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REGIONAL DIFFERENCES IN THE HISTOCHEMICAL SITE AND PATTERN OF DISTRIBUTION OF ACID PHOSPHATASE IN THE ADRENAL GLAND OF *PTEROPUS GIGANTEUS GIGANTEUS* BRUNNICH (MEGACHIROPTERA : MAMMALIA)

S. K. DAVID AND S. B. LALL
Department of Zoology, University of Udaipur, Udaipur, India

ABSTRACT

Pronounced differences were observed in the histochemical site and pattern of distribution of acid phosphatase (AcPase) in the cortical zones, as well as between cortex and medulla of the adrenal gland of *Pteropus giganteus giganteus*. Intense enzyme activity was noticed in the zona glomerulosa and reticularis but the fasciculatis cells displayed moderate AcPase activity. Medullary cells and blood vessels displayed intense enzyme activity. These differences in the site and pattern of distribution of AcPase have been discussed in relation to lysosomal activity gradient, kinetics of hydrolysis for releasing precursors and sustained, albeit variable, transport of material across the cell membrane.

INTRODUCTION

MAMMALIAN adrenal gland barring that of *Tachyglossus aculeatus*[1] is distinctly zonated into cortex and medulla. The cortex is differentiated into an outer glomerulosa, an intermediate fasciculata and a small inner reticularis. These differ not only in their cytological and biochemical characteristics but also in the nature of hormones elaborated. The medulla is embryologically of different origin; and secretes catecholamines which act as 'stress hormones'[1–3].

Histoenzymology of the chiropteran adrenal gland has been described for a few species[4–8]. The present report aims to deal with the regional differences in the histochemical site and pattern of distribution of a key lysosomal "marker" enzyme-acid phosphatase—in the adrenal cortical zones and medulla of *Pteropus giganteus giganteus*.

MATERIAL AND METHODS

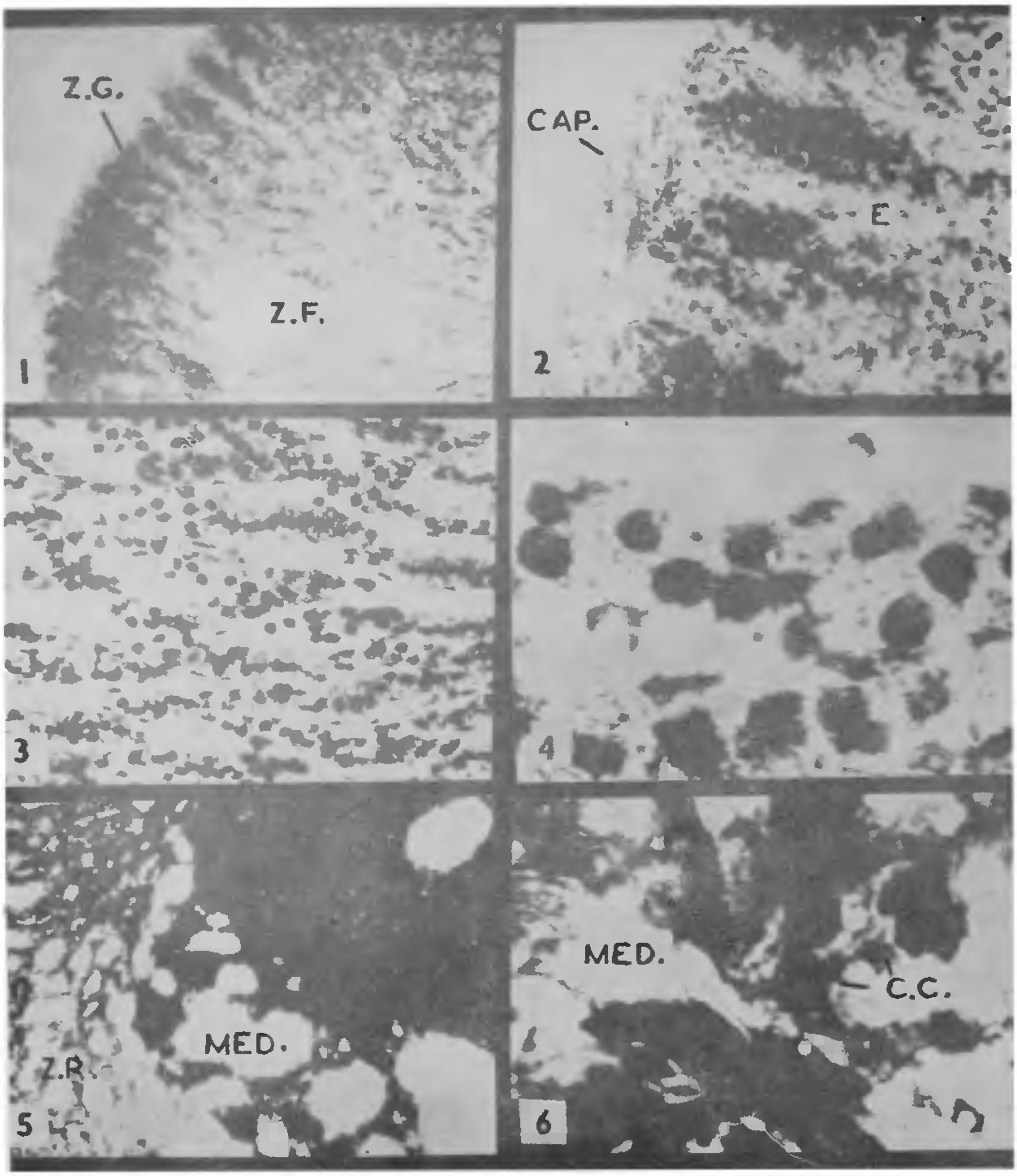
Males of *P. g. giganteus* were netted shot from their roosting sites. Surgical procedures for recovery of adrenal gland were as described earlier. Tissues were fixed in chilled neutral formalin (10% at 4° C) for 6–8 hr. Frozen sections (10 μM) were incubated in the freshly prepared substrate according to Gomori's lead method[9] for 30–40 min (at 37° C). Incubated sections were washed in distilled water and treated with yellow ammonium sulphide for 1-2 min. Sections were washed in water and mounted in glycerine

