
酵素純化與分析

Enzyme Purification and Analysis



國立台灣大學 微生物與生化所 莊榮輝
Professor RH Juang, Institute of Microbiology and Biochemistry



- 酵素純化方法 Enzyme purification methods
- 酵素分析方法 Enzyme analysis methods
- 問題集 Problems

酵素純化方法 Enzyme purification methods



- 1 酵素純化實驗室
Enzyme purification laboratory
- 2 蛋白質抽取 Protein extraction
- 3 色層分析法 Chromatography
- 4 其它純化或分離方法 Other methods
- 5 純化策略 Purification strategy

1 酵素純化實驗室 Enzyme purification laboratory



- 1.1 儀器 Instruments 儀器正確使用及保養
- 1.2 小型器具 Small tools 注意準確度
消耗品 Consumables 供應正常
- 1.3 藥品 Reagents 藥品的貯藏溫度 正確使用
- 1.4 個人用品 Personal utilities 管好自己的用具

Sigma 目錄的試劑說明 Sigma catalogue

新品

目錄
編號

貯藏
溫度

EC
編號

材料
來源

活性
定義

參考
文獻

FOB 航空運送

品名 包裝

別名

純度

PRODUCT NUMBER	USA \$	PRODUCT NUMBER	USA \$
NEW H 3389 HYPOXANTHINE-GUANINE PHOSPHORIBOSYL TRANSFERASE [2-8°C] (HGPRT; Transphosphoribosidase; IMP:pyrophosphate phosphoribosyltransferase; EC 2.4.2.8) From Bakers Yeast Lyophilized powder containing approx. 80% protein (Biuret) and 5% MgCl₂; balance primarily Tris buffer salts. Activity: 300-600 units per mg protein Unit definition: One unit will catalyze the formation of 1 nmole of guanosine 5'-monophosphate (GMP) per minute from guanine and phosphoribosyl pyrophosphate at pH 7.5 at 37°C. May be useful in the enzymatic determination of phosphoribosyl pyrophosphate (PRPP). Ref.: Salerno, C., et al., <i>Experientia</i> , 35 , 1016 (1979) [9016-12-0]	250 units 24.80 1,000 units 79.10	L-α-LYSOPHOSPHATIDYLCHOLINE (L-α-Lysolecithin) [9008-30-4] C ₂₆ H ₅₄ NO ₇ P FW 523.7	
L 5004 [0°C] Type III: Approx. 99% From Bovine Liver White Powder. Prepared by the action of phospholipase A on bovine liver L-α-phosphatidylcholine (P 7763). Contains primarily palmitic and stearic acids. R: 36/37/38 S: 26-36	5 mg 26.40 25 mg 80.80	L 1381 [0°C] Type V: Approx. 99% From Bovine Brain Prepared by the action of phospholipase A on bovine brain L-α-phosphatidylcholine (P 6638). Contains primarily palmitic, stearic and oleic acids. R: 36/37/38 S: 26-36	5 mg 21.90 25 mg 68.20
3-ACETYLINDOLE A 9750 [RT] Practical Grade [703-80-0] C ₁₀ H ₉ NO FW 159.2	1 g 11.40		

說明

型號

RS
編號

CAS 編號

分子式

■ Sigma 目錄的試劑標籤 Sigma reagent label

警告 防護

G 包裝 100g **B** 目錄編號 M-5750 **H** 批號 Lot 119F0448 **F** 純度 **A** 品名

E IRRITANT
Irritating to eyes, respiratory system and skin. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing.

J

I 警告符號 **C** 別名 **D** 貯藏 **L** 分子式 **F** 含水量 **M** 條碼

K CAS 編號

SIGMA
MENADIONE SODIUM BISULFITE
(2-Methyl-1,4-naphthoquinone sodium bisulfite)
Approx. 95% [57414-02-5]

Water soluble addition compound of vitamin K₃
Light sensitive
Desiccate
Store at less than 0°C

$C_{11}H_8O_2 \cdot NaHSO_3$ FW 276.2
H₂O content 1.5 mol/mol
For laboratory use only. Not for drug, household or other uses. .*BW*+G

