THE CARPAL GLAND OF PYGMY HOG (*PORCULA SALVANIA)*: FUNCTIONAL ROLE

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ABSTRACT

The carpal gland of pygmy hog is a glandular complex, located in the subcutaneous layer at the caudomedial tract of the carpus region. To investigate its ethological significance, morpho-functional evaluations were conducted on total 4 samples collected from dead adult pygmy hogs maintained in captivity at Pygmy Hog Conservation Programme (Research and Breeding Centre), Assam, India. All the samples/glands were macroscopically and histologically examined to determine glandular structures. Observed findings including behavioural changes suggests that this gland is similar to sweat or sudoriferous gland and play a significant role in reproduction.

***Key words**:* Pygmy hog, carpal gland, histology

Introduction

Three major cutaneous glands recognized in mammals are sebaceous, eccrine and apocrine glands. The eccrine and apocrine is commonly referred to as sweat or sudoriferous gland, though their secretions do not necessarily function in evaporative cooling (Blackburn, 1991).

Apocrine gland development has been shown to be hormone dependent and in many mammals this gland undergoes seasonal changes in activity (Johnson, 1977). In some mammals apocrine glands are involved in chemical communication via their viscid and odorous secretions (Montagna and Parakkal, 1974). In many mammals, such as ungulates, glands associated with endocrine activity aggregate in large cutaneous glandular complexes that produce odorous secretions which are involved in intraspecific communication (Gosling, 1985).

Histological, ultrastructural and histochemical studies have been performed on the functional role of this gland in wild and domestic swine (Gargiulo *et al*., 1989; Farnesi *et al*., 1999 and Bacchetta *et al.*, 2006). Pygmy hog (*Porcula salvania*) is a Critically Endangered (IUCN, 2012), monotypic genus that belongs to Schedule-I category of Indian Wildlife (The Wild Life (Protection) Act 1972, Amended upto1991, India). Their precise natural habitat has been described earlier (Oliver, 1980). Owing to rarity of the species, various aspects of this suid have not been explored. The existence of carpal gland, its structural and functional role has not been previously reported in *P. salvania*. The aim of the study is to contribute to the knowledge on the existence, structural and functional aspects of the carpal gland in pygmy hog on the basis of observed behavioural changes in captivity, gross and histological structure.

Materials and Methods

A total four glands from four adult pygmy hog were collected after death which was maintained at the Pygmy Hog Conservation and Breeding Programme facility, Basistha, Guwahati-29, Assam, India. The glands were collected from the right forelimbs of four different adult male pygmy hogs by cutting the carpal gland immediately after death. Glands were fixed in 10% formaldehyde solution. They were cut in to three portions i.e., proximal, intermediate and distal. Subsequently, representative samples were processed according to the routine histological technique (Luna, 1968). The pH of the gland secretion was estimated from 15 adult animals *in vivo* during breeding season.

Results and Discussion

In *P. salvania*, the carpal gland is a glandular complex, located in the subcutaneous layer at the caudomedial tract of the carpus (Fig. 1) in both sexes which was similar to domestic pigs (Filotto,1950 and Gargiulo *et al.*, 1989) and wild boars (Hraste and Stojkovic´, 1995 and Farnesi *et al*., 1999), hitherto not recorded earlier. This gland consists of a large group of exocrine glands with lobular organization and a duct system which collects the secretions in large pores clearly visible macroscopically (Fig. 2). It was also observed that the gland becomes enlarged during breeding season. The nature of secretion of gland was alkaline (pH 8 to 9) in live animals. Microscopically, the carpal gland was an exocrine glandular complex organized in tubulo-alveolar lobes and lobules. The lobules of the carpal gland were separated by connective tissue and smooth muscle fibers and consisted of several tubulo-alveolar glandular secretory units with mono-layered epithelium and myoepithelial cells (Fig. 3). The skin covering the carpal gland consisted of thick epidermis with a keratinized layer and a papillary dermis with a particularly abundant collagenous component where the single large cutaneous pore of carpal gland opened to excrete glandular secretory products (Fig. 4).The secretory product flows into several ducts to be released through large cutaneous pores, clearly visible on the skin surface (Fig. 2). In the present study it was found that the method of secretion is apocrine whose secretory material filled the lumen of the tubules and merocrine in some places with distinctly visible dark and clear cell in H& E (Fig. 5) and in PAS (Fig. 6) staining.

