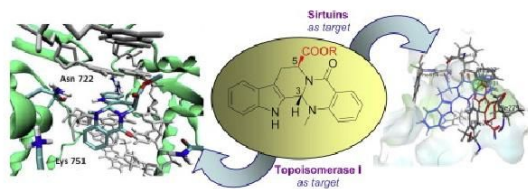


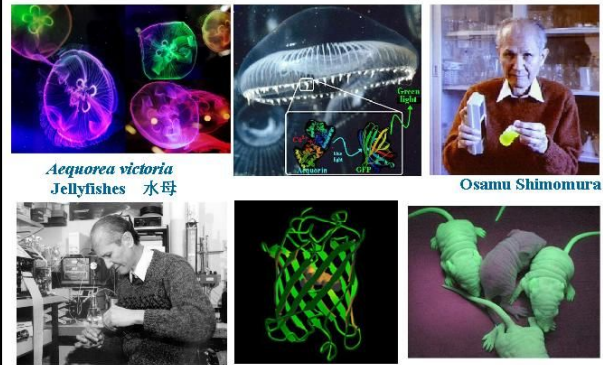
## 喜树碱 Camptothecin

拓扑异构酶I抑制剂



Quinolinecarboline alkaloid evodiamine as scaffold for targeting topoisomerase I and sirtuins.  
*Bioorganic & Medicinal Chemistry* 2013, 21: 6920-6928.

## 2008年诺贝尔化学奖获得者-下村脩



*Aequorea victoria*  
Jellyfishes 水母

Osamu Shimomura

## Pseudopterostin A



*Pseudopterogorgia elisabethae*

Anti-inflammatory (skin care lotions)  
Patented by U. California 1989.

假蕨素A (pseudopterostin)是一种从软珊瑚虫体内分离出来的抗炎成分



Fenical W. *Proc. Natl. Acad. Sci. USA* 1986, 83: 6238.

## 用一株小草改变了世界 A Chinese herb changed the world



*Artemisia annua*

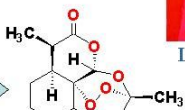
The newest class of potential anti-malarials are peroxy-bridge containing compounds.

《肘后备急方》 Cell: 青蒿素: 源自中草药园的发现 2011

青蒿素结构研究协作组, 一种新型的倍半萜内酯——青蒿素. *科学通报*, 1977, 22(3), 142.

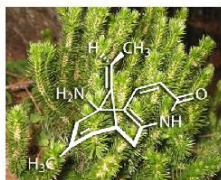


Lasker Award  
2011年9月

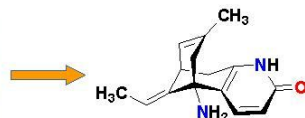


Qinghaosu Artemisinin 诺华

## A Natural Medicine



*Huperzia serrata*  
蛇足石杉, 千层塔

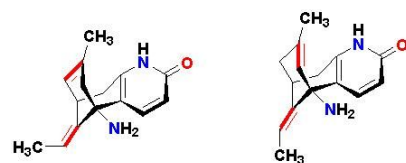


Huperzine A  
Phase I in USA  
石杉碱甲(双益平)

*Phytochemistry* 2008, 69, 2022-2028

*In vitro* production of huperzine A

## (-)-Huperzine And (-)-Selagine

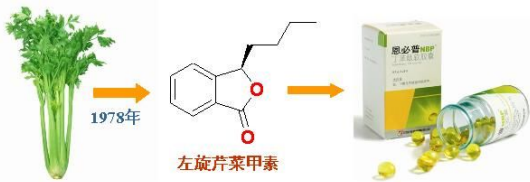


1 (-)-Huperzine A

2 (-)-Selagine

1986年中科院上海药物所刘嘉森等人从石松科植物千层塔 *Huperzia serrata* 的酚性部分获得的生物碱石杉碱甲1。早在1960年Karel Wiesner从小叶石杉(*Lycopodium selago* L.)得到少量的卷柏石松碱2。1989年Wiesner的学生Ayer与Valenta看到两个结构的差异, 即惊又疑, 因2的样品已经用完, 千方百计又从加拿大偏远山头找到一些植物, 分离出少量卷柏石松碱2, 发现过去的结构有误。证实化合物2就是石杉碱甲1。

