

# Ultrastructural organization of parathyroid gland of freshwater turtle *Lissemys punctata granulosa*

**Anita S. Jadhav**

Department of Zoology, ICLES' M.J. College, Vashi, Navi Mumbai 400 703,  
Maharashtra, India

## Summary

Parathyroid gland of the fresh-water turtle *Lissemys punctata granulosa* was examined during March to May. The gland is composed of chief cells and rare oxyphil cells. The chief cells are arranged as solid cords and differentiated into dark and light cells. The cytoplasm of oxyphil cells is packed with mitochondria, which obscure the other organelles. The chief cells possess numerous ribosomes, mitochondria, Golgi complex and microfilaments.

**Key words** : Fresh-water turtle, parathyroid gland, chief cell, oxyphil cell, ultrastructure

## Introduction

A review of the literature reveals that studies on the parathyroid glands of poikilothermic vertebrates are fragmentary. Light microscopic studies reveal all reptilian parathyroids to possess similar structure, consisting of cell cords and follicles (Thompson, 1910; Clark, 1965, 1970; Dubewar and Suryawanshi, 1978; Clark and Khairallah, 1972; Akbarsha, 1983, 1985a, b; Anita and Padgaonkar, 2009). Since there are only very few reports pertaining to the ultrastructure of the parathyroid glands of reptiles (Clark 1970), the present study was undertaken to elucidate the ultrastructural organization of the parathyroid glands of the freshwater turtle *Lissemys punctata granulosa*.

## Materials and Methods

The animals were collected from the suburbs of Mumbai (India). Five adult male animals weighing 400 to 500 g were dissected under sodium pentobarbital anesthesia to expose the parathyroid gland. The gland was separated from the surrounding tissue and fixed in 3% glutaraldehyde and 1% osmium tetroxide. Ultrathin sections were cut in an ultramicrotome (*LKB-Bromma*

Stockholm, Sweden) and examined in a Joel (Japan) 100S transmission electron microscope.

## Observations

The parathyroid gland of *Lissemys punctata granulosa* consists of predominantly chief cells and a few occasional oxyphil cells. The chief cells are organized as dense cords. There are two variants of chief cells, light and dark (Fig. 1). The light chief cells possess spherical nucleus with lightly heterochromatic nucleus and a distinct nucleolus. The clear cytoplasm has abundant RER elements, a few mitochondria, prominent Golgi apparatus and a few secretory vesicles (Fig. 1). The dark chief cells possess a densely heterochromatic nucleus with a prominent nucleolus. The electron-dense cytoplasm has abundant mitochondria, well-developed Golgi apparatus, dilated cisternae of rough endoplasmic reticulum, microfilaments and many secretory vesicles of different densities (Figs. 1-4). The oxyphil cells are elongated and spindle-shaped, with densely heterochromatic nucleus and highly dense cytoplasm. Mitochondria are abundant but secretory vesicles were not to be seen (Fig.1).

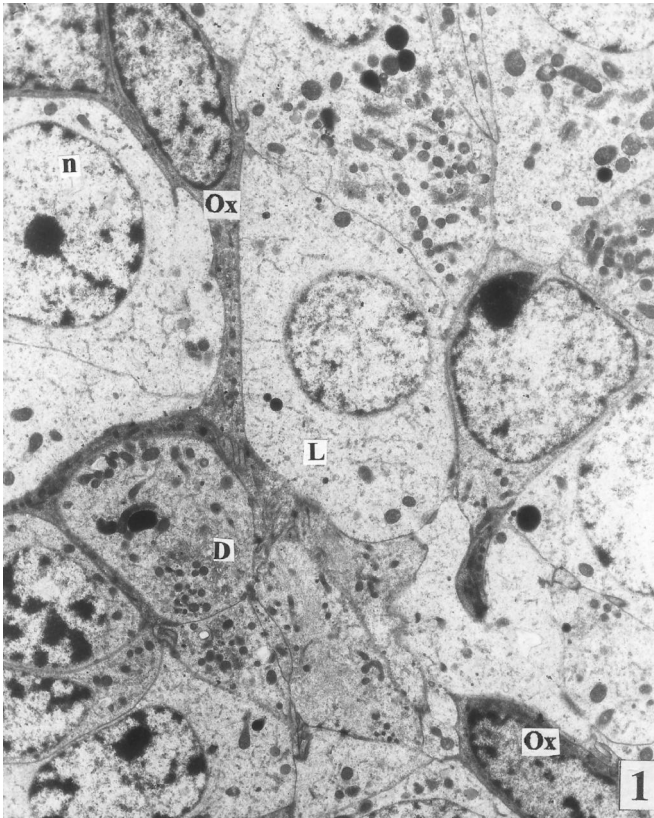


Fig. 1. Transmission electron micrograph of epithelial cells of the parathyroid gland of *Lissemys punctata granulosa*, showing dark (D) and light (L) chief cells cell and oxyphil cells (Ox). x2500.

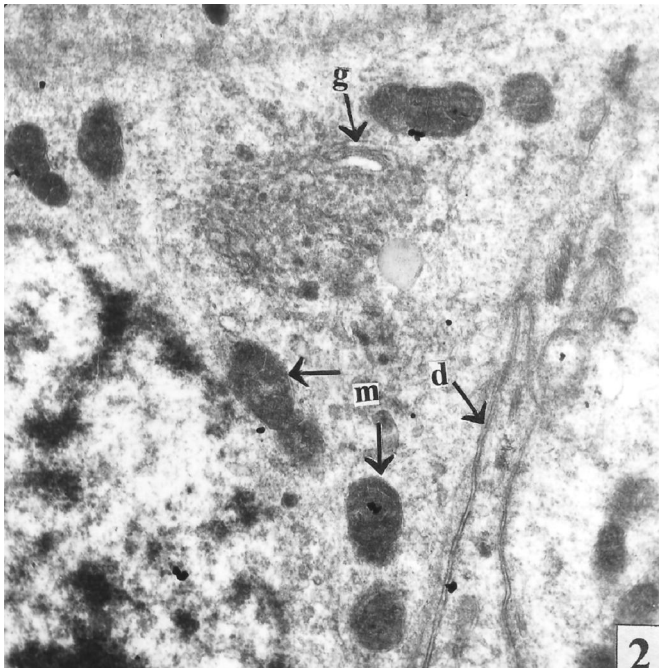


Fig. 2. A dark chief cell, showing mitochondria (m), desmosomes (d) and Golgi region (g). x20,000.

