CONCLUSIONS

On the basis of the present findings of the present Ph. D. dissertation, it can be concluded that AA-NAT activity in the photoreceptive pineal of *Clarias gariepinus* can be activated separately by both adrenergic and cholinergic agonists via α₂, β-adrenergic and M1 cholinergic receptors, respectively. However, simultaneous activations of both adrenergic and cholinergic receptors do not potentiate but counteract the stimulatory action of each other on the enzyme activity, and hence seem to follow different signal transduction pathways.

Findings of the present study also indicated that sulphydryl G-proteins, PTX-sensitive G-proteins (G₁/G₄) and stimulatory G-proteins are involved in the adrenergic and cholinergic regulation of AA-NAT activity and, hence melatonin synthesis in the photoreceptive fish pineal organ. While, sulphydryl G-proteins seem to be a pre-requisite for adrenergic stimulation of AA-NAT activity, stimulatory G-proteins seems to be more important for cholinergic stimulation of fish pineal AA-NAT activity. This might be the first report of its kind establishing the nature of G-proteins involved in the adrenergic and cholinergic stimulation of AA-NAT activity in the photoreceptive pineal of a fish species.

Further, Ca²⁺, PKC, PDE and Ser/Thr phosphatases also play an important role in the adrenergic regulation of AA-NAT activity in the fish pineal organ *in vitro*. Ca²⁺ seems to play an important role in the adrenergic stimulation of AA-NAT activity in the fish pineal. Influx of calcium via the L-type voltage sensitive calcium channels is
essentials for basal as well as for NE-induced AA-NAT activity in the fish pineal organ. Ca\(^{2+}\)-dependent Protein kinase (PKC) seems to be involved in maintaining basal activity of AA-NAT, but it does not seem to play any role in the adrenergic stimulation of AA-NAT activity. PDE also play a crucial role in regulation of AA-NAT activity in the fish pineal. Though Ser/Thr phosphatase 2B do not seem to play any role in the adrenergic stimulation of AA-NAT activity in the fish pineal organ, Ser/Thr phosphatase 1 and 2A are essential for normal as well as for adrenergic stimulation of AA-NAT activity in the fish pineal organ.

To the best of our knowledge, these findings present for the first time a complete picture of adrenergic and cholinergic regulation of arylalkylamine-N-acetyltransferase (AA-NAT) activity in the photoreceptive pineal organ of a fish species.