

## Some problems in nomenclature of *Phytomonas* Donovan (Kinetoplastida: Trypanosomatidae)

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The availability of the name *Phytomonas* and the scope of the genus are discussed.

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### Introduction

Since the description of the first trypanosomatid from plants (Lafont, 1909) it became clear that, "The discovery that trypanosomatids are quite widespread parasites of flowering plants has been a major development in protozoology over the last ten years..." (Vickerman, 1994). Nowadays there are 13 *Phytomonas* species as well as a great number identified only as *Phytomonas* sp. recorded from more than 100 species of 11 plant families in different geographical areas, including Russia (see Podlipaev, 1990; Wallace & al., 1992).

Trypanosomatids inhabit numerous plants without causing any harm, but some are very dangerous pathogens of such important crops as oil and coconut palms, and coffee, and cause considerable damage in agriculture; very alarming are the discoveries of trypanosomatids in corn, soya and beans (Camarago & al., 1990; Dollet, 1984; Jankevicius & al., 1993).

Vickerman (1994) presumed evolutionary expansion of trypanosomatids, especially of *Phytomonas*. Accordingly, origin of new pathogenic host-parasite systems with *Phytomonas* may be predicted (Podlipaev, 1996).

The number of works devoted to plant trypanosomatids increases rapidly but some key problems remain obscure. Nobody knows, if *Phytomonas* the only trypanosomatid genus living in plants is or if there are several species from different genera of trypanosomatids parasitic on plants. In other words: are there special parasites of plants among the lower eukaryotes or can the same genera parasitize animals and plants?

This report deals with the formal analysis of some nomenclature problems in the genus *Phytomonas*.

### History and nomenclatural availability of the name *Phytomonas*

Lafont (1909, June) published a short report on trypanosomatids observed in latex of *Euphorbia pi-*

*lulifera* on Mauritius. A short description of flagellates was given and the name *Leptomonas davidi* proposed for them. He noted (translation from French): "... this flagellate shows all the characters of the genus *Leptomonas* (*Herpetomonas* in the sense of some authors)". Subsequently, Lafont (1910) published a more detailed description of *L. davidi* accompanied with illustrations and records of two other host plants: *Euphorbia thymifolia* and *E. hypericifolia*.

Donovan (1909, November) published the following text: "Lafont has recently found herpetomonads (*leptomonas*) in the latex of *Euphorbia pilulifera* in Mauritius. I have confirmed his find and have discovered these flagellates, small narrow forms, in the latex of the same plants, growing in Madras. The organisms differ from the known flagellates parasitic on animals and will doubtless be placed in a new genus, for which I suggest the name of *Phytomonas*".

The species name *Leptomonas davidi* Lafont, 1909 is available, as Lafont published a description of the flagellates observed. The generic name *Phytomonas* Donovan, 1909 is also available under the International Code of Zoological Nomenclature (Art. 12a, 12b(5)): "To be available every new scientific name published before 1931 ... must have been accompanied by a description or a definition of the taxon that it denotes, or by an indication", "For the purposes of this Article the word "indication" denotes only the following: ... in the case of a new genus-group name, the use of one or more available species-group names in combination with it, or clearly included under it, or clearly referred to it by bibliographic reference". Donovan did not publish a description or definition of the genus *Phytomonas* and did not cite the species included in it, but he gave a clear bibliographic reference to the paper of Lafont (1909) in which the species *Leptomonas davidi* was described. Accordingly, *Leptomonas davidi* is the type species of *Phytomonas* by monotypy.

The authorship of *Phytomonas* is sometimes credited to Lafont, 1909 (Podlipaev, 1990) which is incorrect.

### The scope and definition of the genus *Phytomonas*

As Donovan proposed the name *Phytomonas* for flagellates occurring in plants, some authors accept that occurrence in plants is a necessary character for inclusion of a species in *Phytomonas* and that all trypanosomatids found in plants should be included in *Phytomonas*. Such opinion is incorrect. The taxonomic concept of a genus is determined by many characters, not necessarily by those indicated by the author of the genus.

The following recent definitions of *Phytomonas* are given: "We define *Phytomonas* as promastigote parasites that lack arginase, do not have opisthomastigote stages, and infect plant and insects" (Wallace & al., 1992); "A genus of trypanosomatid flagellates whose members have a two-host life cycle involving a plant and a heteropterian hemipteran host, and whose morphology always exhibits the promastigote form" (Vickerman & Dollet, 1992).

Actually the insect host is definitely known only for a few species (Camargo & Wallace, 1994) and there is no evidence that it will be found in all species included in *Phytomonas*. The promastigote form is common and opisthomastigote stages are absent in several genera of trypanosomatids. The lack of arginase cannot be currently evaluated as taxonomic character as the number of species in which this character was examined is insufficient. It is evident that a new definition of the genus should be produced.

At least 3 major groups of species within the genus can be distinguished currently, mostly by biochemical characters (see Dollet, 1994, etc.):

1. Species living in the latex of Euphorbiaceae, Asclepiadaceae and some other plant families. Usually they are termed isolates without use of species names. The following species names are proposed in this group: *Ph. davidi* (Lafont, 1909); *Ph. bancrofti* (Holmes, 1931); *Ph. euphorbia* (Nieschulz, 1924); *Ph. bordasi* (Franca, 1921); *Ph. elmassiani* (Migone, 1916); *Ph. ficum* Fantham, 1925; *Ph. francai* Aragao, 1927; *Ph. funtuniae* (Franchini, 1922); *Ph. gomarae* Franchini, 1931; *Ph. tortuosa* Ruiz, 1958. Most of these species are known from original descriptions only. On the other hand, many cultures isolated from Euphorbiaceae and Asclepiadaceae have been intensively studied but did not receive scientific names. In case it should become necessary to separate several species living in Euphorbiaceae, it will be important to receive a culture from the *Euphorbia pilulifera* from Mauritius (the type host from the type locality).

2. Species living in the phloem of palms: *Ph. staheli* McGhee & McGhee, 1979. Many cultures belonging to two subgroups have been isolated.

3. Species isolated from fruits: *Ph. serpens* (Gibbs, 1957). Numerous cultures belonging to this very heterogeneous group have been isolated, but scientific names were not given to most of them.

Should *Phytomonas* be subdivided into subgenera or separate genera, the name *Phytomonas* must be retained for the first group which includes the type species.

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