## 恩必普 (Butylphthalide Soft Capsules)



恩必普是由中国医学科学院和石药集团联合投巨资(3.9亿)历时24年开发研制成功的,其对脑缺血具有良好的治疗作用。是从南方水芹菜籽中发现的一种天然化合物—**丁苯酞**,现人工化学全合成。2002年9月,以2500万元转让给石药集团。2009年获得国家科技进步二等奖,同年石药集团利税12和14亿元/18000职工。

## 河北医科大学 药学院 天然药物化学教研室的工作

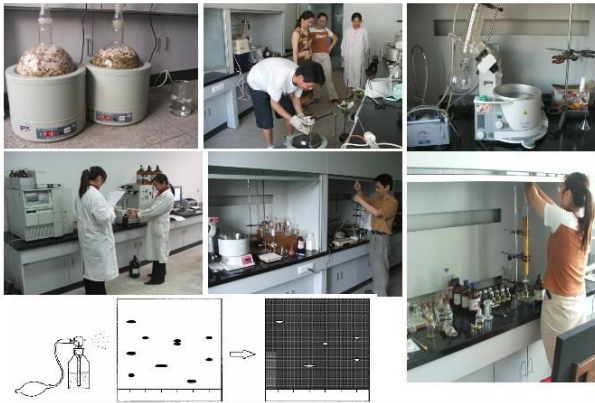
选题: 天然资源—植物—抗肿瘤抗癌活性的植物—主要是含倍半萜、二萜的植物。

主要工作: 分离、纯化、鉴定。

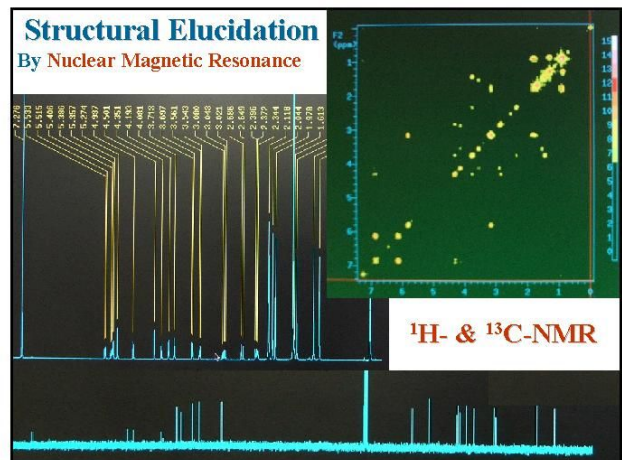
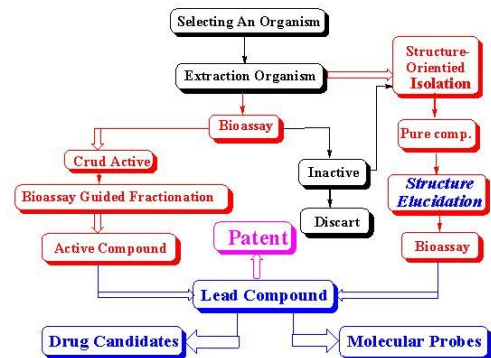
结构鉴定: 委托加拿大、英国、和日本朋友做。加拿大做核磁等项目还负责解析结构和总结结构数据。

