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(V)

PGBC9B  
C02B11 \*  
SG25/35 \*  
C36G11  
B0012 \*  
M04G8  
C14G1 \*  
C12A12  
SC25/51  
C09F3  
M04G8 1 en88C-5  
MY03

(V)

C27G5  
C38G2  
C39C11 \*  
C13G3  
C28C3 \*  
B0005  
C28B10 \*  
PGBC22 \*  
ACT123

(V)

LCBB2  
C46C8 \*  
C06F5  
C36B12  
C35A10  
A59  
C42H3



C0675  
C30B12  
C35A10  
A59  
C42H3  
C45E2  
D2042  
anconin C42H3  
HISTONE

(V)

C04A8  
C1775  
EB11 \*  
WK10  
COL7

(V)

RW2070-2 \*

53

Job CHW (PAB) queued to SYS\$PRINT on 12-MAY-1985 15:37 by user JES, UIC (JES), under account CB at priority 4, started on printer LPAB: on 12-MAY-1985 15:49 from queue LPAB.

FFFFFFFFFFF  
 FFFFFFFF  
 FFFFFFFF

(1)

PCE7

RE138-

KEYS

90467 •

C27H11 •

RIB

C05F4 +

R0542

SG25/3

PCHCB-10

00309 \*

5023/3

SC25/38 \*



SG25/3

PGBC5-10

C0309 \*

SG23/3

SG25/26 \*

C19G1 \*

centre<-end  
UNC54

(1)

C1258

SG25/26

C33F11 \*

PGBC90'

C12C7 \*

C47H4 \*

B0332 \*

C33F11 odd: 10 rep  
MY01

(1)

C26G11

C0L7

C15A11

C06B12 \*

C43D6 \*

C0L7

Aim of 'mitty' project ~~with 33~~ to completely map C. elegans genome - ultimate goal -  
 Also foster inter lab communication and provide people with information about flanking sequences

## INTRO

### Silly numbers

	b.p./genome.	seq. time.	(50 kb p person/yr)
Coli	$4 \times 10^6$	80 myr	
Yeast	$2 \times 10^7$	400	
nematode	$10^8$	2000	
human	$2 \times 10^9$	40000.	

100x rate to sequence nematode.

What to do to give us handles on these genomes, esp. when large numbers of people involved? interested. Obviously clone, but then once and for all work.  
Mapping = Bank of overlapping set of clones aligned to genetic map.

Allowing easy access to regions of interest for specific projects and, long term, as a prelude to general sequencing.

Nematode : ~ 2500 cosmid clones.

Say library of 6000 with reasonable overlap.

## HISTORICAL

One approach - Olson / yeast -

- precisely run agarose gels of  $\lambda$  clone digests.
- scanning a computer matching & assembly of overlaps.
- resolution of agarose gels may not be good enough for larger genomes.

Sydney & Karn basic idea

SLIDE 1

Not restriction map, but 'fingerprint' to allow construct map by a 'shotgun' approach. re. sequencing strategy

## REASONING in 1988

Main bank (cosmids) 2x sized pSawA in Bam site (importance of sizing. of 1988.)  
 (Insert size by agarose gel ~ 35 kb).

Microtitre gridding of 7000 cosmids.

Hedgehogging onto aux. plates for colony growth prior to miniprep. (Easier than  $\lambda$ s).

f/p as slide  
 Gels - denat. 4%

minimisation of distortion (Wacker metal plate)



Marker digest - 1. SawA  
frag. sizes

SLIDE 2

- Digitisation (currently using sonic dig.)
  - sonic digitiser
  - ref. to standard grid for correction of local distortion and variation.
- Comparison with data base - PRINTOUT
  - probability of matches due to random chance
  - probability cut off. — explain

Assembly of data into 'contigs' - the marking, interactive adjustment, V.Q.O.

- Visual inspection of acceptability of matches
- insufficient accuracy for computer to do this.

overhead simple contig.  
or SLIDE 3

- shuffling interactive on V.Q.O.
- length =
- 'hidden clones'
- notes a chromos. allocat.
- joining.

overhead more complex contig.  
or SLIDE 4

genetic/rusitu  
- Donna  
(1-2000 kb)

Incorporation of markers & clones from other sources (cosmid,  $\lambda$ 's, plasmids if enough Hind III sites).

