Seasonal changes in the structure and secretory activity of the androgenic gland of *Travancoriana schirnerae*

**Research Article**

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**Abstract:** This study investigated the seasonal variation in the structure and secretory activity of the androgenic gland (AG) in the freshwater crab: *Travancoriana schirnerae*. The androgenic gland is an elongate structure, attached to one side on the wall of the ejaculatory duct. Histological studies showed the presence of three cell types, which differ in size, shape of nuclei, and presence or absence of secretory vesicles. Type I cells are small with large nuclei whereas type II cells are large with small nuclei. Type III cells are intermediate in size and exhibited streak-like nuclei and transparent cytoplasm. Seasonal changes were discerned in the morphology, histology and secretory activity of the gland. March-June appeared to be the active season with type II cells containing secretory vesicles. The mode of release of secretion found to be holocrine. The secretory activity almost completed by July-August (the mating season) with vacuolization of type II cells. The gland remained inactive from September-December with abundance of vacuoles, scattered pycnotic nuclei, indistinct cell membranes and total cellular degeneration. January-February was the revival period with type I cell proliferation. The present study revealed that the secretory activity of the gland is in tune with the male reproductive cycle.

**Keywords:** Androgenic gland • Freshwater crab • Posterior vas deferens • Secretory vesicles • Seasonal variation • Travancoriana schirnerae • Vacuoles

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1. Introduction

Unlike other arthropods, sex differentiation in male crustaceans is not controlled by the gonad, but by a unique gland—the androgenic gland (AG) [1-7]. It is the only endocrine gland in crustaceans, which is exclusively linked to sexual functions [8-10]. The androgenic gland was first described in the blue crab *Callinectes sapidus* by Cronin [11]. Charniaux-Cotton [1] carried out the first experimental study that elucidated the role of androgenic gland in amphipod, *Orchestia gammarellus*. Since then, this gland has been described in several other malacostracans, including the isopods and decapods [12-18]. However, the androgenic gland has been identified in a variety of crustaceans, its location and morphology vary in different species. The androgenic gland of the freshwater prawn *Macrobrachium lamerri* is located close to the seminal vesicle along the wall of the vas deferens [19]. Li and Xiang [20] reported the location and light microscopic structure of the androgenic gland of the shrimp *Penaeus chinensis*. The androgenic gland structure of the brown mud crab *Scylla serrata* was investigated by Rangneker et al. [21]. The location, morphology, microstructure and ultrastructure of the androgenic gland were studied in the swimming crab *Portunus trituberculatus* [22]. Seasonal morphology and histology of androgenic gland in the crayfish, *Orconectes nais* have been described by Carpenter and De Roos [23].

The androgenic hormone (AH) secreted by the androgenic gland plays a key role in the regulation of male sexual differentiation in crustaceans [9,12,24-29]. King [30] and Sun et al. [31] reported a proteinaceous or polypeptidic nature for androgenic hormone in decapods. Berreur-Bonnenfant et al. [32] extracted a lipoidal substance with a molecular weight of 200-250 daltons from the androgenic gland of the crab *Carcinus maenas*. The ultrastructural studies on the androgenic gland of the crayfish *Procambarus clarkii* revealed a peptidergic-proteinaeous nature for the androgenic hormone [16,33]. Sagi and Khalaila [27] isolated, purified and characterized the androgenic hormone.

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