

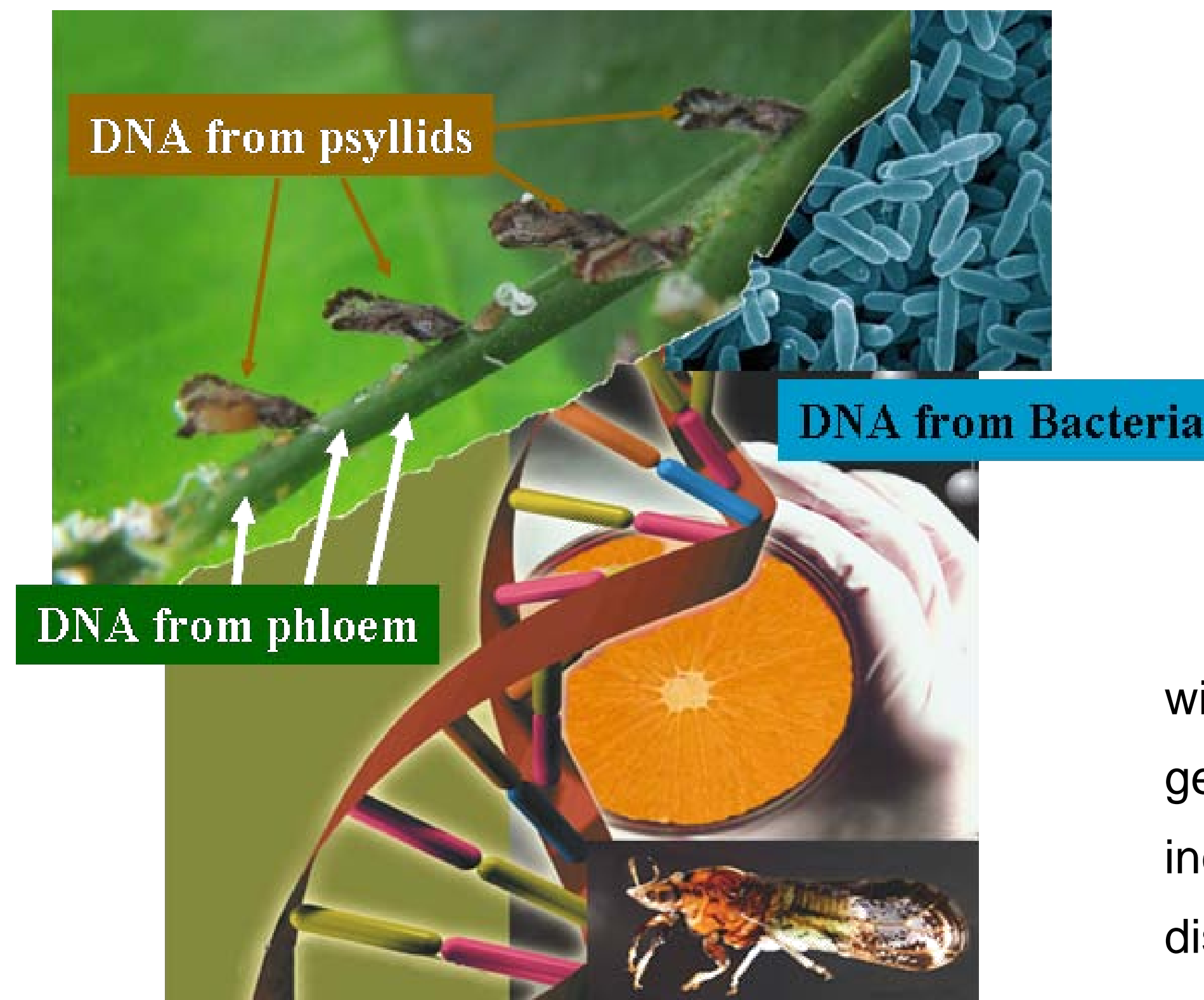
Advantages of a Metagenomics Approach to Solve Huanglongbing



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Organisms identified within:	
Glassy-winged sharpshooter	Asian Citrus Psyllid
5 Bacteria	9 Bacteria
3 Insect Viruses	2 Viruses
1 Fungi	1 Fungi
1 Phage	1 Phage

Applications of Metagenomics

Many microorganisms live inside or are associated with insects and can not be cultured. Understanding the genetic relationship between insects and pathogens, increases the likelihood for the development of more efficient disease management strategies.

Species comparison of the microbial organisms from the *Psyllid* and *Glassy-winged sharpshooter*, provided a new understanding of the microfauna inside these important vectors of plant diseases. Both insects transmit plant infecting bacterial pathogens of economic importance. Further comparisons of these genetic similarities or differences, may provide the information needed to reduce the ability of these vectors to acquire or transmit these and other plant pathogens.

Huanglongbing, is a devastating disease of citrus, whose causal agent(s) have remained elusive for more than 30 years. Current technologies now permit a thorough examination of this system such that all microbes within it can be identified, thus identifying which pathogen(s) are there.

Metagenomics

Insects and other arthropods make up the majority of animal species known on earth. Many of these such as Psyllids and Leafhoppers transmit bacterial or viral diseases thus living in an intimate relationships with this invisible fauna of microorganisms. However, less than 1% of all microorganisms observable in nature can be cultured under laboratory conditions. Thus 99% of this biological diversity has remained elusive. Metagenomics is a new field combining molecular biology and genetics that permits researchers to now look into a system, such as an insect, tree, pond water, etc...and to identify, and characterize the genetic material from those samples. The genetic diversity is accessed by isolation and analysis of all the DNA and RNA in an organism, or system, thus bypassing the need to culture individual microbes or viruses. Thus researchers can now see or detect the presence of unknown organisms, which may be causing devastating diseases, or which may just be a member of the normal microbial fauna.

Metagenomics is providing a new and exciting field of molecular biology that is growing into a standard technique for understanding biological diversity and organism interactions. The method is cost effective, provides biological and genetic information for further applications, and is rapidly being considered a first step to diagnose difficult disease systems.