Overhead, SB4 example?  
but confirmed by M-Gilb.

- few Hind III sites

Statistics to date -

Overhead CEROS?

or write up?

Slides graphs

5

6

2 phase? - hotspots + underlying steady growth of new data but presumably some holes.



Might hope different banks would tend to extend map faster.

(3)

## Analysis of other banks

MIT Mbo  
our mbo  
our RI

Overlap indexes.

Conclusions re. other banks. - all pretty much the same

## Rate of progress

~200 clones/week

Currently = ~800kb (?) growth of map, so still worth proceeding with random approach  
Specific walks overtaken by random.  
Use in walking by probing. **SLIDE 75**  
No 2nd screen.

Families. Ones that don't belong to walk useful anyway.  
- so not altogether an 'all or nothing' method.

## Conclusions.

Working for ~~a~~ nematode-sized genome.  
Human - divide into chromosomes or  
orthogonal digest  
End random approach

Show gene list & explain.  
~~Leaving/walking/negative screening?~~

When and random approach?  
Then leaving?  
walking?  
negative screening?



①.

*C. elegans* genome  $\sim 10^8$  b.p.

BoAxp

i.e.  $\sim 20 \times$  coli

$\frac{1}{20}$  human.

So 2500 cosmid clones to cover with no overlap.

Say  $\sim 6000$  with reasonable overlap.

Shotgun fingerprinting scheme based on idea of  
Brenner & Korn.

SLIDE 1.

Explanation.

Construction of main bank.

- Carefully sized ~~frags.~~  $\sim$  pH. *Sal*3A frags  
in PBS8.

Microtitre plate gridding of 7000 cosmids.  
Hedgehogged for colony growth prior to f.r.  
on denaturing 4% thin acrylamide gels.

SLIDE 2.

Marker digests lanes of  $\lambda$  *Sal*3A

Separation of frags from  $\sim 40$  bp  $\rightarrow \sim 2$  Kb; <sup>20-30</sup> bands/clone

Minimisation of distortion by wackering  
metal plate.

Following exposure, digitisation by sonic  
digitiser, using a standard grid based on the  
marker lanes of an early gel to correct local  
~~distortion~~ expansion and contraction from gel  
to gel.

Digitised data ~~compared~~ compared at a given  
tolerance with the data base as a whole.

Printout indicates possible matches, and ~~is~~  
at the probability of such matches being due to  
random chance.

Visual assessment of matches & assembly  
into 'contigs' by interactive adjustment on VDU



(2)

(Inability of computer to construct contigs due to insufficient accuracy of data (loss of resolution by some digitisation, partial products etc.) compounded with size of genome).

SLIDE (3)

- interactive adjustment on VDU
- length of lines =
- hidden clones.

incorp. of markers & genes  
cosmids,  $\lambda$ 's / plasmids

- chromosomal allocation; <sup>genetic</sup> in situ.
- notes.
- joining.

SLIDE (4).

Allocations

Incorp. of walk  $\lambda$ 's.

Confirmation of dubious assignments, esp. other people clones if not enough Hind III sites - i.e. plasmids,  $\lambda$ 's - by probing different enzyme digests (eg. Bgl  
Notam / Cribbet or apparently matching bands.

Statistics to date, - includes analysis of other banks - more to say later.  
- WRITE UP.

Progress curves - SLIDE 5B.

Rates of progress - ~~SLIDE 6~~.

2000 clones:	1300 kb/100
4500	560 .. ..
7000	240 .. ..

SLIDE 6.



(3)

One might hope different banks would lead to faster acquisition of new data.

Other banks:- Mbo in ~~PS~~ ? PSS9.

Mbo in PSS8.

R1 in PSS8

Mbo in LORISTB.

Varying numbers of clones from each bank f/p'd.  
As a general assessment, we have a program to reduce the contribution of any given set of clones to a histogram.

SLIDE 7.

The height of each line represents the number of bands in the set occurring a given number of times in the database as a whole. Normalised so that the total height of all the lines is the same for a set of any size.

So the more new dot coverage a set provides, the more the histogram will be skewed to the left.