活性筛选: 活性评价委托英国先正达集团和法医学系。

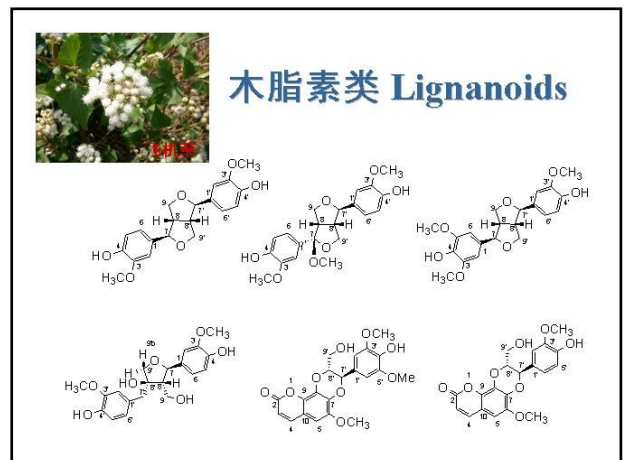
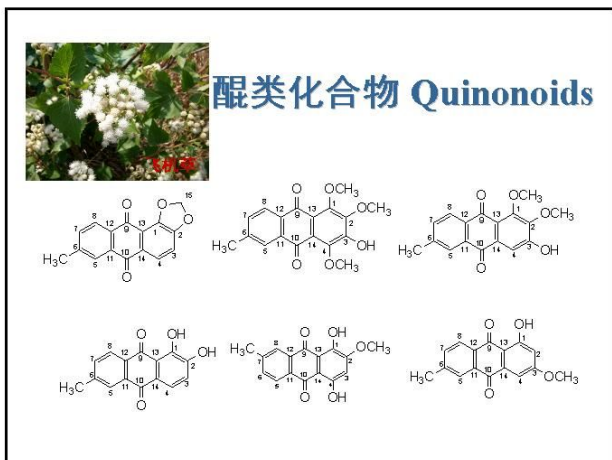
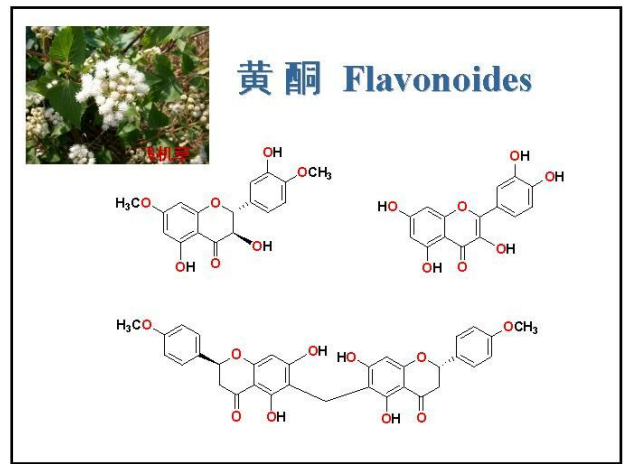
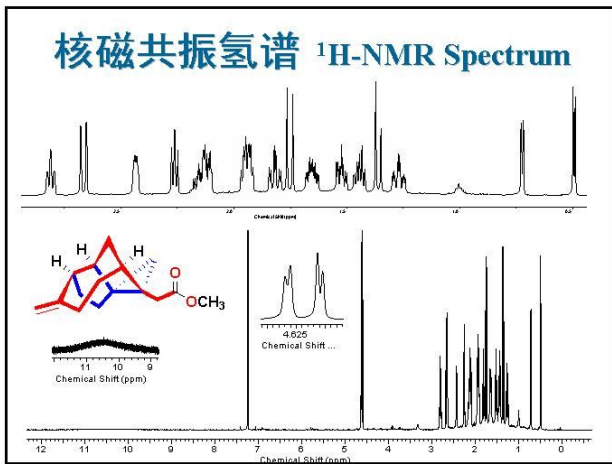
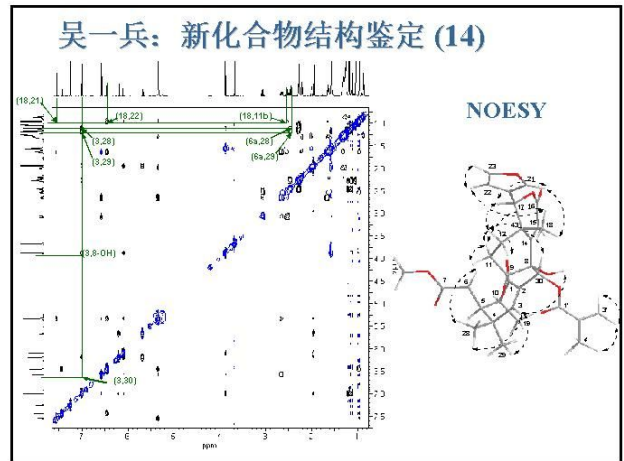
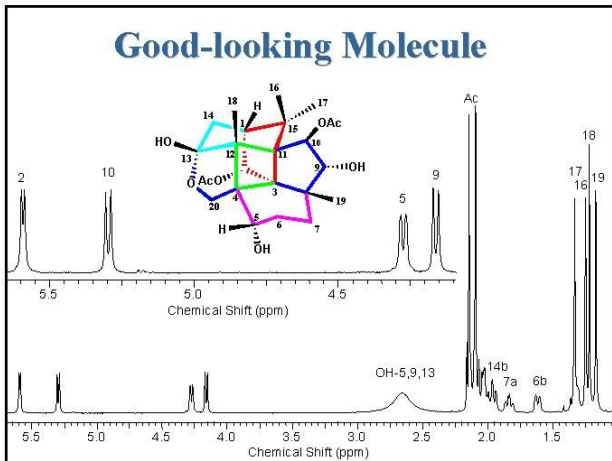
## Introduction to Our Laboratory



