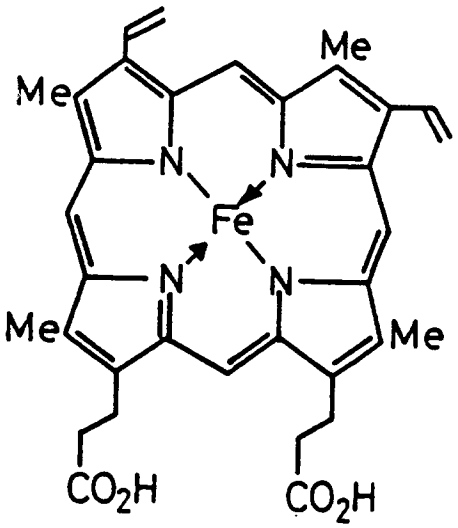
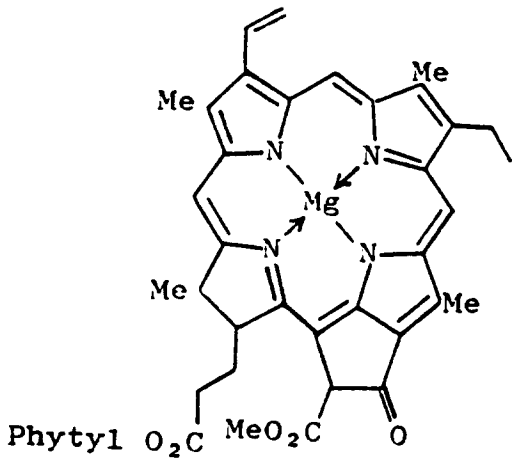
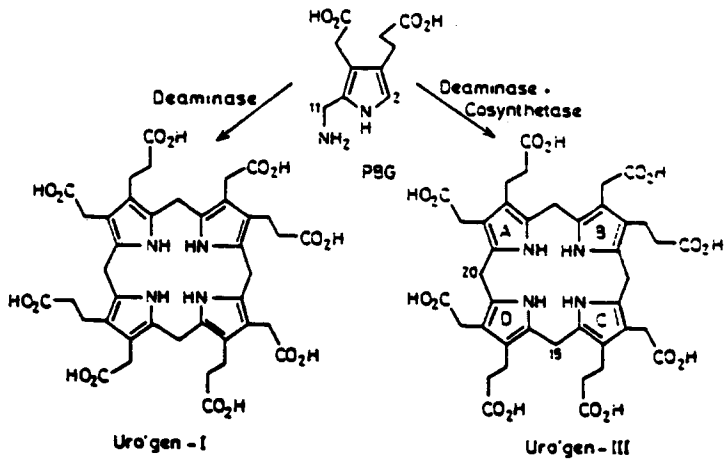