SIGMA CHEMICAL CO. P.O. Box 14508 St. Louis, MO 63178 USA 314-771-5750

常見警告符號 Common chemical warning signs

爆裂物



Explosive

氧化劑



Oxidizing

易燃物



Highly Flammable or
Extremely Flammable

毒藥



Toxic or
Very Toxic



Harmful or
Irritant



Corrosive



Biohazard



Dangerous for
the Environment

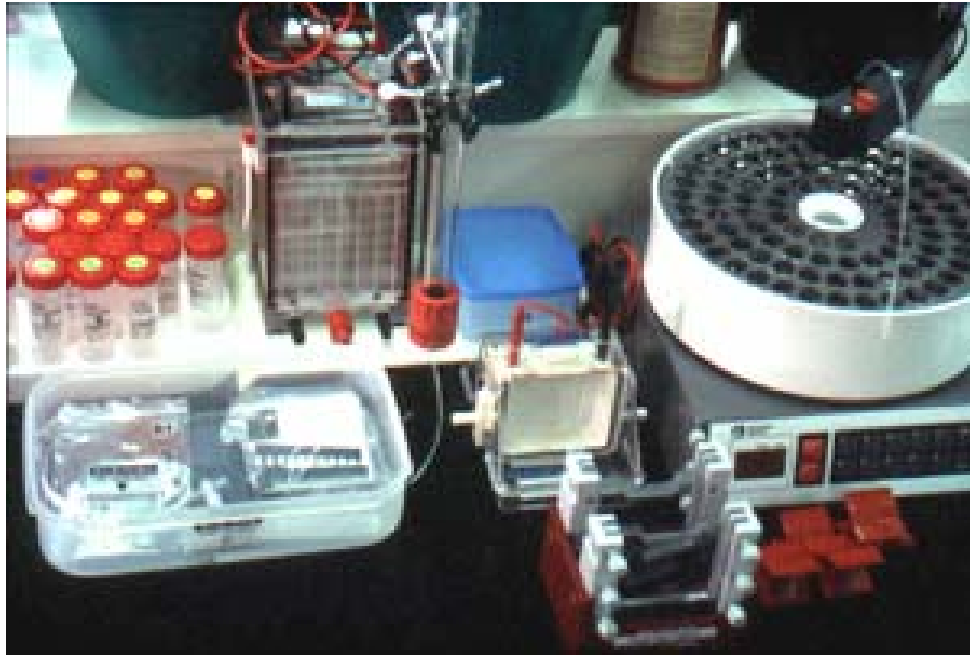
刺激性

腐蝕性

生物傷害

環境傷害

寫好你的標籤紙 Label your reagents well



濃度 試劑名稱 酸鹼度

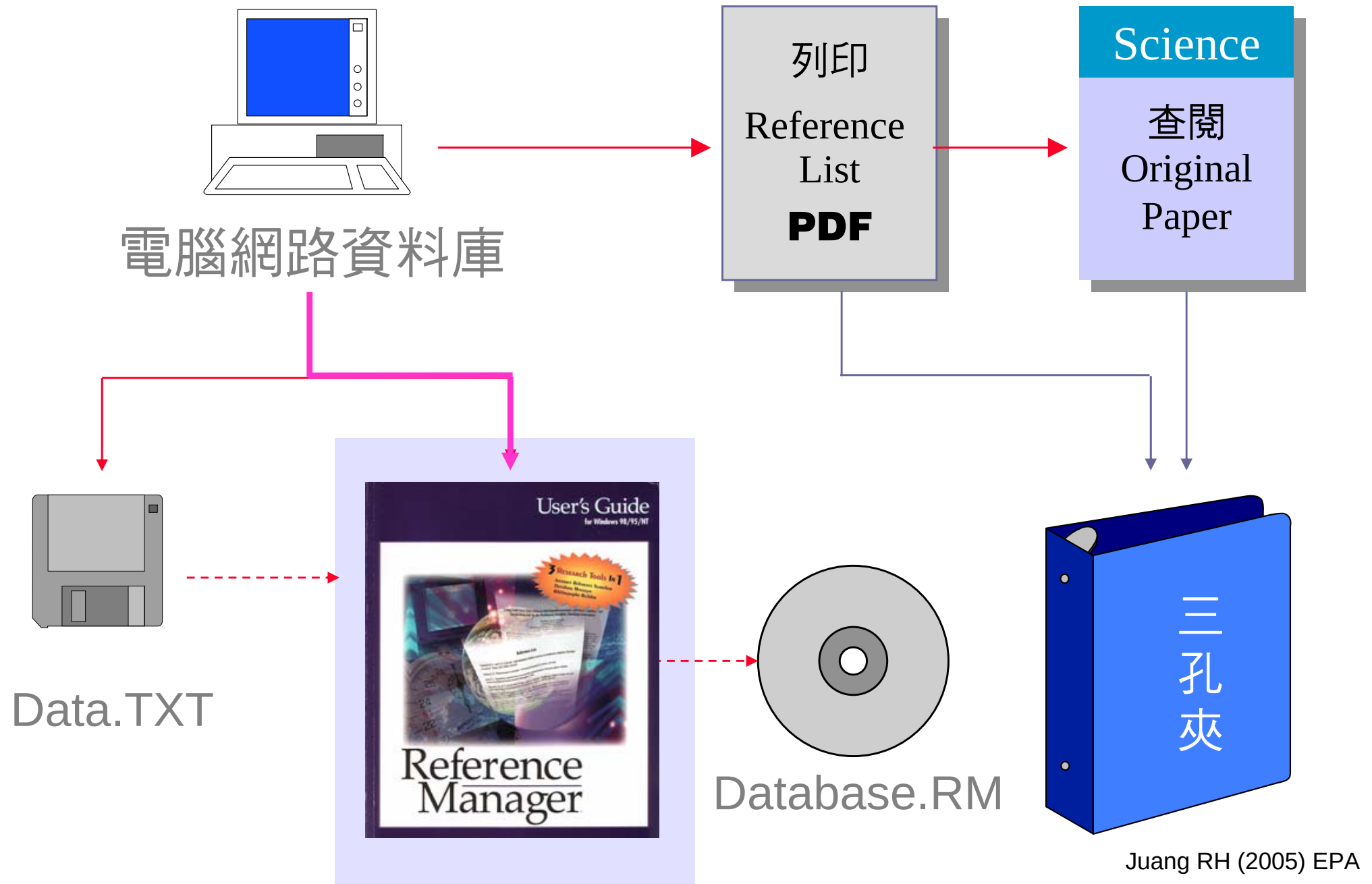
