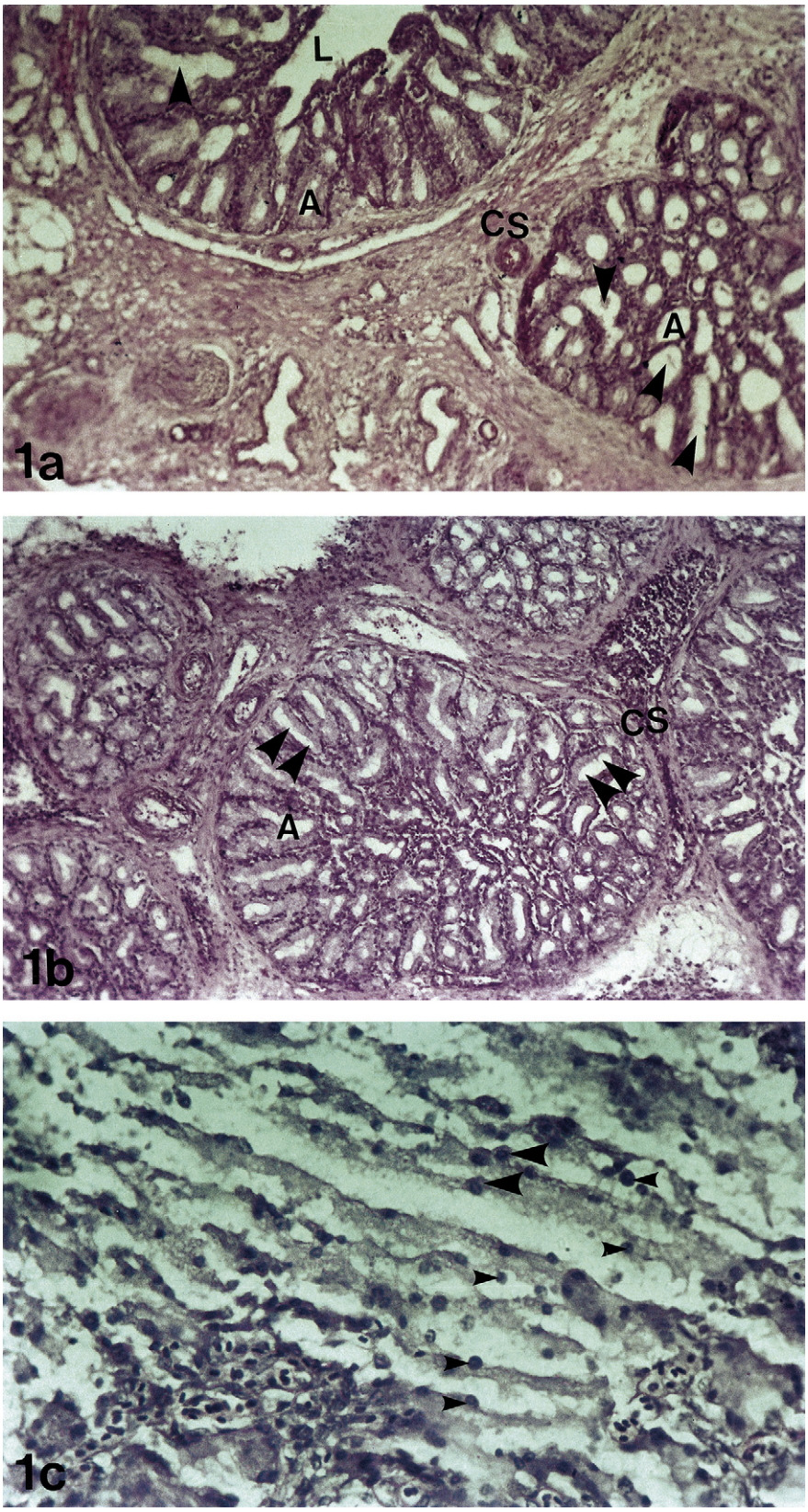

Fig. 1. (a and b) Histological sections of Harderian glands of broiler (a) and native chickens (b and c) showing lumen of the lobule (L), connective tissue septa (CS), acini (A) and lumen of the acini in broiler (single arrowheads) and in the native chickens (double arrowheads). The lumina of the acini are spherical in the broiler; however, some of them are elongated. In the native chickens, the acini are elongated and narrower. H & E stain × 25. (c) The lobular lumen of a native chicken, which principally consists of lymphocytes (small arrowheads) and plasma cells (large arrowheads). H & E stain × 100.