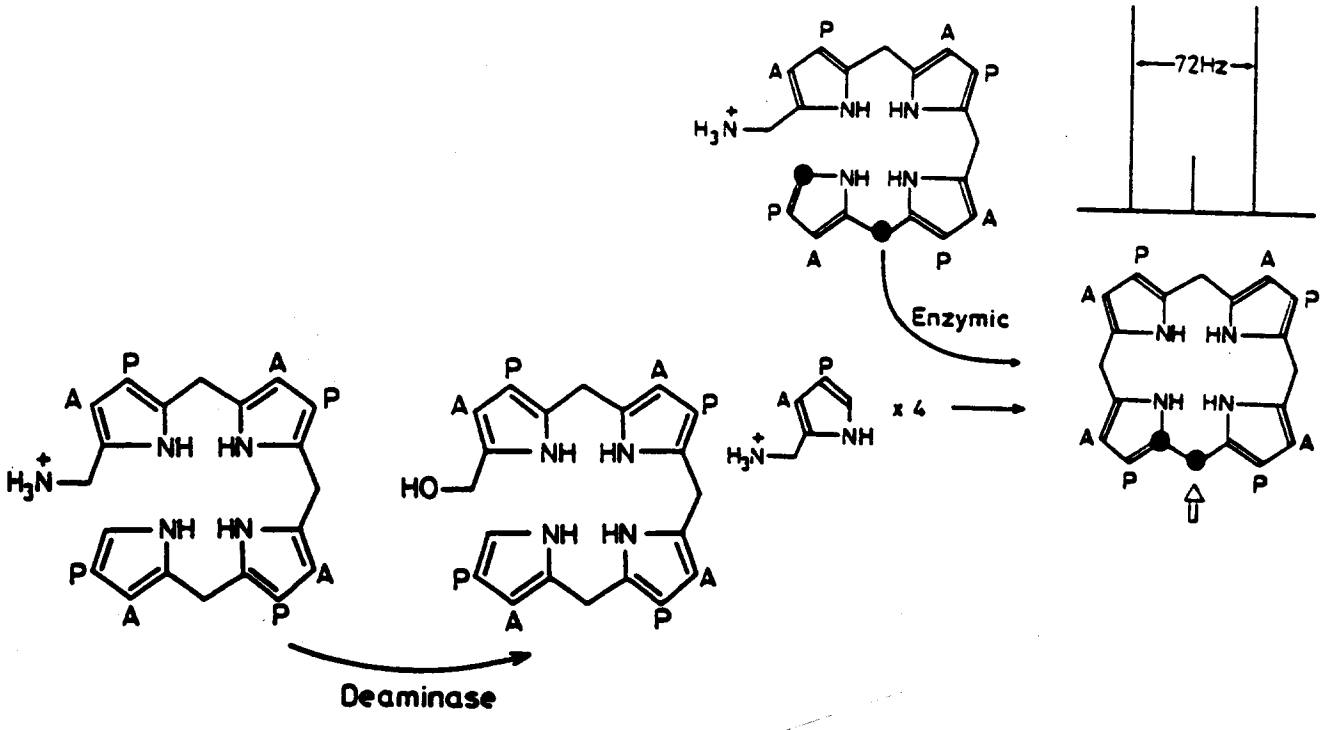
Protoheme

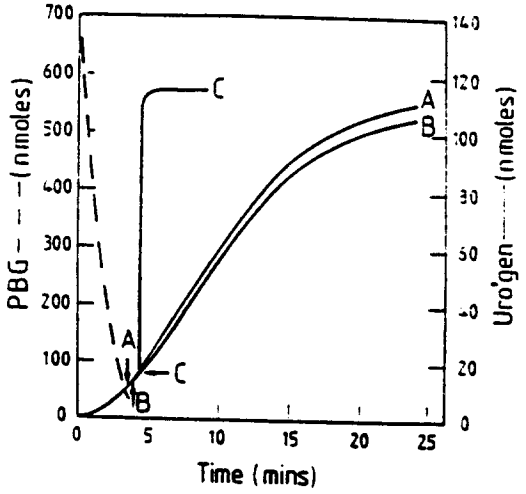


Chlorophyll a



Bogorad, Granick, Neuberger, Rimington, Shemin





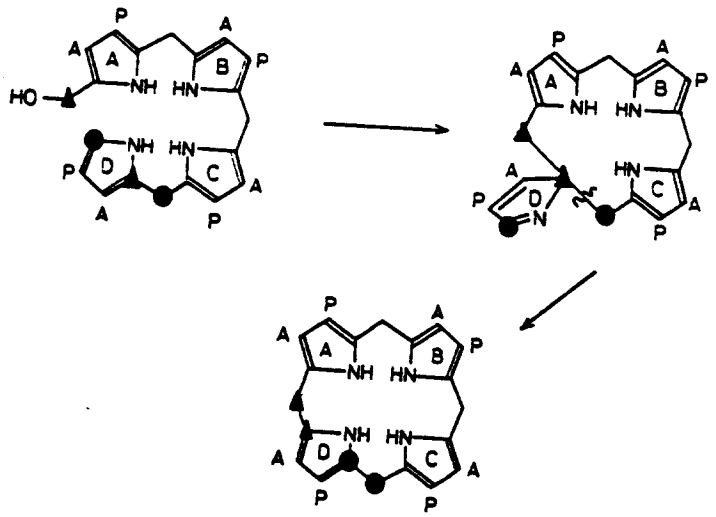
Comparison of synthetic and natural $HOCH_2$-bilane

	$t_{\frac{1}{2}}$ pH 8.25 37°	% Uro'gen-III formed by cosynthetase alone	V_{max} for cosynthetase*
Synthetic	4.0 min	>98	151
Natural	4.2 min	98	148

* μmol uro'gen/hr at 25°/pH 8.25 per ml.

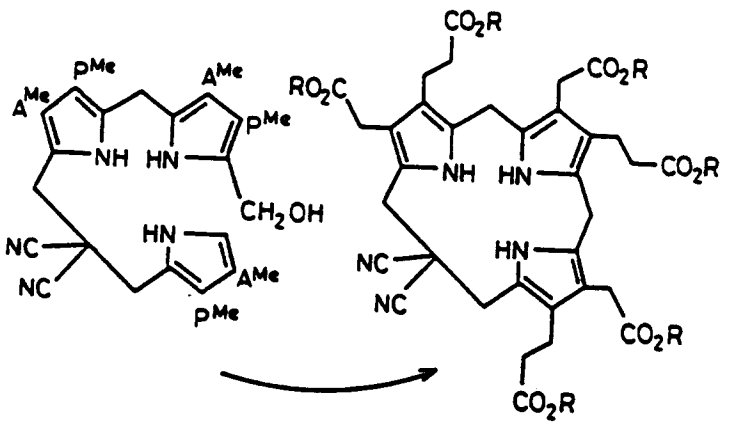
DEAMINASE

1. NOT A RING-CLOSING ENZYME
2. ASSEMBLES OPEN-CHAIN BILANE
3. IN ABSENCE OF COSYNTHETASE, RELEASES HYDROXYMETHYLBILANE



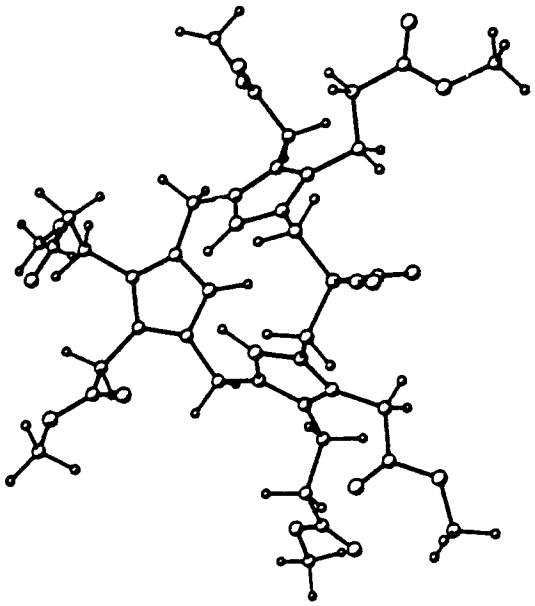
COSYNTHETASE

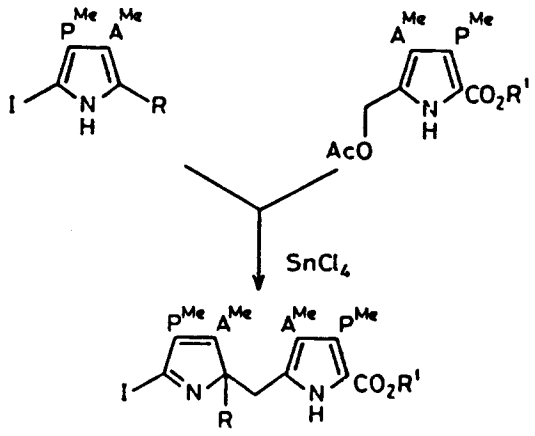
1. IS A RING-CLOSING ENZYME
2. RING-CLOSES HYDROXYMETHYLBILANE WITH REARRANGEMENT ⟶ URO'GEN-III