1 M Tris-HCl pH 7.4

JRH 050825Thu

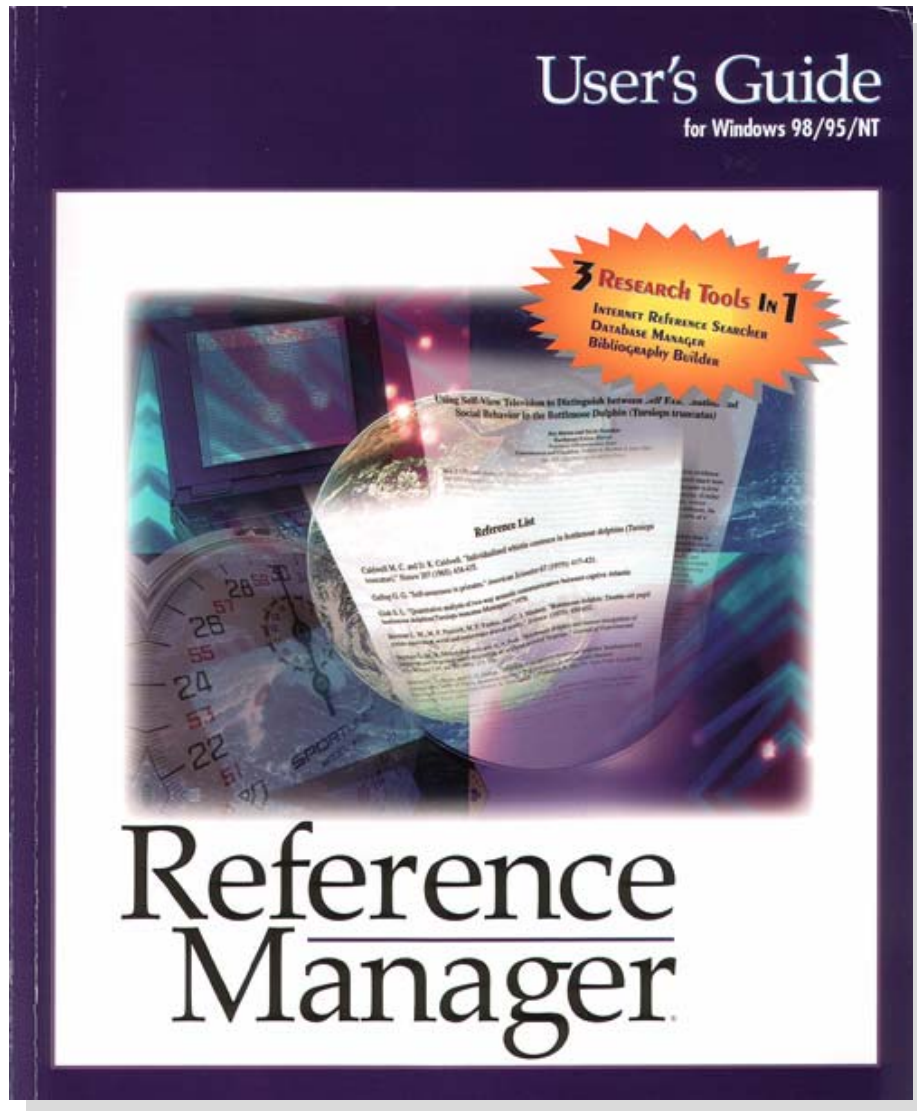
姓名縮寫

日期

■ 文獻查詢及管理 Manage your reference well



■ 文獻查詢及管理 Create your reference list



▼ Build up your database

Search and store your reference using RefMan

▼ Insert references in your article

Insert {reference ID} in your Word article

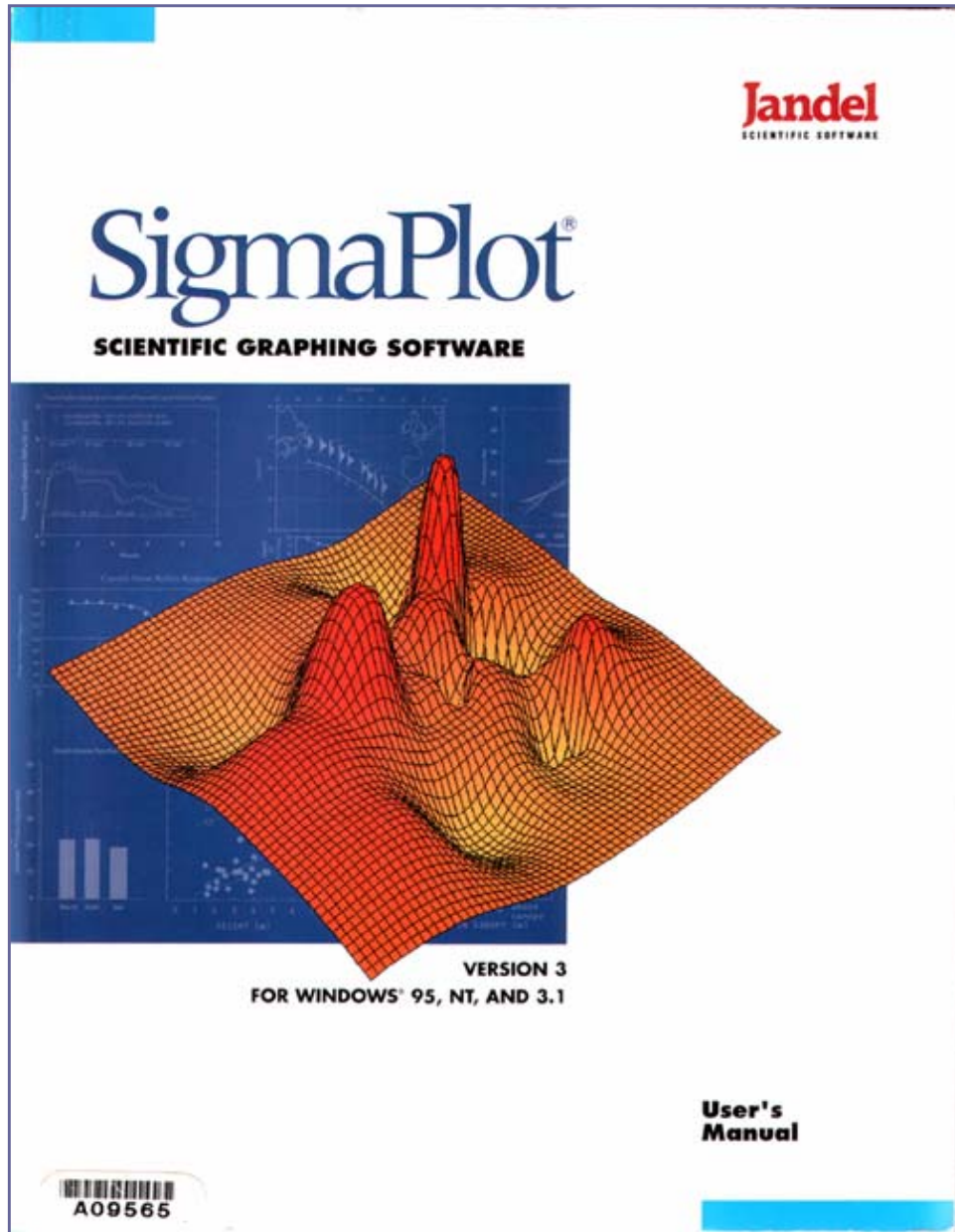
▼ Create reference list

You may use any preferred format of reference list

▼ Citation will be inserted in article automatically

Every {ID} is changed to citation

■ 必備製圖軟體 SigmaPlot for scientific graph



▼ Key in your data

Any kind of (X, Y) data

▼ Choose preferred graph

Useful graph types available

▼ Create the graph

Graph is created automatically

▼ Modify title or legend

You can modify graph freely

■ 流程軟體 Visio creates professional flow charts



▼ Drag plates to create tasks

All tasks are put on various types of plates (different shapes)

