GREGOR MENDEL INSTITUTE OF MOLECULAR PLANT BIOLOGY

PRESS ALERT

Austrian Academy of Sciences

From weeds to humans: new mixed model GWAS approach developed from *Arabidopsis* data opens up new analytic possibilities, also for human genetics.

Using the model plant Arabidopsis thaliana, Magnus Nordborg, Scientific Director of the Gregor Mendel Institute of Molecular Plant Biology of the Austrian Academy of Sciences, Arthur Korte, and other colleagues at the GMI have extended the mixed model GWAS approach to now also deal with correlated phenotypes. This development has exciting potential for analysis not only of plant but also of human genetic data; it will also allow for cost-efficient re-analysis of data from previous studies. The results of this study have been published in the current online issue of the scientific journal Nature Genetics: "A mixed-model approach for genome-wide association studies of correlated traits in structured population."

A fundamental challenge in biology today is understanding the respective contributions that the environment and the genetic makeup of an organism, plant or animal, make to its phenotypic (physically manifested) traits. GWAS (genome-wide association studies) attempt to understand how genetic variation translates into phenotypic variation. The principle behind a genome-wide association study is to compare the DNA sequences of individual organisms and to see whether particular differences in the DNA sequence are associated with particular differences in the characteristics of the individuals. However, relationships between individuals in a population present a major difficulty; to solve this problem, mixed models have been recently developed.

This new study now extends this mixed model approach to also deal with correlated phenotypic traits. Being able to deal with these correlations will allow new insights into the interplay between environment and genetic makeup.

There are two particularly exciting aspects to the new approach. Firstly, the method is generally applicable to the genetic sequences of any organism, including humans; it thus provides a good example of the importance of basic plant research for practical applications far beyond the research itself. As Magnus Nordborg has said: "Understanding how genetic variation translates into phenotypic variation and how this translation depends on the environment is fundamental to our understanding of evolution, and has enormous practical implications for both human medicine and agriculture".

Secondly, the method will allow researchers to re-analyse data from existing studies and perhaps come up with important new insights at a fraction of the time and costs of performing new experiments. A mass of useful historic data is available for researchers with new methods to analyse it.

To assist other researchers in these efforts, the GMI developers of this method have made their method and its tools available online, along with sample data and a tutorial (see MTMM link below).

Links
MTMM: https://cynin.gmi.oeaw.ac.at/home/resources/mtmm

Nordborg Group: http://www.gmi.oeaw.ac.at/research-groups/magnus-nordborg
GMI Media: http://www.gmi.oeaw.ac.at/pr

About the GMI
The Gregor Mendel Institute of Molecular Plant Biology (GMI) was founded by the Austrian Academy of Sciences in 2000 in the form of a company to promote research excellence within the field of plant molecular biology. It is the only international center for basic plant research in Austria. Research at the GMI is curiosity driven and covers many aspects of molecular genetics, from basic mechanisms of epigenetics, to chromosome biology, developmental biology, stress resistance, and population genetics. *Arabidopsis thaliana* is used as the primary model organism. The GMI has about 80 employees from 22 countries. The working language is English. The GMI is located at the Vienna Biocenter Campus within the purpose-built Austrian Academy of Sciences Life Sciences Center Vienna, completed in January 2006.

Über das GMI
Das Gregor Mendel Institut für Molekulare Pflanzenbiologie (GMI) wurde von der Österreichischen Akademie der Wissenschaften im Jahr 2000 gegründet, um Spitzenforschung in der molekularen Pflanzenbiologie zu fördern. Das GMI, organisiert als GmbH, ist die einzige internationale Grundlagenforschungseinrichtung auf diesem Gebiet in Österreich. Die Forschung am GMI gilt primär den Grundlagen der Pflanzenbiologie und umfasst vor allem molekulargenetische Aspekte wie epigenetische Mechanismen, Populationsgenetik, Chromosomenbiologie, Stressresistenz und Entwicklungsbiologie. Die Ackerschmalwand *Arabidopsis thaliana* ist die am meisten verwendete Versuchspflanze. Das GMI hat ca. 80 MitarbeiterInnen aus 22 verschiedenen Ländern. Die Umgangssprache ist Englisch. Das GMI befindet sich in einem modernen Laborgebäude der Österreichischen Akademie der Wissenschaften, das im Januar 2006 fertig gestellt wurde. Dieses gehört zum Vienna Biocenter Campus (VBC), auf dem mehrere Forschungseinrichtungen sowie Biotechnologie-Firmen angesiedelt sind.

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