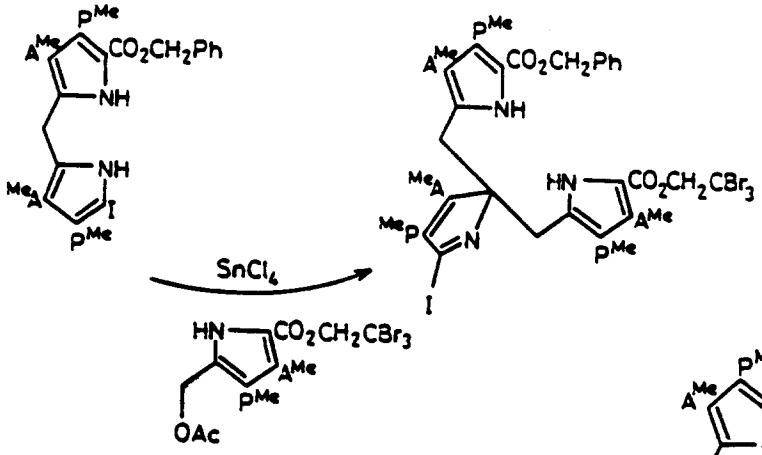
R = Me

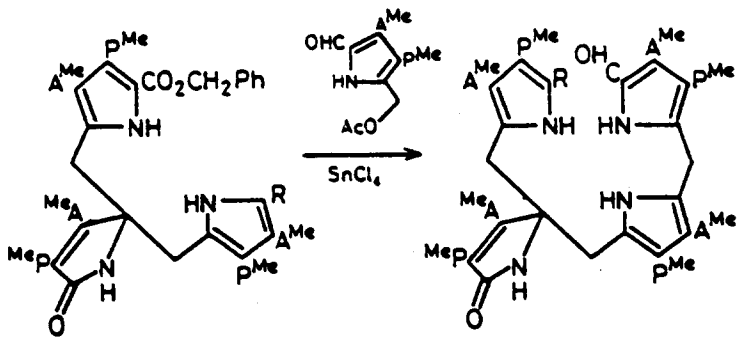
R = H





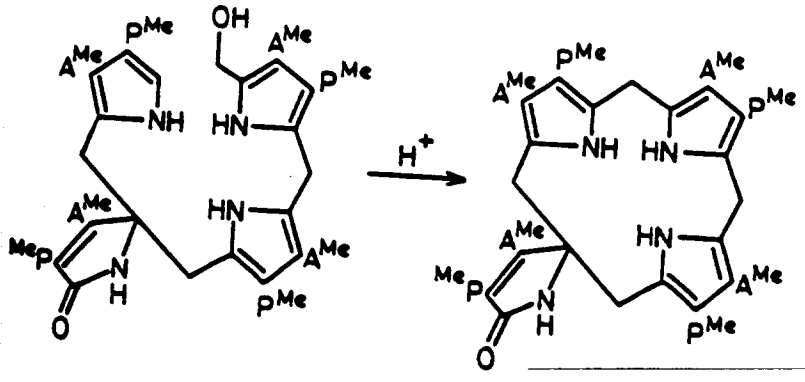
The Stark Reaction

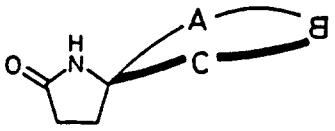


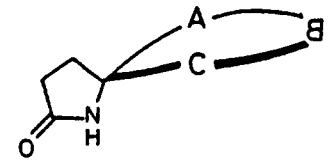


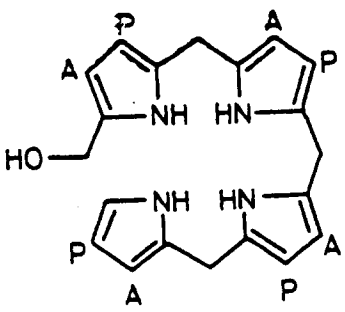
R = $CO_2CH_2CBr_3$
R = CO_2H
R = H

R = CO_2CH_2Ph
R = I
R = H

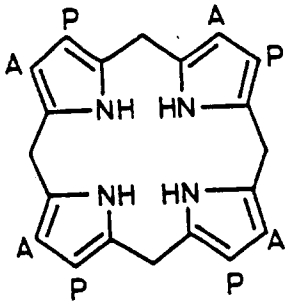






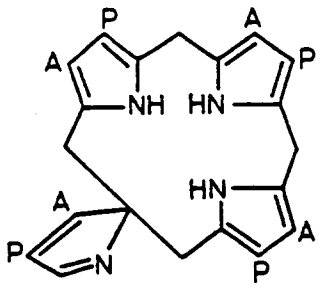


Substrate

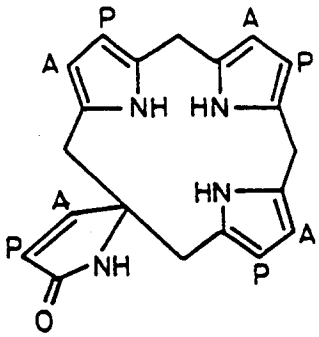


Product

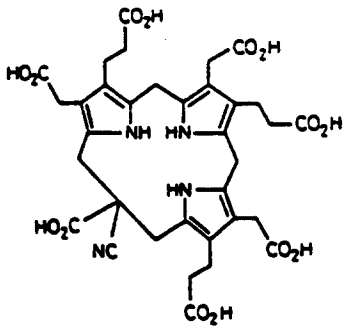
(Cosynthetase)