SLIDE 8.

- similarity of SANJA, R1, Mbo.
- encouragement of LORISTB but small sample a different bug. (C08467 v 1046).

SLIDE 9.

Explanation RAN / on DS.

$$\frac{8 \times 10^{7-4}}{35 \times 10^8}$$

$$\frac{2700}{35180000}$$

B0326 \*

U51

C18E2

U32

H80

C42D8

H148

C24H10

U53

B0422 \*

YP2



46-D2062 (36b, 248)

clone name/control (H gets help) =■

D2062 \*

C07D6

C15G1

806-COL2 (17b, 572)

0  
next clone for current contig/contig control=

(IV)

MSP24-7  
COL2  
COS204  
B0555 \*

COLMSP24

(III)

C01A7  
D2086  
C32G8  
SB13  
B0523  
C10D6 \*  
C17G3 \*  
B0303  
SUP5

C02D5  
C43G3  
C03B9 \*  
C06E1 \*  
C13G5  
C05C11 \*



807-L51 ( 8b, 37)

```
clone name/control (H gets help) =
```

(X)

C05F6

C14DZ

\*

CZ5H1

C15C11 \*

C08A6

\*

B0015

C01G4

DZ071

\*

C12D12

B0468 \*

484

C11H11 \*

C0ZF1Z \*

B0004

H138

C33B7

C03H7 \*

H87

C27D7

C18B2

YOLK 3-8

C01C4

B0295 \*

L51

DZ001

YP3 YP4

clone	gene		genetic%	in situ%	
PCE7	RIB	(I)	99.9	0 - 0	60kb
U32	VIT2		0.0	0 - 0	127kb
YOLK 3-8	VIT3,4	(X)	0.0	11 - 26	282kb
SG25/36	UNC54	(I)	97.0	0 - 0	58kb
COL3	COL3	(IV)	84.2	0 - 0	191kb
SG25/35	MYO3	(V)	0.0	45 - 65	93kb
C05F1	EP7	(III)	68.6	60 - 74	215kb
EEG4	LIN14	(X)	58.0	0 - 0	134kb
HK5	PHYO		0.0	0 - 0	19kb
COL6	COL6	(II)	0.0	0 - 0	109kb
PGBCE6S	MYO2	(X)	0.0	52 - 74	75kb
C15G3	C15G3	(X)	0.0	50 - 70	134kb
C14H8	TC1A	(X)	57.8	0 - 0	53kb
ACT13	ACT4	(X)	0.0	17 - 29	64kb
C05C9	TC1G	(X)	57.9	0 - 0	92kb
SG25/26	MYO1	(I)	0.0	40 - 53	84kb
C10F8	TC1K	(X)	57.8	0 - 0	110kb
MSP113-1	MSP113	(IV)	0.0	32 - 49	47kb
IG10A	LIN12	(III)	68.3	0 - 0	240kb
HSL151	MHSA	(IV)	98.4	0 - 0	75kb
SB1	tRNA-W4		0.0	0 - 0	60kb
L122	L122	(IV)	88.8	0 - 0	57kb
C04F6	VIT5		0.0	0 - 0	58kb
COL7	COL7	(I)	0.0	0 - 0	43kb
PGBCE2	ACT123	(V)	51.5	35 - 60	98kb
YOLK 2-3	VIT1	(X)	0.0	0 - 0	162kb
COL2	COL2	(IV)	84.9	0 - 0	116kb
MSP24-7	MSP247	(IV)	84.9	0 - 0	116kb
IICOL9	COL9	(X)	0.0	0 - 0	61kb
LDM17	UNC22	(IV)	89.7	0 - 0	70kb
LCEH2	HISTONE	(V)	0.0	30 - 45	79kb
L121	L121	(IV)	89.9	0 - 0	33kb
SB15	tRNA-W1	(IV)	90.3	0 - 0	113kb
TP3	tRNA-W2		0.0	0 - 0	103kb
RW7	tRNA-W3		0.0	0 - 0	49kb
SB2	SUP7	(X)	41.4	0 - 0	51kb
SB13	SUP5	(III)	68.1	0 - 0	147kb
D2406	CALMOD	(IV)	0.0	52 - 68	47kb
MSP2-4	MSP24		0.0	0 - 0	135kb
CGBP1	CGBP1	(IV)	88.3	0 - 0	30kb
L138	L138	(IV)	87.9	0 - 0	14kb
L136	L136	(IV)	87.6	0 - 0	58kb
C33C3	UNC86TC1	(III)	67.5	0 - 0	85kb
COL8	COL8	(III)	0.0	0 - 0	58kb
WK10	COL?	(V)	0.0	0 - 0	53kb
RW2070-2	5S	(V)	0.0	70 - 80	7kb
RH7	GAPDH		0.0	0 - 0	28kb
MSP24-2	MSP242	(IV)	84.9	0 - 0	116kb
MSP2-13	MSP213		0.0	0 - 0	135kb
MA7	MSP/2		0.0	0 - 0	47kb
RUSSB7	16KHS		0.0	0 - 0	46kb
L5.1	L5.1	(II)	50.5	0 - 0	35kb
C01D10	MSP7G		0.0	0 - 0	147kb
C55B8	MSP/1		0.0	0 - 0	88kb