The carpal gland is a compound tubulo-alveolar gland located in the subcutaneous layer, histologically similar to sweat glands. Results from histological findings agree with previous

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Fig.1: Carpal gland of pigmy hog located in subcutaneous layer in caudomedial tract of carpus (Dorsal view)

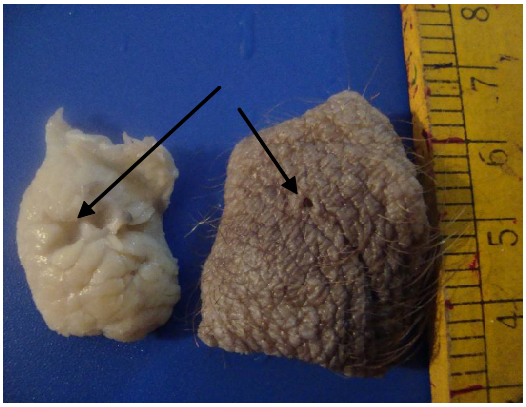

Fig. 2: Duct system of carpal gland which collects macroscopically (arrow) the secretion in large pores clearly visible

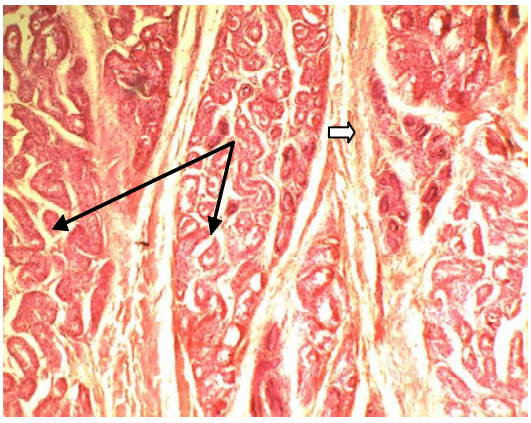

Fig. 3: Carpal gland consisting of several tubulo-alveolar secretory units (left arrows) separated by connective tissue (right arrow)

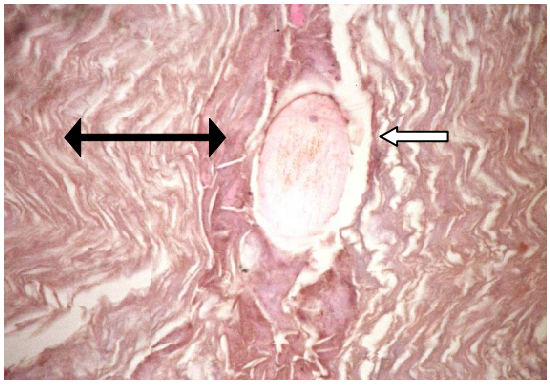

Fig.4: Large cutaneous pore of carpal gland through which glandular secretory products are excreted (Left arrow) and thick keratinised epidermis(double arrow)

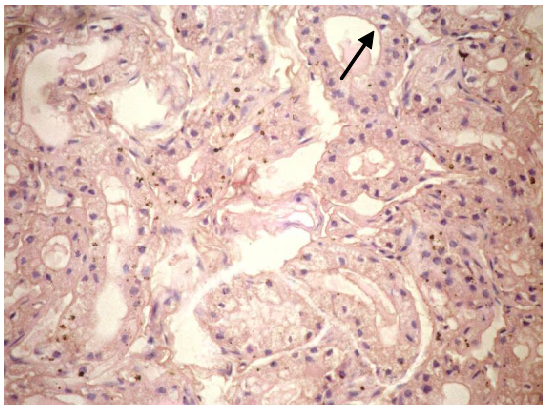

Fig. 5: Secretory tubules of carpal gland containing secretory products (➔) in H&E-stained secretory units

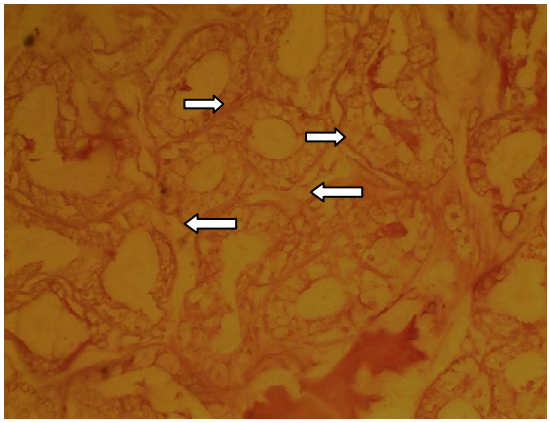

Fig. 6: Secretory tubules of carpel gland containing dark (⇦) and clear cells (⇨) in PAS staining

studies made on the histology of this gland in domestic pigs (Filotto,1950 and Gargiulo *et al*., 1989) and wild boars (Hraste and Stojkovic, 1995 and Farnesi *et al*., 1999). Our observations on the functional role of the carpal gland in pygmy hog are reliable with mating behaviour. In males, rubbing the distal portion of their forelimbs on the ground extensively, smelling the carpal region of the females was observed during the mating season. This agrees with the findings of Massei and Genov (2006) and Marion (1982) in wild swine. There were also frequent pressing male's head in thoracic region of both side and smelling in the carpal region of the female**.** The method of secretion is apocrine and merocrine in nature. Similar findings were also recorded in pig by earlier workers (Farnesi *et al*., 1999 and Bacchetta *et al.,* 2006). These preliminary findings suggest that the carpal gland/organ is histologically similar to sweat glands in pygmy hog and contribute to reproductive behaviour in adults.

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