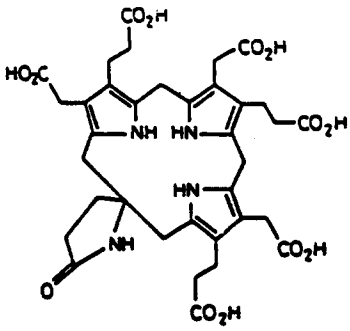


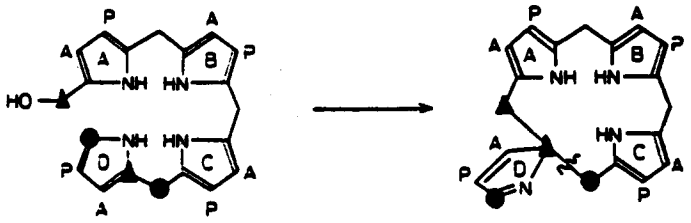
Proposed
Spiro Intermediate



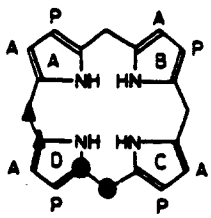
Synthetic
(2 Isomers)



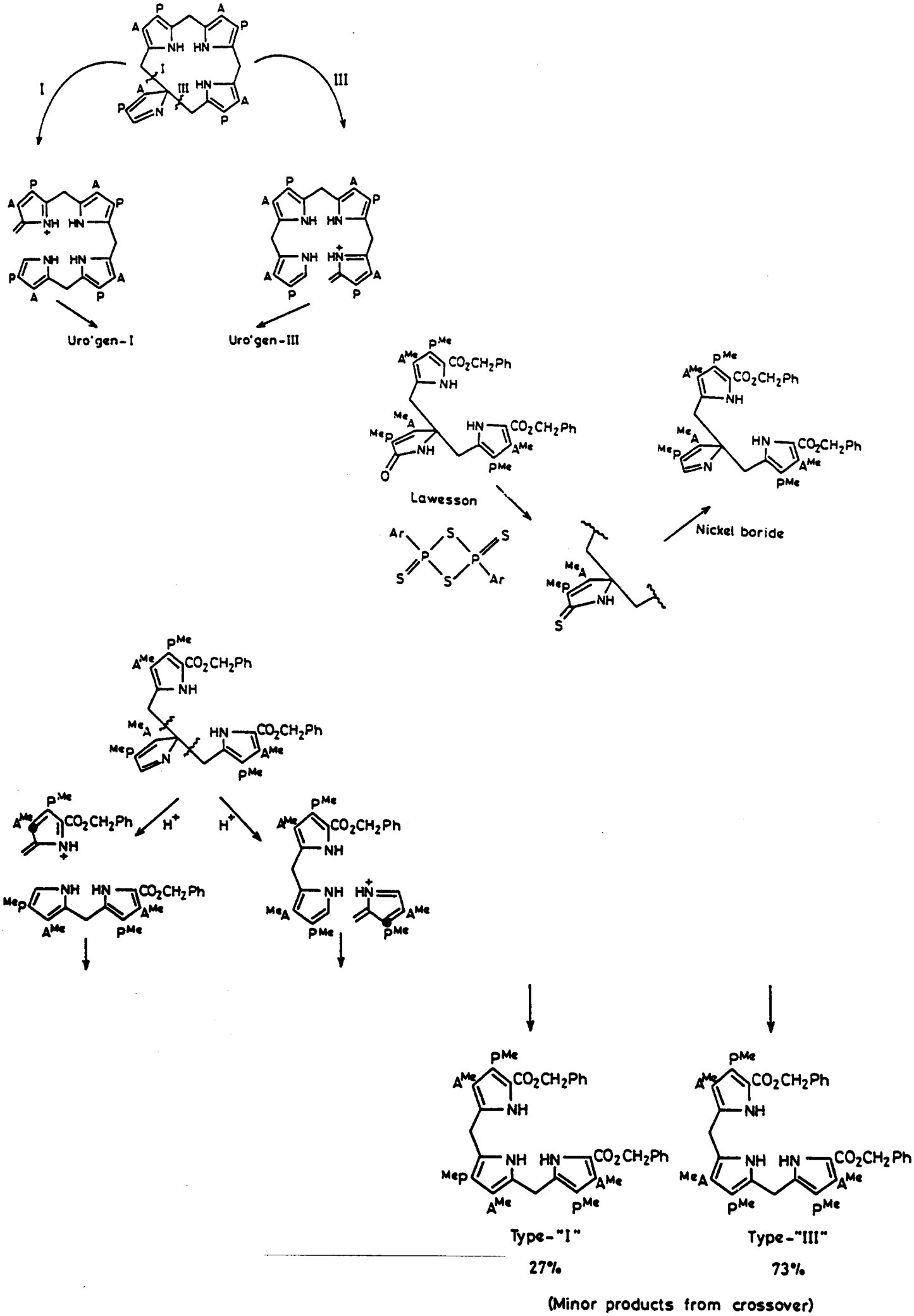


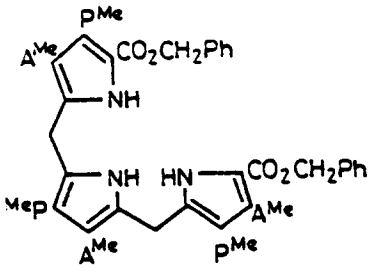


A = CH_2CO_2H
P = $CH_2CH_2CO_2H$



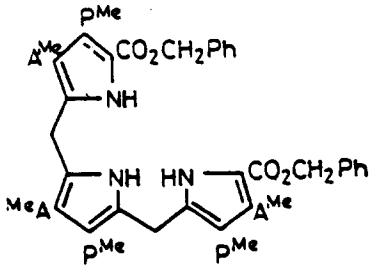
Urogen—III


I
III
Uro'gen-I
Uro'gen-III
Lawesson
Nickel boride
Type-"I"
27%
Type-"III"
73%
(Minor products from crossover)



Type-"I"

