A NOTE ON THE EFFECT OF OXYGEN TENSION ON RESPIRATION IN *RANA TIGRINA*

METABOLIC rates in salamanders[1] are known to be dependent upon the oxygen tension in air, and oxygen concentration in water has been found to modify the oxygen consumption and heart rates in several amphibians submerged in water.[2]

The oxygen consumption of the frog, *Rana tigrina*, placed in different atmospheres of oxygen-nitrogen mixtures[3] was measured at 30° C by simple pressure-sensitive respirometers as described by Dwarakanath.[4] The respirometers contained 10 ml of water in which the frogs were placed. Two ml of 20% potassium hydroxide was used as carbon dioxide absorbent.

The oxygen consumption of *R. tigrina* increased 43% from 10% oxygen to an atmosphere of air (21% oxygen) as shown in Fig. 1.

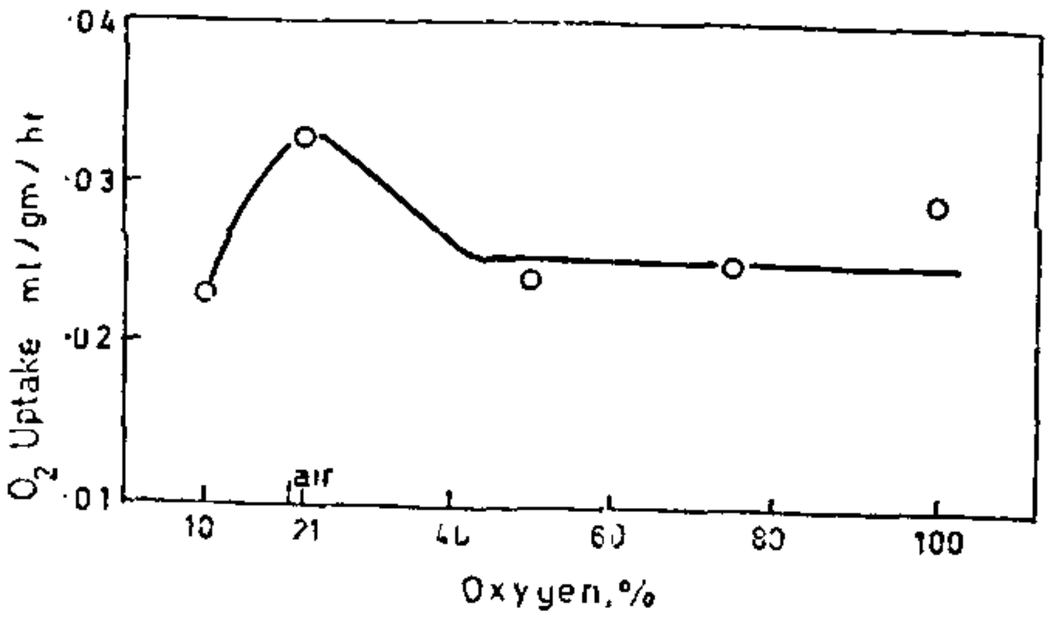

FIG. 1. Effect of oxygen tension on oxygen uptake in *R. tigrina* at 30° C. Each dot represents the average value of oxygen consumption of 4-6 animals.

The rates decreased in an atmosphere of 50% oxygen compared to that in air and a similar trend has also been observed in salamanders.[1] The rates showed little change in an atmosphere of 50% and 75% oxygen though a slight increase was observed in 100% oxygen. *R. tigrina* could not tolerate pure oxygen for 3 hours since some of them died on the day next to the experiment though *R. esculenta*[5] could survive for 52 days in an atmosphere of pure oxygen.

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Madurai-2, *April* 27, 1971.

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FREE AMINO-ACID CONTENT OF THE GREENING-AFFECTED AND HEALTHY PLANTS OF SWEET ORANGE (*CITRUS SINENSIS* OSBECK)

THE present investigation was carried out to study the free amino-acid content of the greening-affected and the healthy plants of sweet orange in order to get a possible explanation as to why the various fungi, *e.g.*, *Colletotrichum gloeosporioides*, *Curvularia tuberculata* and *Diplodia natalensis*,[2,3] were found to be more virulent on greening affected plants than on the healthy ones.

The analysis of the free amino-acids was done by ascending paper chromatography using standard amino-acids as control.[1] Five grams of fresh tissue (leaves) from healthy as well as greening-affected plants of same age were incubated at 25 ± 1° C. The leaves were air-dried, powdered and extracted twice with 80% hot ethanol. The extract was filtered and evaporated to dryness on a water-bath. The residue was dissolved in 1 ml of *n*-butanol. The extract was applied on Whatman No. 1 filter-paper (28 × 28 cm) and a mixture of *n*-butanol : acetic acid and water (4 1 : 5 v/v) was used as the running solvent. Chromatograms were developed after 14 hr, by spraying with 0·2% ninhydrin (indane-trione hydrate) in *n*-butanol to detect various amino-acids. Sprayed chromatograms were allowed to dry and subsequently they were heated in an electric oven at 110° C for 15 min. Identification of various amino-acids was established by chromatography of the standard at known concentrations. Qualitative differences were determined on the basis of visual observation of the colour intensities and size of ninhydrin positive spots. The signs + and — are the indications of the presence or absence of particular amino-acid. The number of +ve signs denote the intensities of the individual amino-acid. The number of + sign is not comparable between different amino-acids (see Table I).

