Studies on the PR toxin of
*Penicillium roqueforti*

Shenq-Chyi Chang¹*, Yau-Huei Wei¹, Kuang-Lieh Lu², Min-Kuei Cheng¹,
Ding-Ling Wei³, Shung-Chang Jong⁴, and Ru-Dong Wei¹

1. Department of Biochemistry, National Yang-Ming University, Taipei 112, Taiwan, Republic of China.
2. Institute of Chemistry, Academia Sinica, Taipei 112, Taiwan, Republic of China.
3. Division of Biology, Center for General Education, National Yang-Ming University, Taipei 112, Taiwan, Republic of China.
4. Mycology Department, American Type Culture Collection, Manassas, Virginia 20110, U.S.A.

**ABSTRACT**

*Penicillium roqueforti* Thom is a fungus traditionally used in the ripening of French Roquefort cheese. PR toxin (C₁₇H₂₀O₆) is a secondary metabolite of the fungus *P. roqueforti*. The toxin has been shown to be lethal to animals and exhibits a broad spectrum of biochemical activities which cause toxicities in animals. In the past few years, we have come across several secondary metabolites related to PR toxin and observed that they are produced sequentially in the culture medium of the fungus. The compounds were isolated, purified and identified as eremofortin C (EC) (C₁₇H₂₂O₆), PR-imine (C₁₇H₂₁O₅N), PR-acid (C₁₇H₂₉O₇), and PR-amide (C₁₇H₂₁O₆N), respectively. The structures of EC, PR toxin, PR-acid and PR-amide are closely related and differ only in the presence of a hydroxymethyl group in EC, an aldehyde group in PR toxin, a carboxyl group in PR-acid and an amide group in PR-amide at the C-12 position, respectively. As our effort to elucidate the synthetic and metabolic pathway of the toxin, we discovered that EC is transformed to PR toxin by EC oxidase and PR toxin is further converted into PR-acid by PR oxidase. Moreover, the PR-acid was metabolized into PR-amide by PR-amide synthetase. Thus, we propose that PR toxin is synthesized from EC and is degraded into PR-acid and PR-amide in the culture medium of *P. roqueforti*.

**Key words:** Eremofortin C, *Penicillium roqueforti*, PR-acid, PR-amide, PR-imine, PR toxin.