



## LECTURE - BIOLOGY OF GALLS

### **GALL-INDUCING PSYLLOIDEA (HEMIPTERA) IN THE LIGHT OF RECENT PHYLOGENETIC AND TAXONOMIC STUDIES**

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Psyllids are small hemipterous insects with slightly over 4000 described and at least as many undescribed species worldwide. Adults are always winged and range from 1–10 mm in body length. They have a simple life cycle with sexual reproduction passing through five immature instars. They are generally phloem feeders displaying several adaptations to overcome this unbalanced diet: mid gut with filter system, bacteriome with endosymbionts, secretion of honeydew and wax. Many psyllids induce galls which is a way to improve the nutritional quality of their host. Psyllids have generally narrow host ranges at species and often at higher taxonomic rank.

Immature psyllids are either free-living or develop in open or closed galls. Some species as the South African *Ctenarytaina melanota* Burckhardt are associated with witches' broom possibly induced by *Phytoplasma* they transmit. The earliest mention of psyllid galls and of psyllids in the literature is by Bauhin (1620), professor of Anatomy the University of Basel, Switzerland, describing the galls of *Livia junci* (Schrank). Psyllid galls display a wide range of shapes usually on leaves but also on stems, flowers and roots. They are generally induced by the first instar but exceptionally also by oviposition and the egg.

Psyllid hosts belong mostly to the eudicots, to a lesser content to magnoliids and only a few to monocots and conifers. Fabaceae, Myrtaceae and Asteraceae are the most important host families in terms of associated psyllid genera, followed by the much less species-rich Sapindales. Hosts of this order are colonised by four subfamilies of three families of Psylloidea and represent perhaps the primitive host association. Gall inducing species are present in some subfamilies and lack in others. In some subfamilies both types can be found. *Limataphalara* Hodkinson exemplifies a genus with monophagous psyllid species inducing galls on different *Nectandra* species (Lauraceae) producing a pattern of vicariance. Quite the opposite is found in *Copaifera langsdorffii* (Fabaceae) which hosts 13 species of the genera *Colophorina* Capener, *Jataiba* Burckhardt & Queiroz and *Mitrapsylla* Crawford. The species of the first genus are gall-inducer, those of the other two are not. Often four or more psyllid species are found on the same tree, hence qualifying as superhost.

There is a host of literature on psyllid galls from various authors published in the late 19th and early 20th centuries. Most of these publications are descriptive and often lack good identifications of the plants and/or the psyllids. Many of these records are dubious and difficult to elucidate. Examples are the genera *Neotrioza* Kieffer, *Neotrioza tavaresi* Crawford [= *Nothotrioza tavaresi*] and *Ozotrioza* Kieffer. Apart from some unresolved old names and records, the major challenge for a better understanding of gall diversity among Psylloidea is to describe the large number of new species and genera represented in our collections. For many psyllid species the host is still unknown or needs confirmation and little or nothing is known about gall induction. This requires also targeted field work.