



## LECTURE - BIOLOGY OF GALLS

### **THE CURIOUS CASE OF NOTHOTRIOZA SPP. ASSOCIATED WITH PSIDIUM SPP. IN BRAZIL**

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The study of triozyd galls in Brazil goes back to the early 20th century, when Tavares reported globoid galls of an unspecified psyllid on an unidentified species of Malpighiaceae, later described by Crawford in 1925 as *Neotrioza tavaresi*. Crawford assigned the new species to *Neotrioza* with hesitation. The species was not mentioned again until 2003 when, some 80 year later, Butignol and Pedrosa-Macedo reported it as the inducer of globoid galls on *Psidium cattleianum* (Myrtaceae) from Paraná state, south Brazil. In 2011, globoid galls were also found on *Psidium myrtoides* from Minas Gerais, south-eastern Brazil, and the inducer was identified as *Neotrioza* cf. *tavaresi* by Burckhardt. To learn more about these psyllids and galls, thorough studies of available specimens were conducted. In 2013, Carneiro, Burckhardt and Isaias erected *Nothotrioza* as a new genus, described *Nothotrioza cattleiani* associated to *Psidium cattleianum*, *Nothotrioza myrtoidis* associated to *Psidium myrtoides*, and transferred *Neotrioza tavaresi* to *Nothotrioza* as a new combination. Research on the biology of *Nothotrioza* spp. led to the discovery of striking novelties,

unveiling a fruitful scenario of new hypotheses and discussions on the complex structure and metabolism of galls induced by sucking insects, which were classically believed to be simple and non-nutritive. In fact, the similar globoid galls of *N. cattleiani* and *N. myrtoidis* were found to accumulate primary and secondary metabolites, forming different gradients along gall tissues. Nutritive cells around the vascular bundles were ultrastructurally characterized for the first time, and together with immunocytochemical analyses on cell wall components, such galls were shown to be true extended phenotypes of their inducers, despite striking similarities. In 2019, two new species of *Nothotrioza* have been found in Brazil during field expeditions in the states of Goiás, center-western Brazil, and São Paulo, south-eastern Brazil, both also associated with *Psidium* spp. The galls of *Nothotrioza* sp. nov. on *Psidium* cf. *laruotteanum* were shown to retain great anatomical similarities with the previously studied galls, with peculiar characteristics due to harsh environmental conditions of the Cerrado from Goiás state. As all the *Nothotrioza* spp. we found are associated with *Psidium* spp., we suggest that the “*Malpighiaceae*” of Tavares may in fact be a misidentified *Psidium* species. Field trips to Bahia state, municipality of Camassari, in north-eastern Brazil, where Tavares’ material comes from, should help elucidating the identity. An intriguing perspective on the study of *Nothotrioza* spp. is the wide distribution of their galls in plants occurring from the Atlantic forest at the state of Paraná toward the states of São Paulo and Bahia along the coast. In the state of Minas Gerais, galls are found in transitional Atlantic forest - Cerrado formation, and in Goiás, galls occur in Cerrado sensu strictu. As the phylogenetic relationships within the genus are yet unknown, time-based analyses should help understand the natural history of the association of *Nothotrioza* to *Psidium* spp. along the diverse phytophysiognomies of Brazil, as well as evolutionary trends concerned to gall morphology, ontogeny, and metabolism. As *Nothotrioza* galls on *Psidium* species are the best-known systems involving co-generic species in the Neotropics, from insect systematics to plant cell biology, their case is indeed curious, isn’t it?