jelly. Controls were incubated similarly but in a substrate deficient medium. Sodium fluoride was used as an inhibitor.

AcPase activity in the cortical zones and medullary tissues was visually scored as described earlier.

Results and Discussion

The adrenal gland of *P. g giganteus* is divisible into a zonated outer cortex consisting of glomerulosa, fasciculata, and reticularis, and inner medulla which



Figs. 1–6. Regional differences in the AcPase profile of the adrenal gland of *P. g. giganteus*. Figs. 1–4. AcPase activity in the zona glomerulosa (Z.G.) and fasciculata (Z.F.). Note the differential enzyme activity (E) in the cortical zones. Slight reaction can be seen in the capsule (CAP) (× 40, × 100, × 100, × 400). Figs. 5–6. AcPase activity in the reticularis (Z.R.), and medullary cells (MED) arranged in a cord-like fashion (C.C.). Vascular elements can also be seen manifesting intense enzyme activity (× 40, × 400).

is well developed. Glomerulosa cells are large with round nuclei. The zona fasciculata has a relatively wider disposition and the reticularis cells present a polyhedral appearance. The cells are radially arranged and have central nuclei. The cells of this region are small and the width of this cortical segment is the least of all. The medullary cells are large and are arranged in a cord-like fashion. Vascular supply in this region is profuse.

Zonal differences were noticed in the histochemical site and pattern of distribution of AcPase in the cortex. Maximal enzyme activity was discerned in the glomerulosa and least in the fasciculata. Reticularis cells exhibited intense AcPase activity. Nucleus and nucleolus dispalyed positive enzyme activity (Figs. 1–4).

Medullary cells manifested the most intense AcPase activitiy. This was even stronger than the cortical glomerulosa and reticularis. Vascular elements permeating the substance of the adrenal medulla also displayed intense enzyme activity (Figs. 5–6).

The adrenal gland of *P. g. giganteus* represents a heterogeneous assemblage of cells. Hydrolytic enzymes form only a small portion of the functionally active ingredients of the adrenal, useful in the follow-up of physiological functions. AcPase is essentially a lysosomal enzyme with 4–5 isoenzyme units[10]. Zonal differences in the AcPase profile in the adrenal cortex and medulla may signify the : (i) presence of lysosomal activity gradient, (ii) differential kinetics with which precursors are released in the various histological constituents of the gland commensurate with their cellular dynamics, and (iii) sustained, albeit variable, transport of material across the cell membrane. Such relationships may also be valid for adrenal medulla.

Our results are at variance with the only study of AcPase pattern in *Rhinopoma kinneari* and *Megaderma lyra lyra*, in which the activity of this enzyme in the medulla was confined to the cell nuclei. Further, the cortical zones of these bats displayed a uniformly intense AcPase activity[11]. These differences probably point towards a species-specific enzymological pattern as substantiated by the results of earlier studies[7–8].

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