EARLY MOLECULAR PATHWAYS TRIGGERED UPON PLANT-INSECT INTERACTION CAN BE USED BY VIRUSES TO IMPROVE TRANSMISSION

Stéphane Blanc

UMR BGPI, INRA-CIRAD-SupAgro, TA-A54/K, Campus International de Baillarguet, 34398 Montpellier cedex 05, France. blanc@supagro.inra.fr

The vast majority of plant viruses are transmitted by hemipteran insect-vectors. Although several modes of interaction between viruses and insect-vectors have been described, the most frequent is the so called “non-circulative transmission”. In this type of transmission, the virus particles are taken up within infected plants during feeding of the insect, and retained specifically on attachment sites locate within the stylets, or in some cases within the foregut. This specific binding to the insect anterior alimentary tract is most often highly labile, and the virus is rapidly released upon feeding of its vector on a new healthy plant. Detailed studies on the *Cauliflower mosaic virus* (CaMV), transmitted non-circulatively by several aphid species, have recently revealed two interesting phenomena:

-First, a cuticular protein is used as a specific receptor by CaMV, and we have recently shown that this protein is located exclusively in a distinct anatomical feature, lining the bottom of the bed of the common duct at the extreme tip of the maxillary stylets. This newly described anatomical structure is present in all aphid species investigated thus far, and has been named the “acrostyle”. We have shown that it contains an important concentration of cuticular proteins with a typical RR2 motif, representing potential candidates for the CaMV receptor. The physiological function of the acrostyle, its role in the aphid-plant interaction, as well as in the vector-transmission of other non-circulative plant virus species remains elusive.

-Second, preliminary evidence indicates that CaMV can high jack very early steps of the signal transduction cascade induced when the host plant perceives the feeding activity of an aphid. Indeed, the aphid puncture into an infected leaf is inducing a sudden change in the composition and morphology of the CaMV transmission body (TB), an inclusion body known to regulate the virus acquisition by the aphid. These changes in the TB are occurring within seconds, a time lap compatible with the duration of the aphid intracellular punctures, and are positively correlated with a dramatic increase in the transmission rate. To date, the nature of the initial stress triggered by the aphid and perceived by the plant is unknown, the signal transduction cascade is not identified, and the molecular mechanisms translating this signal into an increased transmission are even more mysterious. Both these phenomena will be presented at the meeting, and a particular emphasis on one or the other will depend on the respective progress on each line of research.