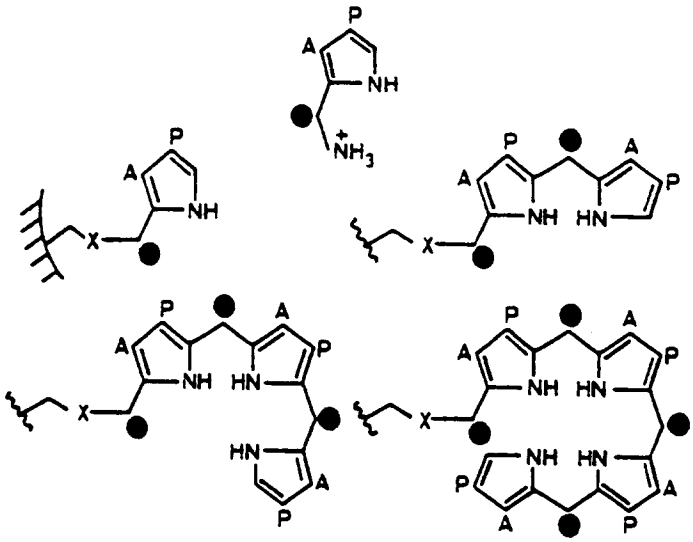
27%

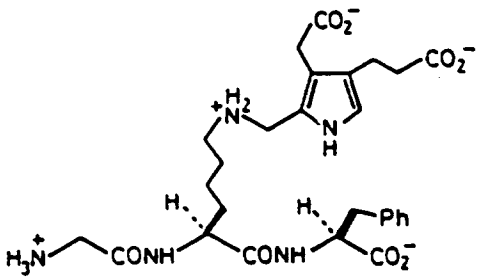


Type-"III"

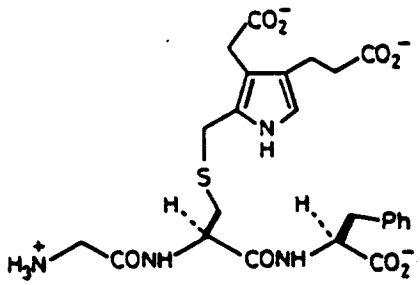
73%

(Minor products from crossover)