HARVARD CLUB OF NEW YORK CITY  
27 WEST 44TH STREET  
NEW YORK, N. Y. 10036

March 18, 1965

Dear M,

Excuse my not answering  
sooner.

I will love to see you  
when you come to the States.

Though it would be difficult  
to put you up at the house,  
(Mom's recuperating from a heart  
attack) I should like to  
put you up at the Harvard Club  
which is quite nice or a hotel  
around the corner if you wish  
to be closer.

How was Peggy leaving party?  
Send my love to the lab and  
particularly to Peggy.

Please write if I should reserve  
My 20 + 21.

Yours,

George Pessen

P.S. If there are requests that tell what's been  
happening at the lab for the last 5 years please bring.

Mut-M

Paul.  
-send.

May 19/2003



Graham Hatfull  
129 York St., Apt. 2E

U.S.  
0101

Newhaven, Connecticut 06511

15/19

(1) 203-787-4166



Work: [203 <sup>unassigned.</sup> 436 2163.]

436

~~785-4042~~

Info: ~~436 4771~~

203-785-4584

~~785-4584~~  
785-4584



Keith  
Howe 301-897-8546

Lab 301-496-9106

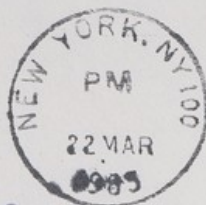
Lab Mol. Gen.