▼ Link plates with lines

Connecting line indicates the relationship between tasks

▼ Paste your own graph

Make your own plates with special graph of figure

▼ Useful in many jobs

Experimental flow chart, maps

流行的製圖軟體 CorelDraw produces cool graphs



▼ Create vector-based graphs

Experimental graph

Maps and indications

Molecular formula

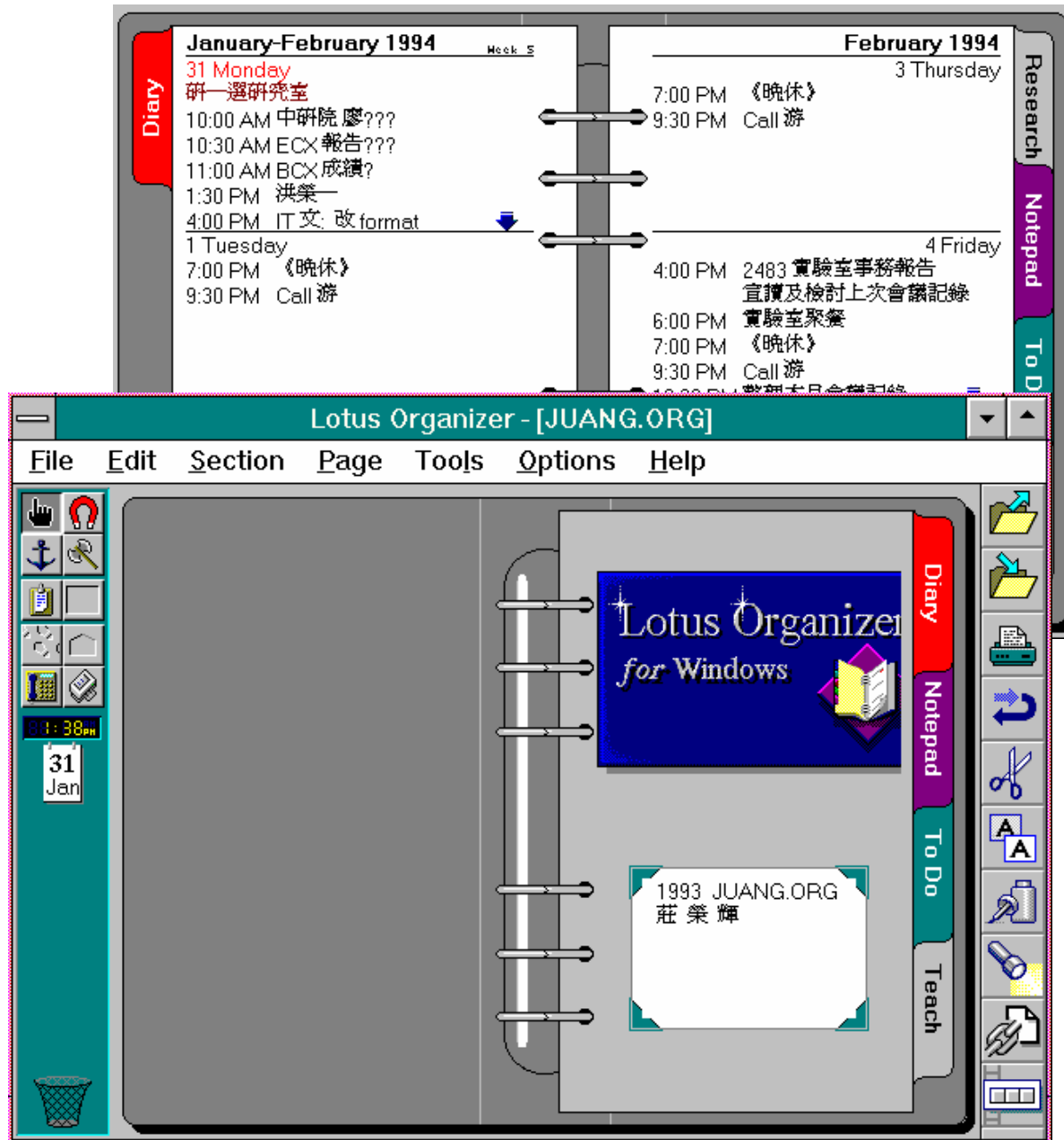
DNA sequence alignment

Amino acid sequences

▼ Bitmap also editable

Put labels on any bitmap
(for a electrophoresis gel)

