Gross and Microscopic Anatomy of the Stomach of the Australian Rainbow Lorikeet (Trichoglossus haematodus moluccanus) with reference to Pollen Digestion

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This poster presents an anatomic description of the stomach of the rainbow lorikeet as a reference for ongoing research into the mechanisms of pollen digestion in birds.





Internally, the junction between the caudal oesophagus and proventriculus was obvious.

There was a short segment of multilobular mucous glands at the distal extremity of the caudal oesophagus.



Magnified view of mucous gland segment above oesophagoproventriculus junction.







The proventriculus was an elongated spindle shaped structure.



The surface mucosa consisted of 4 raised patches of gastric glands that formed 4 longitudinal channels.







The deeper layer contained compound tubulo-acinar glands.



The exact microscopic junction between the proventriculus and intermediate zone was unclear.



The junction between the proventriculus and intermediate zone was externally visible.











The longitudinal plica consisted of a core of smooth muscle tissue that was continuous with the inner longitudinal layer of muscle.





The intermediate zone was the same length as the proventriculus.

the length of the intermediate zone.











The intermediate zone was lined by koilin

producing tubular glands proximally with

oxynticopeptic cells at their base.

Key Features

Proventriculus

- Cranially displaced
- Nodular patches of proventricular glands forme longitudinal channels Glandular bi-layer. Superficial layer produced koilin-like material

The Role of the Stomach Regarding Pollen Digestion in the Rainbow Lorikeet

Most animals are thought to extract pollen nutrients through the pollen wall by germination (pseudo-germination), osmotic and acid shock, enzymatic penetration of the pollen wall or any combination of the above. In the rainbow lorikeet, the proventriculus and intermediate zone contain glands that secrete acid and may provide a suitably acidic environment for pseudogermination.

Intermediate Zone

- Of equal length to proventriculus
- Longitudinal plica (folds)
- Surface koilin-like material

Gizzard

- Small with under-developed muscles
- Internally covered with a complex array of transversely serrated longitudinal and twisted surface folds

Pollen pre-soaking in a weak sucrose solution might occur along the nectar filled longitudinal channels of the glandular proventriculus and in the intermediate zone. Pollen grains are more likely to be retained in a mixture of sucrose and acid in the spacious intermediate zone than the restricted longitudinal passageways of the proventriculus. Therefore, the intermediate zone is the most likely site of pseudo-germination if this process is involved with pollen digestion in the rainbow lorikeet. The acid producing patches of the proventriculus might also facilitate pollen digestion via acid shock.

It was deduced from the results of this study that the proventriculus and intermediate zone provided suitable conditions for pollen digestion.