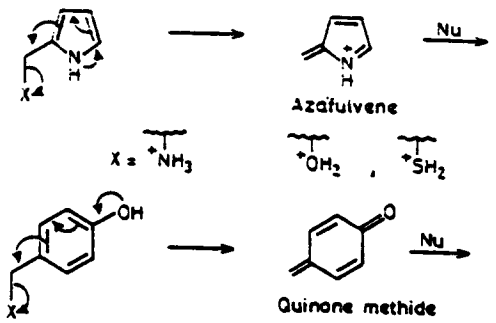


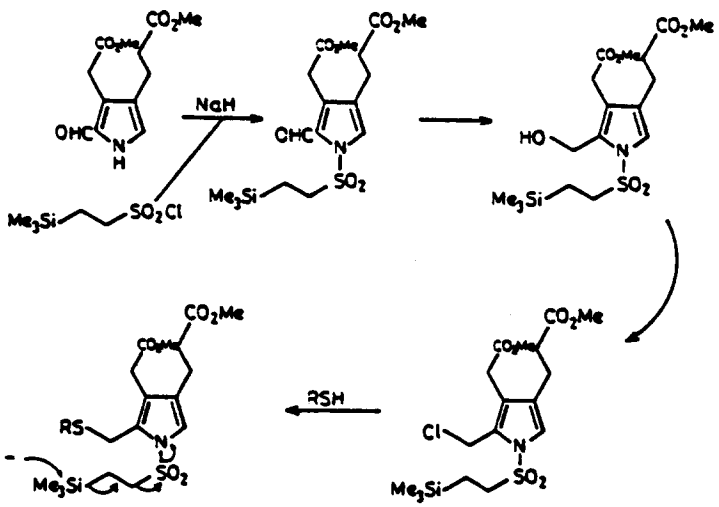


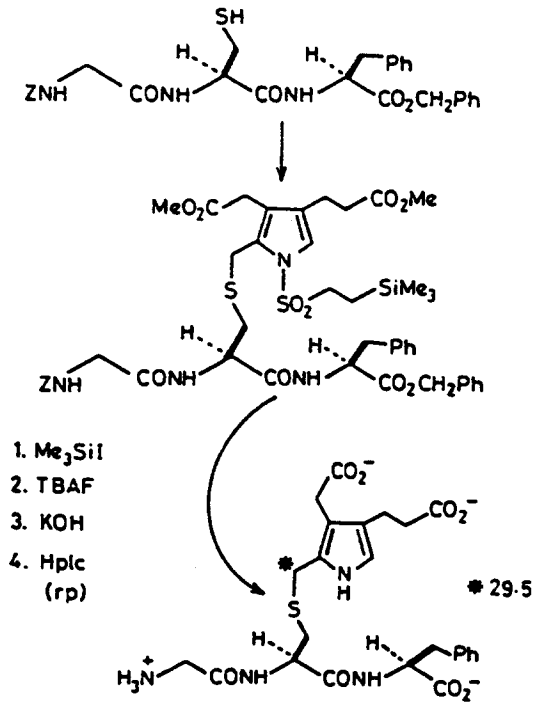
H.gly.lys(PBG).phe.OH

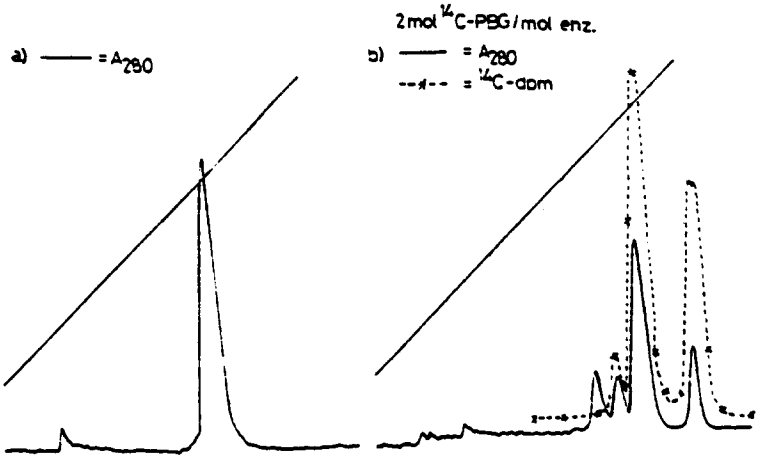


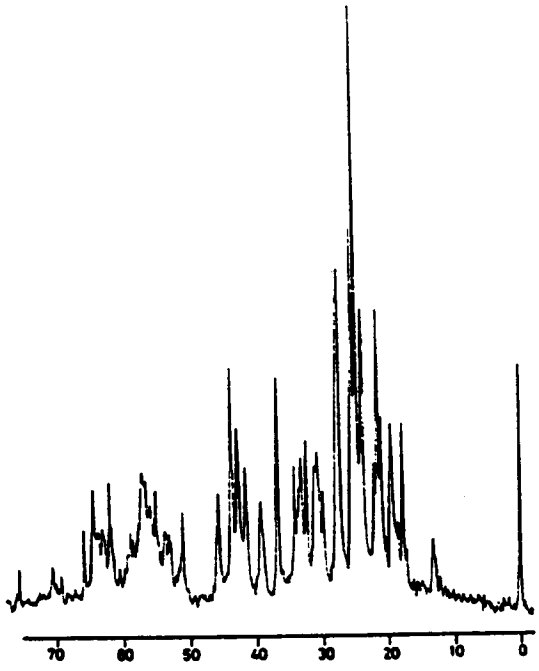
H.gly.cys(PBG).phe.OH

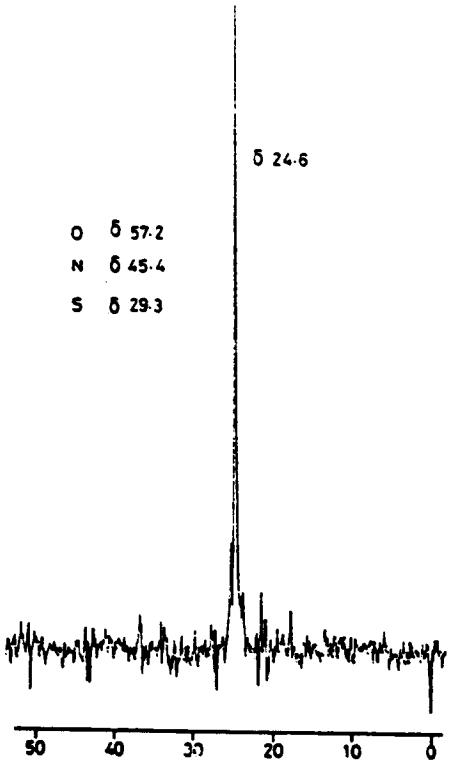


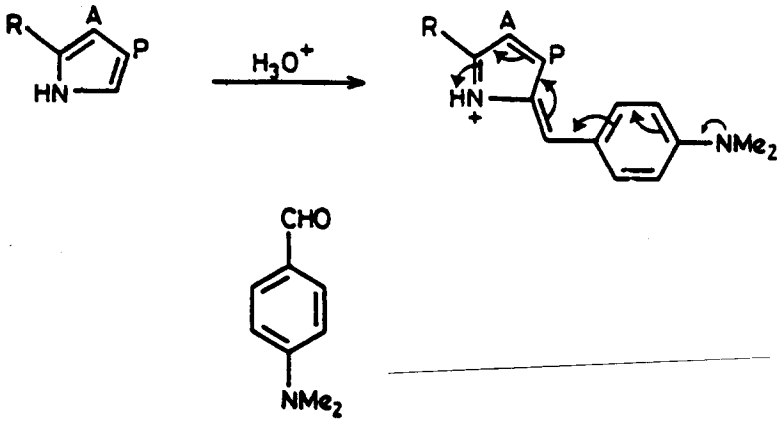



SH
ZNH
CONH
CONH
Ph
CO_2CH_2Ph
MeO_2C
CO_2Me
N
S
SO_2
$SiMe_3$
1. Me_3SiI
2. TBAF
3. KOH
4. Hplc
(rp)
CO_2^-
H_3N^+
* 29.5