■ 每日生活排程軟體 Organizer organize you life



▼ Personal information management

Diary

To do list

Note pad

Address book

▼ A dynamic notebook

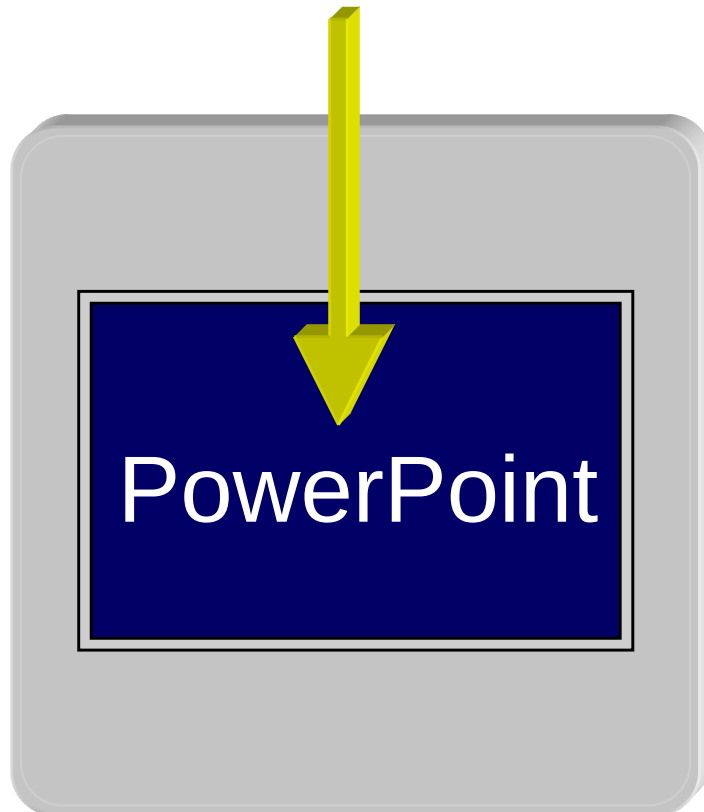
Week view or month view

Convenient linking

No page limitation

■ 展示成果 PowerPoint demonstrates your result

- Introduction
- Graph
- Flow chart
- Photo
- Results
- Gels



▼ Write on the storyboard

Turn your report into scenario