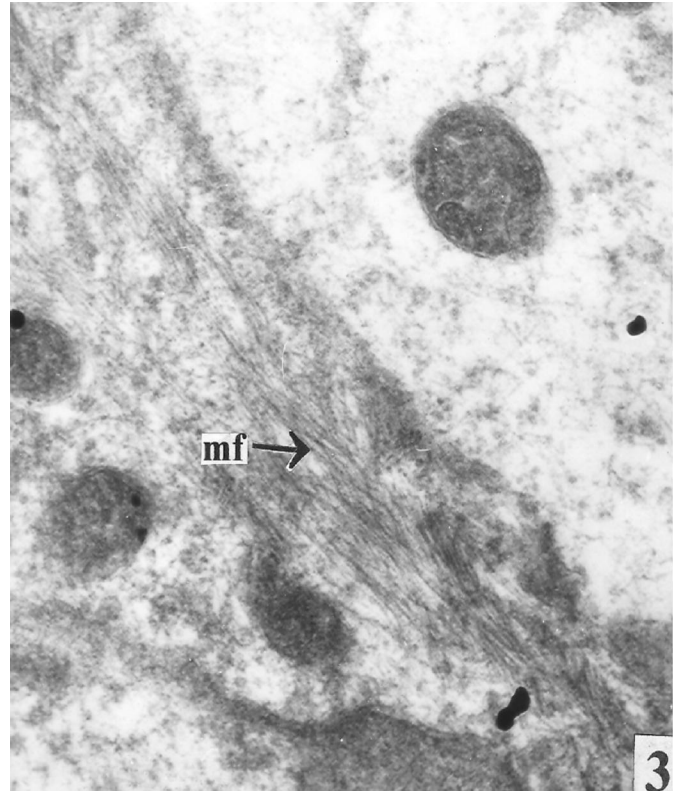


Fig. 3. Portion of a dark cell showing microfilaments (mf). x40,000.

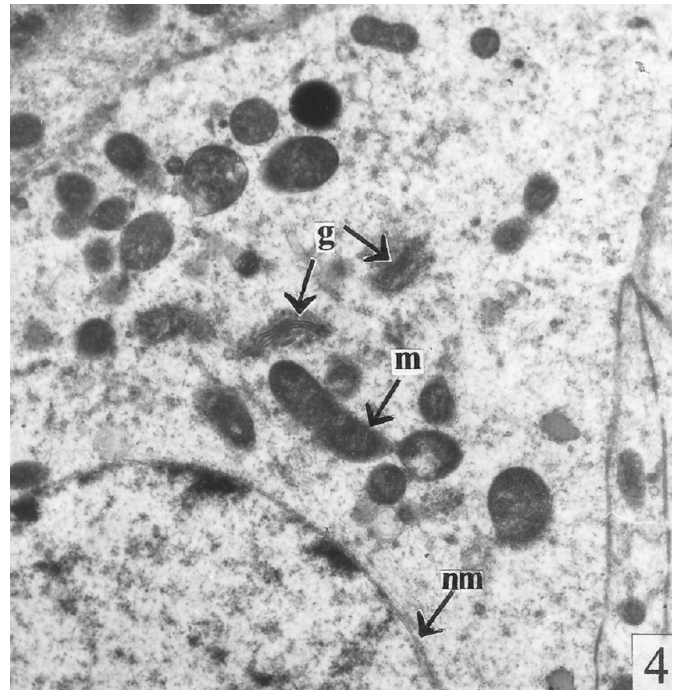


Fig. 4. Portion of a dark chief cell showing nuclear envelope (nm), mitochondria (m) and Golgi cisternae (g). x12,000

## Discussion

In the snake *Thamnophis sirtalis* only chief cells, all with same electron density, were reported by Roth and Schiller (1976). Chief cells, all with the same electron density, and stellate cells, with suggested supportive function, were observed in the lizard *Iguana iguana* (Anderson and Capen, 1972; Clark et al., 1986). But the observation in this study in the turtle (*Lissemys punctata granulosa*), the dark and light variants of chief cell, is in agreement with the observation in the turtles *Pseudemys scripta* and *Chrysemys picta* and the tortoise *Clemmys japonica* (Clark 1970; Clark and Khairallah, 1972; Chin, 1974; Pandey, 1991). The presence of rare oxyphil cells in turtle

*Lissemys punctata granulosa* is in accordance with that reported in the parathyroid glands of *Pseudemys scripta* and *Chrysemys picta* (Clark and Khairallah, 1972; Pandey, 1991), although Grandi (1982) did not find this cell type of in *Pseudemys scripta* parathyroid. But microfilaments in cytoplasm of dark chief cell as observed in this study in *Lissemys punctata granulosa* have been reported earlier in *Pseudemys scripta* by Grandi (1982). Thus, the ultrastructural organization of chief cells, containing organelles such as prominent Golgi cisternae, mitochondria and microfilaments in the turtle *Lissemys punctata granulosa* parathyroid is almost similar in many respects to that of other chelonians.

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