

Melatonin ameliorates steroid induced suppression of lung associated immunity: Expression of melatonin (Mel_{1a}, Mel_{1b}), glucocorticoid (GR) and androgen (AR) receptors in lung of a tropical bird, *Perdicula asiatica*

Rajesh Kumar Kharwar^{1*} and Chandana Haldar²

¹ Department of Zoology, Kutir Post Graduate College, Chakkey, Jaunpur-222 146, India

² Pineal Research Laboratory, Department of Zoology, Banaras Hindu University, Varanasi-221 005, India

* Corresponding author Email: rkkharwar1982@gmail.com

The respiratory system of avian species differs anatomically and morphologically from that of mammals and similarly the lung-associated immune system (LAIS). A well-organized LAIS comprising bronchus associated lymphoid tissue (BALT) nodules, non-BALT nodules, free lymphocytes and macrophages has been noted in lung of *Perdicula asiatica*. BALT nodules (located at the junctions of the primary and secondary bronchi) and non-BALT nodules both of which are aggregates of lymphocyte (T cells and B cells), play a crucial role in the development of local immune response to inhaled antigens. Non-BALT nodules found adjacent to blood vessels in *P. asiatica* suggest an opportunity for lymphocytes and humoral products to enter directly into the vascular system, which might conceivably provide extra local protection for seasonally occurring stress. The role of circulatory steroid hormone (adrenal and gonadal) along with melatonin in regulation of lung associated immune system (LAIS) has never been explored in any birds so far. This could be interesting because steroid hormones are immunosuppressive while melatonin is immunostimulatory in nature. In our present study, we report the function of melatonin and steroid hormones (testosterone and dexamethasone) in regulation of lung associated and general immunity of a tropical bird *Perdicula asiatica* during reproductively inactive phase when internal melatonin level was high while glucocorticoid and testosterone level was low. Dexamethasone (30µg/100g B.wt./day) and testosterone (1 mg/100g B.wt./day) injection reduced the immune status in terms of total leukocyte count (TLC), lymphocyte count (LC), percent stimulation ratio of isolated lung lymphocytes, size of bronchus associated lymphoid tissue (BALT) and non-BALT nodules, upregulated expression of glucocorticoid (GR) and androgen (AR) receptors whereas downregulated expression of melatonin receptor types Mel_{1a} and Mel_{1b}. Melatonin (25µg/100g B.wt./day) administration increased the above mentioned immune parameters and upregulated expression of melatonin receptor types Mel_{1a} and Mel_{1b} while downregulated GR and AR receptors respectively. Our results clearly suggest that a trade-off relationship between melatonin and steroid hormone exist to regulate lung associated immunity and reproduction via their receptors. Such a relationship is of high adaptive value for a wild bird for energy balance between two mega events; reproduction and immunity.

Is facultative paedomorphosis driving trophic niche differentiation in the Alpine newt?

Benjamin Lejeune^{1,2*}, Gilles Lepoint², Nicolas Sturaro² and Mathieu Denoël¹

¹ Laboratory of Fish and Amphibian Ethology, Behavioural Biology Unit, Department of Biology, Ecology and Evolution, University of Liège, 22 Quai van Beneden, 4020 Liège, Belgium, ² Laboratory of Oceanology, Department of Biology, Ecology and Evolution, University of Liège, 13 allée du 6 août, 4000 Liège, Belgium

* Corresponding author. E-mail: Benjamin.Lejeune@doct.ulg.ac.be, Mathieu.Denoel@ulg.ac.be

Facultative paedomorphosis is a developmental process allowing individuals in a population to retain juvenile traits at the adult stage. This process has important adaptive and evolutionary implications, as it allows for phenotypic variation to occur without the need of extensive genetic modifications. In newts, paedomorphs retain gills at the adult stage, allowing for a fully aquatic life, while metamorphs undergo complete metamorphosis, allowing for a terrestrial life-stage. This polyphenism involves important morphological differences that affect feeding mechanisms and microhabitat use during the aquatic life stage of newts. Facultative paedomorphosis has been proposed to promote resource partitioning between morphs and thus lessen intraspecific competition, accounting for its maintenance in populations with high resource heterogeneity that are devoid of interspecific competitors. However, previous studies on trophic partitioning in paedomorphic newt populations only involved stomach content analyses. We explored niche partitioning between paedomorphic and metamorphic newts of the species *Ichthyosaura alpestris* during their aquatic life-stage in an Alpine lake, using both stable isotope and gut content techniques. Our results show a particular pattern of niche partitioning between morphotypes and sexes that could be explained by an interaction between feeding activity, differences in microhabitat use and possibly sexual activity of the males. While paedomorphic females mainly feed on branchiopods (Cladocera and Anostraca) in the water column in deep parts of the lake, both paedomorphic males and metamorphs rely more on littoral and benthic taxa on the shore. As a consequence, the paedomorphic males' trophic niche shows slightly more overlap with metamorphs than with the paedomorphic females, while paedomorphic females show more overlap with overwintering juveniles than with the other adult newts. Our results support the adaptive role of facultative paedomorphosis in newts' resource partitioning in a deep Alpine lake.



ZOOLOGY 2015

22nd Benelux Congress of Zoology

Amsterdam, the Netherlands

8 & 9 October 2015

Initiated by the:

Royal Dutch Zoological Society (KNDV) - <http://kndv.science.ru.nl>

Royal Belgian Zoological Society (RBZS) - <http://rbzs.myspecies.info>