▼ Design every slide exhaustively

Clean, clear, correct

▼ Rehearsal is very critical

At least five formal rehearsals for an important talk

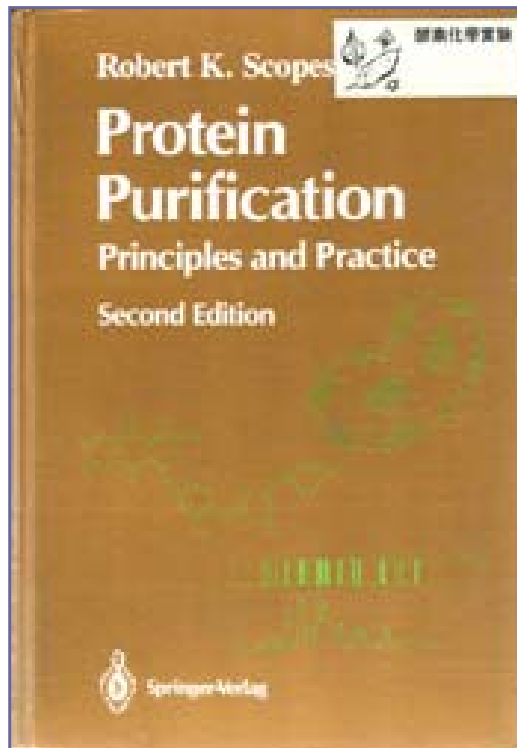
▼ Do your best when talk

Talk enthusiastically and answer the questions frankly

■ 酵素純化工具 References for enzyme purification

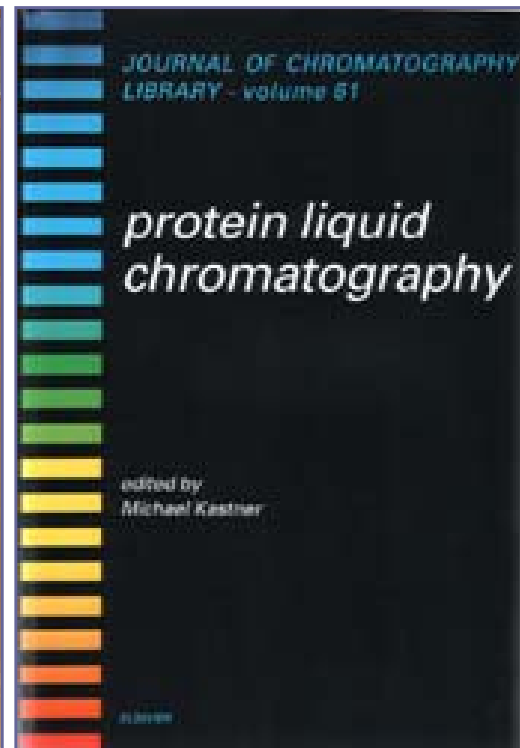


Protein
Purification



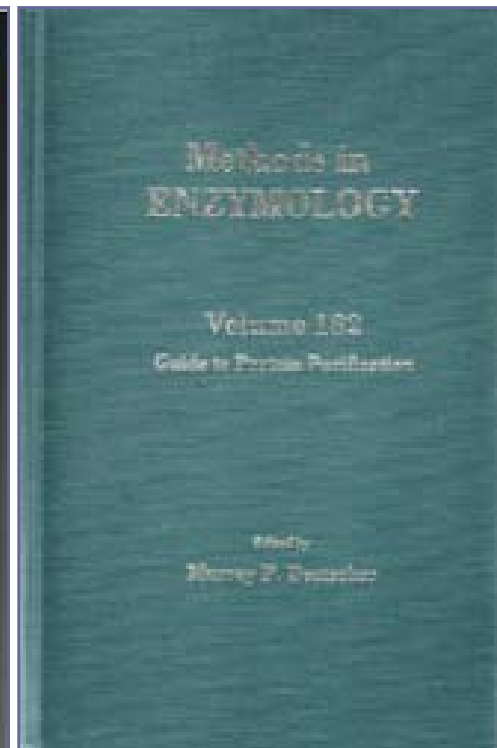