2mol ^{14}C-PBG/mol enz.
a) —— = A_{280}
b) —— = A_{280}
--•-- = ^{14}C-dpm

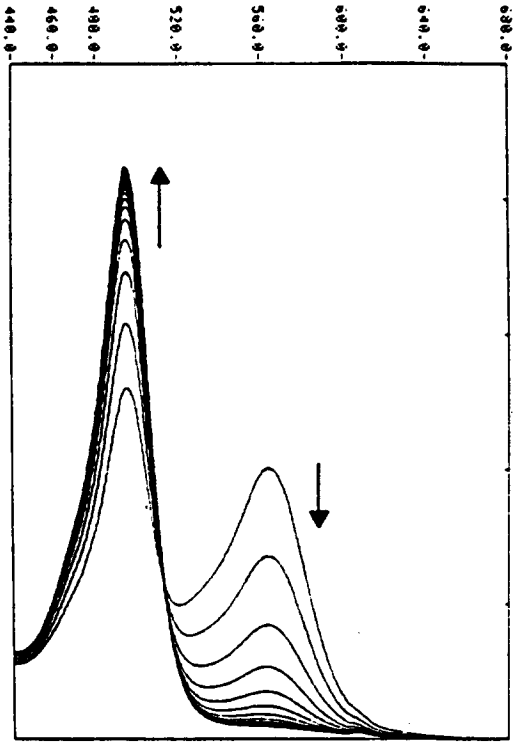

70
60
50
40
30
20
10
0

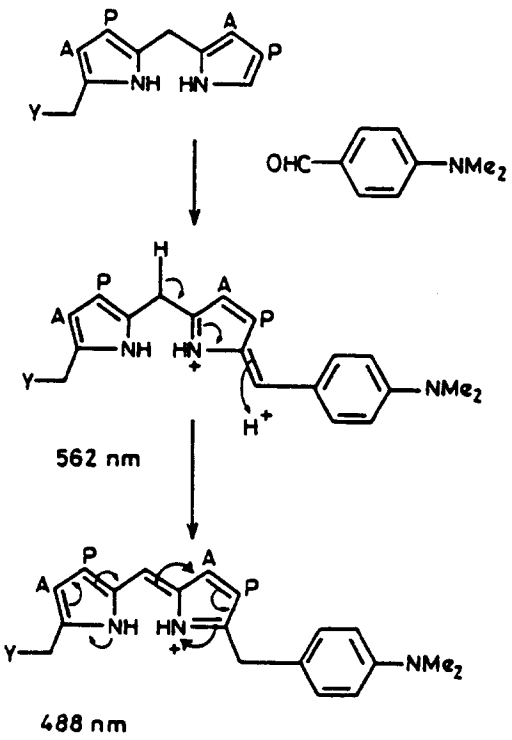

δ 24.6
O δ 57.2
N δ 45.4
S δ 29.3
50
40
30
20
10
0

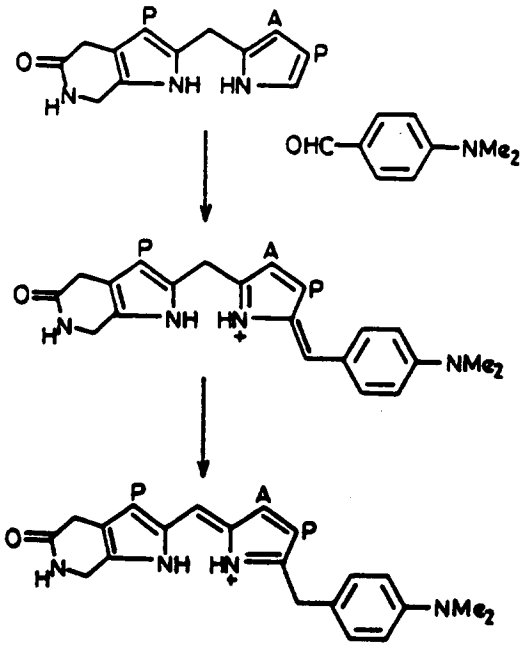

R
A
P
HN
H_3O^+
NMe_2

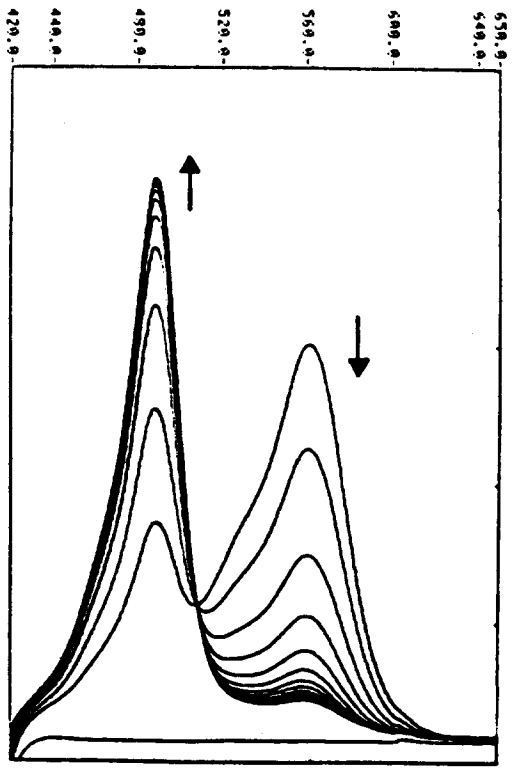
CHO
NMe_2

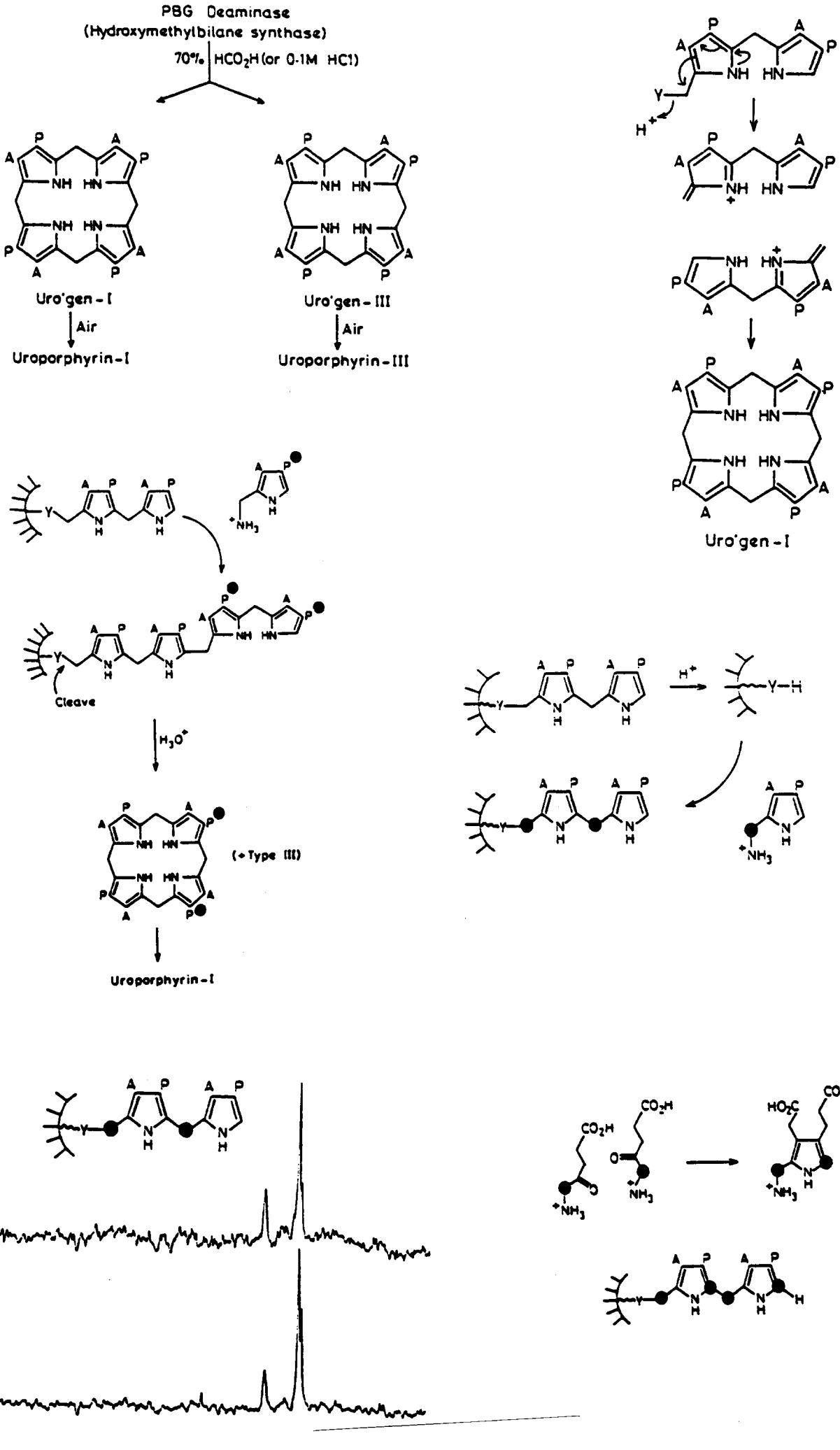
Ehrlich

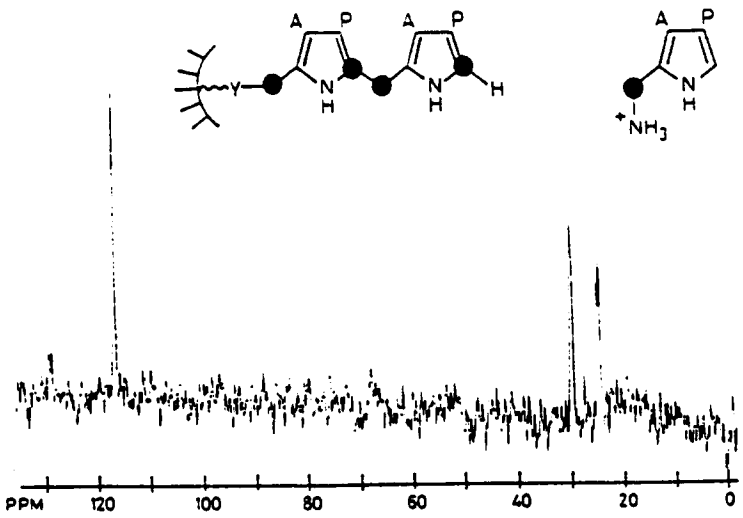


