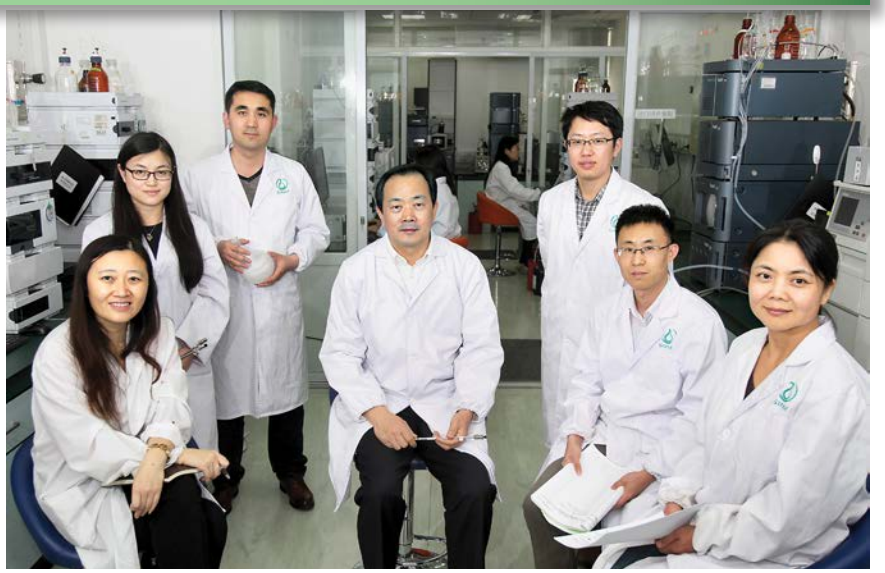
Behind the Scenes in Pharmacognosy: Hybrid Compounds Discovered

By Dr. Amy Keller

Earlier this year, *Analytical Chemistry* published an article authored by ASP member Dr. De-an Guo and others entitled, "Global Profiling and Novel Structure Discovery Using Multiple Neutral Loss/Precursor Ion Scanning Combined with Substructure Recognition and Statistical Analysis (MNPSS): Characterization of Terpene-Conjugated Curcuminoids in *Curcuma longa* as a Case Study." Dr. Guo is Director of the Shanghai Research Center for Traditional Chinese Medicine Modernization at the Shanghai Institute of Materia Medica, Chinese Academy of Sciences, Shanghai, China. Dr. Guo utilizes a unique approach for elucidating hydrid bioactive compounds. We thank Dr. Guo for allowing us to know his work better and invite ASP members to read the original article. (*Anal Chem.* 2016 Jan 5;88(1):703-10).



The Guo Group: Dr. Wan-ying Wu, Ms. Juan Da, Dr. Wen-zhi Yang, Dr. De-an Guo, Dr. Jin-jun Hou, Dr. Min Yang, and Dr. Bao-hong Jiang.

DR. PENG QI

How did you become interested in turmeric and curcuminoids?
Our lab aimed to discover novel bioactive compounds from popularly used herbal medicines. We started the study in 2009, driven by the favorable anti-tumor effect of curcumin. In addition, turmeric (*Curcuma longa*) was a popularly used traditional Chinese medicine, and this reinforced our interest.

Who in your laboratory carried out the research?
Mainly Dr. Xue Qiao and Dr. Xiong-hao Lin. Dr. Qiao established the analytical method, multiple neutral loss/precursor ion scanning combined with substructure recognition and statistical analysis (MNPSS), for rapid analysis and data processing of novel curcuminoids. Dr. Lin purified the compounds and identified their structures. The research was based on the thorough chemistry work of Dr. Lin, who first discovered curcuminoids in our lab (*J. Org. Chem.* 2013, 78, 11835 and *J. Nat. Prod.* 2012, 75, 2121). We also want to address the contribution of other co-authors, S. Ji, Z. Zhang, and T. Bo, in conducting the experiments and writing the paper.

Could you provide a brief explanation of the work and results in your own words?
Turmeric contains curcuminoids and terpenes. Our previous study suggested it also contains hybrids of these two structures, and the hybrids are potent anti-tumor agents. In this study, we established analytical methods to discover these terpene-curcuminoid hybrids, and found that there is a large family of more than 800 hybrids in turmeric. We then used a statistical approach to rapidly find the novel hybrid patterns and isolated two of them.

Your work reports a new way of global phytochemical profiling and uncovering new compounds. What is the future potential of this technique in natural products chemistry?
Our method remarkably improved the efficiency to discover unknown constituents from herbal medicines. A large number of minor novel structures ignored by conventional methods can be revealed with this method and could be important lead molecules for drug discovery. Meanwhile, the work will accelerate secondary metabolomic studies of medicinal plants. The global chemical profiling of secondary metabolites will provide important reference points for the biosynthesis routes of certain natural products.

What is a favorite nonscientific activity of your lab?
Playing table tennis.

What is your lab's motto or slogan?
Always try to do a better job. ■

Above left: Turmeric, the root of *Curcuma longo*.

XIONG-HAO LIN.

Left: The aerial part of *Curcuma longo*, developed from the roots.

XUE QIAO.