有第三版

Protein Liquid
Chromatography



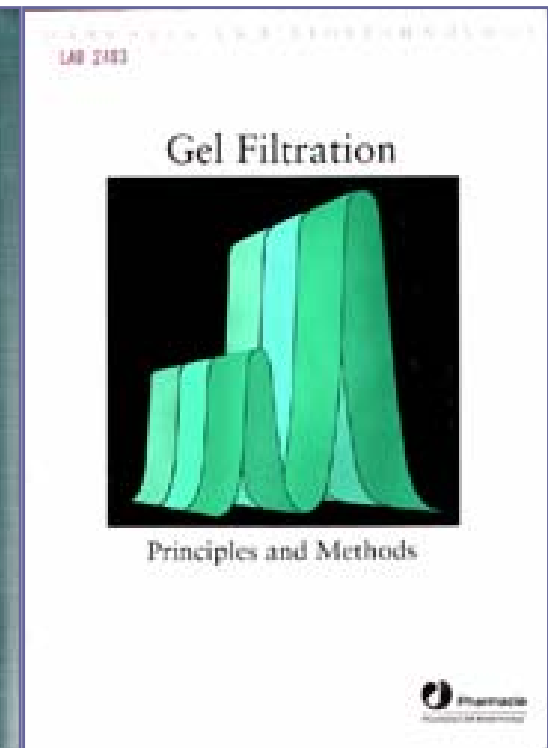
最新最完全

Methods in
Enzymology



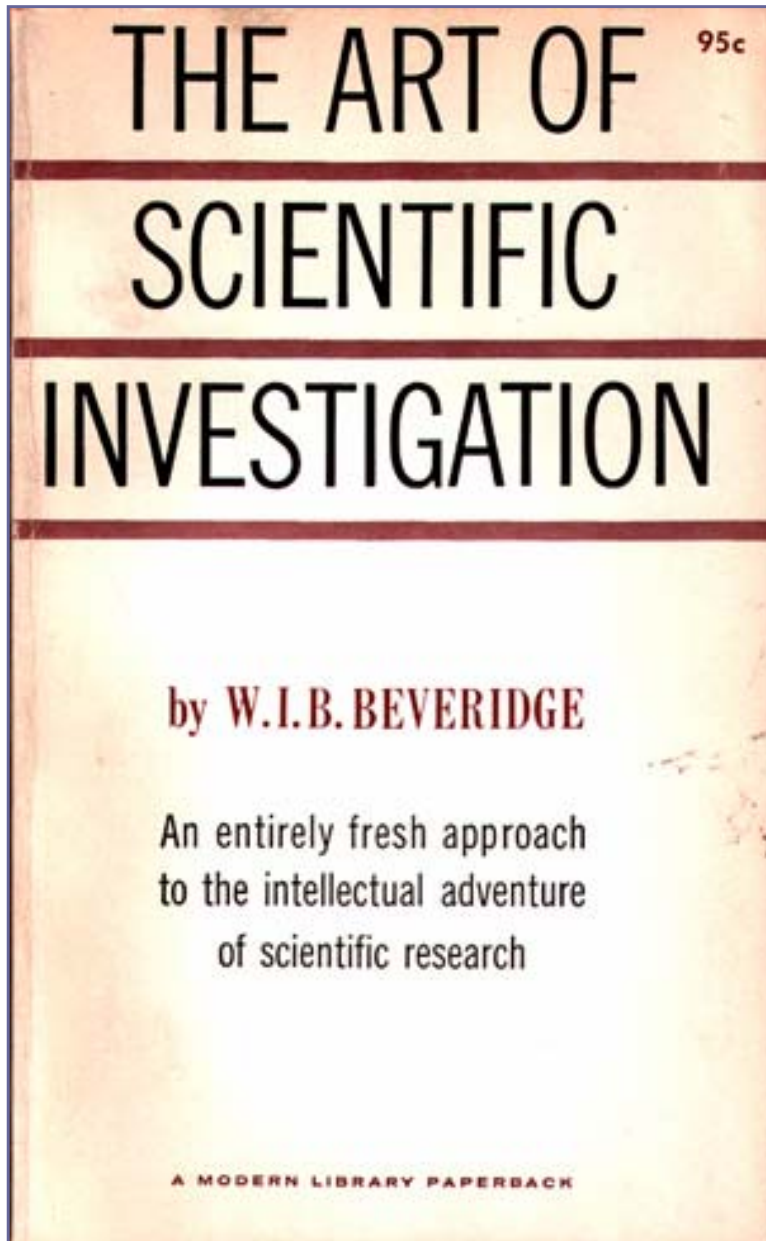
酵素研究寶藏

Pharmacia
Handbooks



完全操作手冊

■ 科學之路 The philosophical aspects for science



構成我們學習上最大障礙的是已知的東西，而不是未知的東西。

達爾文：『大自然一有機會就要說謊』

很多具有時代意義的發現先前都被提出過，只是未能繼續發展研究，直到適逢其人才得以正確展開。

測定智力技能的最佳標準，可能是檢測其放棄謬誤的速度。

人們最出色的工作往往是在處於逆境的情況下做出來的。