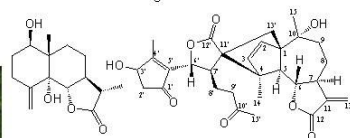
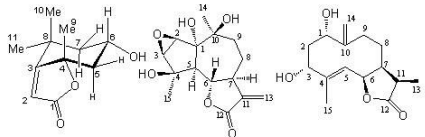
## Procedures of Nat. Med. R & D



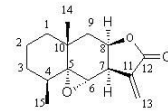
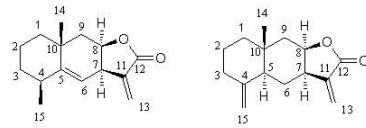




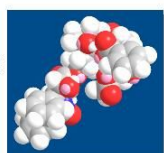
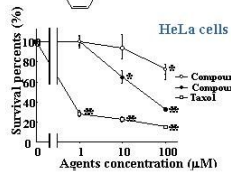
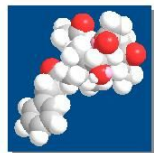
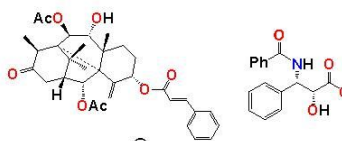
## 倍半萜 Sesquiterpenoids



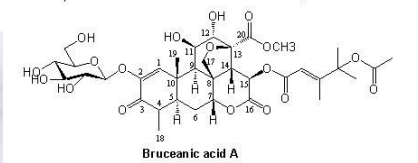
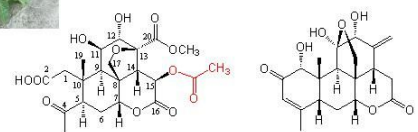
## 倍半萜 Sesquiterpenoids



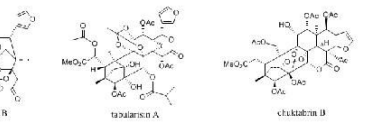
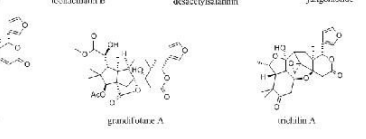
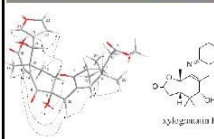
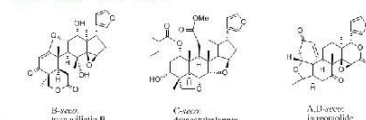
## 紫杉烷二萜 Taxanes