TABLE I

Comparison of free amino-acids in healthy and greening-affected leaves of sweet orange

Amino-acid	R F. value	Healthy leaves	Diseased leaves
1. Histidine ..	·043	+++	++
2. Lysine ..	·045	+++	++
3. Arginine ..	·060	−	+
4. Aspartic acid ..	·106	++	+
5. Glycine ..	·132	++	−
6. Glutamic acid ..	·155	++	−
7. Threonine ..	·185	++	+
8. Alanine ..	·244	++	+
9. Tyrosine ..	·314	+++	+
10. Tryptophan ..	·428	−	+
11. Methionine ..	·430	++	+
12. Phenylalanine ..	·532	+	−
13. Proline ..	·561	+	+
14. Leucine ..	·622	++	−

+++ High; ++ Medium; + Low; − Absent.

It was observed that histidine, lysine, aspartic acid, threonine, alanine, tyrosine, methionine and proline were present both in healthy as well as greening-affected sweet orange leaves. The healthy plants showed the additional presence of glycine, glutamic acid, phenyl alanine and leucine whereas they were not detected in greening-affected leaves. However, arginine and tryptophan could not be observed in healthy sweet orange leaves though the same were found to be present in the greening-affected ones. It was also recorded that the content of histidine, lysine, aspartic acid, threonine, alanine, tyrosine and methionine was comparatively lower in diseased than the healthy leaves.

The total absence or reduction in the content of amino-acids in the greening-affected leaves may be attributed to their utilization by the pathogen or to their degradation by enzymes while the increase may be due to the proteolysis of the host protein.

The low amino-acid content in the greening-affected leaves as compared to healthy ones might be the contributory factor for increased susceptibility of the greening-affected plants towards the various fungi involved.

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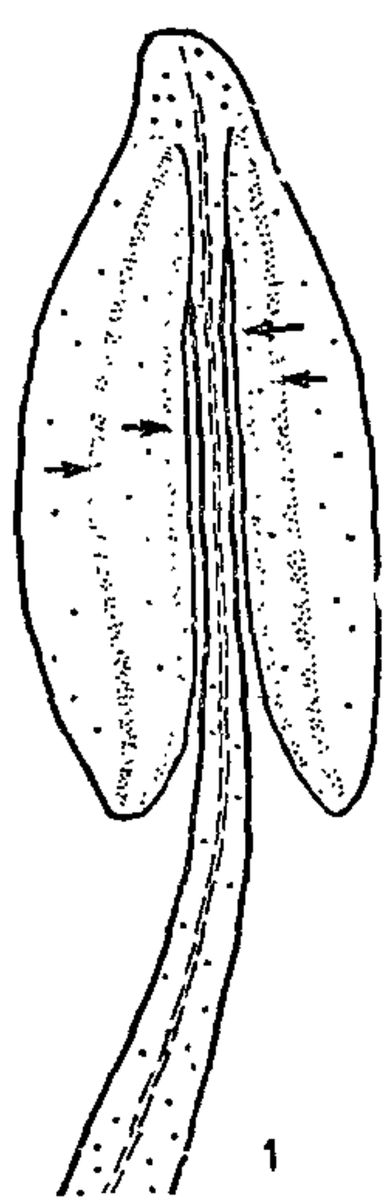
ENDOTHECIUM IN *PYROSTEGIA VENUSTA*

WHILE discussing the embryology of the family Bignoniaceae, Davis[1] mentions that in the anthers of *pyrostegia venusta* (= *Bignonia venusta*), the endothecium does not show characteristic thickenings. Our study revealed a multi-layered fibrous endothecium in the same species.

In a fertile stamen of *Pyrostegia venusta* (Ker-Gawl.) Miers, the two lobes are widely separated as is common to divaricate anthers. The organisation of the multi-layered anther wall conforms to the dicotyledonous type[1]. In most angiosperms, in a microsporangium, the endothecium is the outermost wall layer (inner to the epidermis), with fibrous thickenings all along its formation. The thickenings are now known to be composed of α-cellulose[2].



In Pyrostegia, the endothecial cells differentiate quite early but prior to the dehiscence of anther most of the cells get crushed. At the pollen grain stage, characteristic thickenings appear in the endothecial cells, *in restricted areas*, in the four microsporangia (Figs. 1, 3).