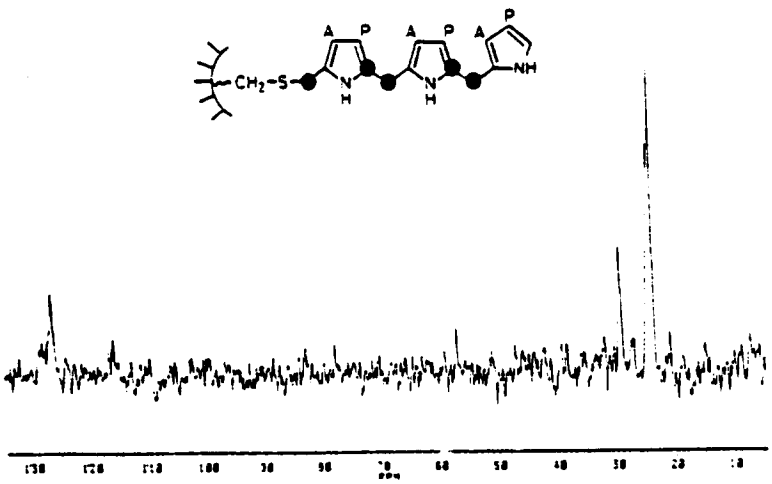

P
A
NH
HN
Y
OHC
NMe2
H
H+
562 nm
488 nm

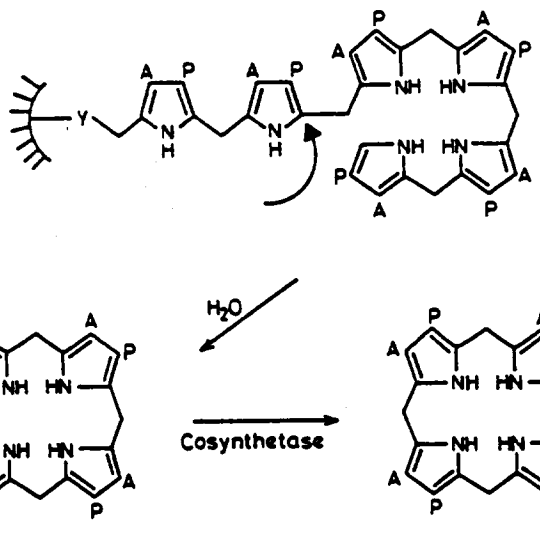

O
NH
HN
OHC
NMe2




PBG Deaminase
(Hydroxymethylbilane synthase)
70% HCO2H (or 0·1M HCl)
Uro'gen-I
Uro'gen-III
Air
Air
Uroporphyrin-I
Uroporphyrin-III
Uro'gen-I
Cleave
H3O+
(+Type III)
Uroporphyrin-I


A P A P
Y
N H N H H
A P
N H
+NH3
PPM 120 100 80 60 40 20 0


A P A P A P
CH2-S
N H N H
NH


P A
A P
NH HN
Y
A P A P
N H N H
NH HN
P A
A P
H2O
HO
Cosynthetase