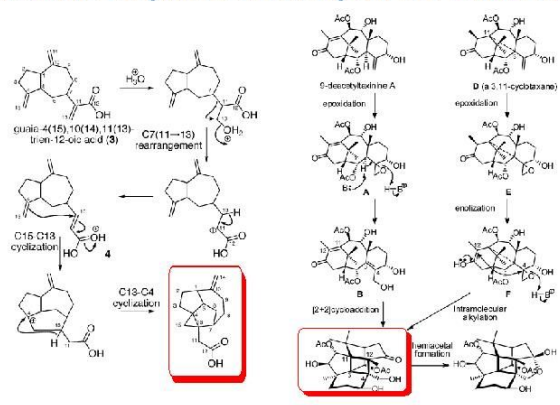
## 苦味素 Quassinoids



## 柠檬苦素 Limonoids



## Plausible Biosynthetic Pathway for Novel Skeletons



# 天然药物化学

一个充满魅力的领域

- ◆ Integrated development of Natural Product Chemistry with Molecular Biology and Biochemistry.
- ◆ Exploration of secondary metabolites of organisms hold promise for new Natural Products that may improve our health and our lives.

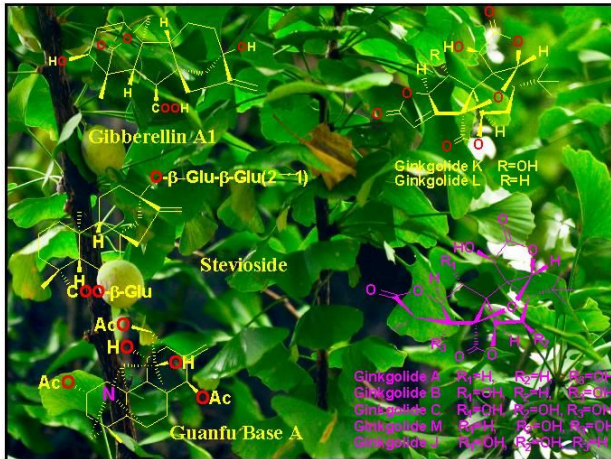
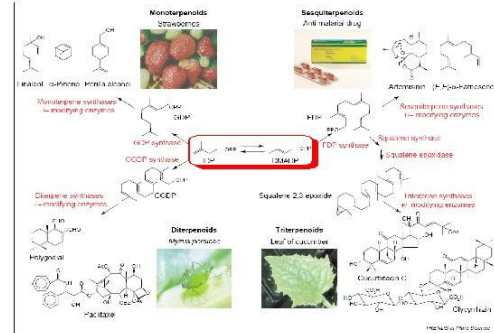
### Bottleneck

1. 分离得到的化合物量少，以毫克计。
2. 活性筛选仅仅停留在MTT抗肿瘤细胞粗筛。
3. 目前只能以化合物的形式发表，没专利不能开发。

大自然的影响无处不在，天然产物化学的成果遍布我们生活的各个角落，我们必须细心地寻



# 天然药物化学 Medicinal Natural Product Chemistry



# 地球只有一个——停止自己的贪婪

扫荡‘冬虫夏草大军’

扫荡甘草的‘甘草大军’

一级保护植物红豆杉

If the west coast forests had been harvested 80 years ago, *Artemisia* would not have been discovered. The loss of a species from the natural world is permanent. Human health is inseparable from the health of the natural. Biological Diversity = Chemical Diversity

# 谢谢大家

河北医科大学药学院  
天然药物化学教研室

<http://202.206.48.73/tryw1/default.asp>