NINCDS/NIH

Bldg 36

Bethesda MD 20205

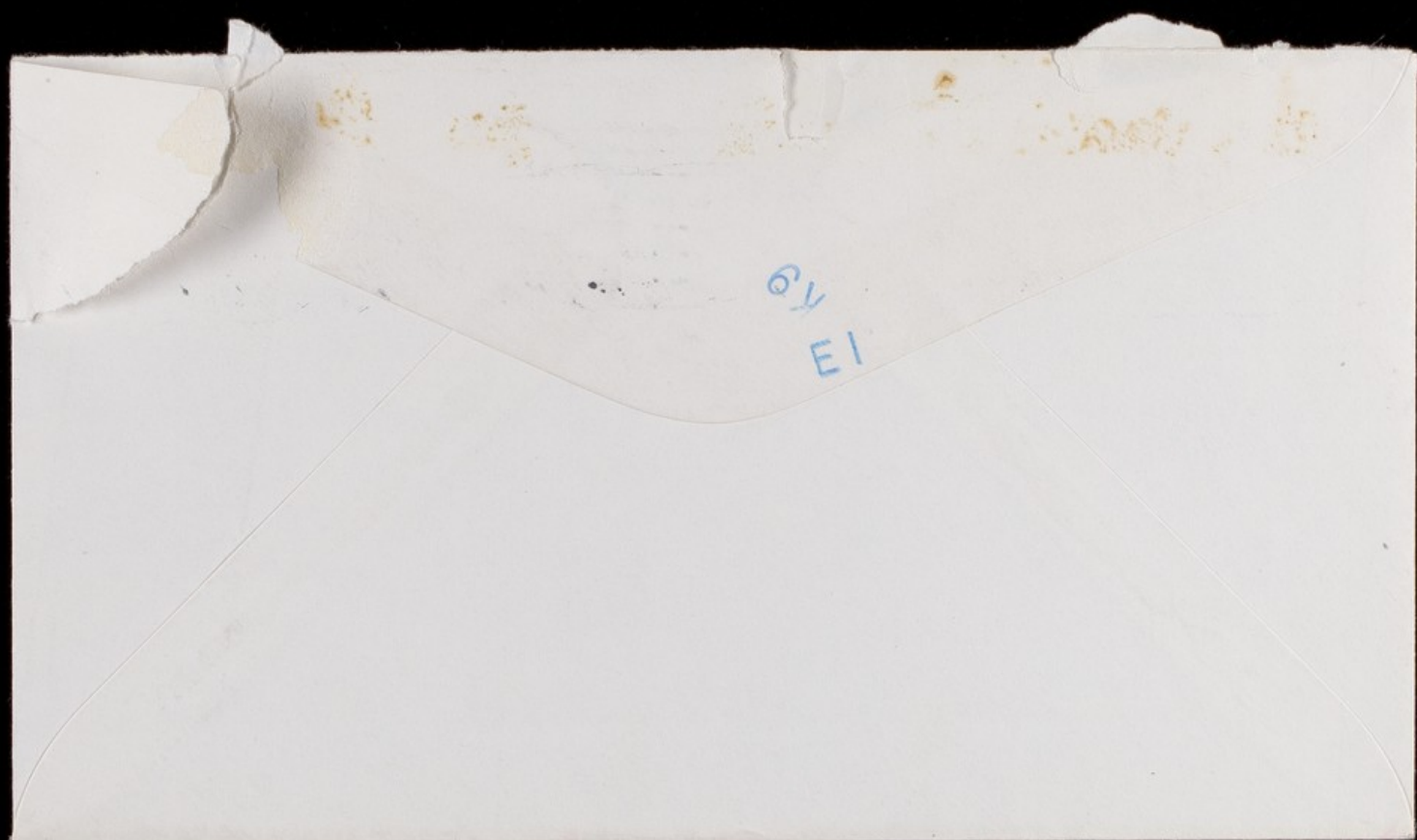
*Dr. George Rosenzweig*  
HARVARD CLUB OF NEW YORK CITY  
61 West 62nd St Apt 116  
27 WEST 44th STREET  
NEW YORK, N. Y. 10036 10023



Mr. Alan Coulson  
M.R.C. Laboratory of Molecular  
Biology  
Hills Road  
Cambridge  
England

VIA AIR MAIL







Cold Spring Harbor Laboratory

Cold Spring Harbor, New York 11724

Dr. Coulson:

Dr. Tieczenik called with the following message. He has booked a room for you at the Harvard Club, 44th St. between 5th and 6th, New York city, for the nights of the 20th and 21st. He'd like you to be his guest. They'll charge \$77.00 per night.

Please call him and leave a message as to whether you have enough information.





**Cold Spring Harbor Laboratory**

Cold Spring Harbor, New York 11724

Dr. Coulson

COLD SPRING HARBOR LABORATORY

P. O. BOX 100  
COLD SPRING HARBOR, NEW YORK 11724

SUMMER PROGRAM OFFICE

Dr. Alan R. Coulson  
MRC Laboratory of Mol. Biology  
Hills Road  
Cambridge CB2 2QH ENGLAND

INVOICE NO M 29855

DATE 1985

C.S.H. ACCT. NO.

401-00-683

C. ELEGANS Meeting, May 15 - 19, 1985

Registration  
Room and Board

146  
244

TOTAL PAID (Fees waived by organizers)

390

**FEES WAIVED**

**PART I**

PLEASE INCLUDE OUR INVOICE NUMBER WHEN MAKING PAYMENT



COLD SPRING HARBOR LABORATORY

P. O. BOX 100  
COLD SPRING HARBOR, NEW YORK 11724

SUMMER PROGRAM OFFICE

Alan Coulson  
MRC Lab of Mol Biology  
Hills Road  
Cambridge ENGLAND

INVOICE NO M 29019

DATE 1985

C.S.H. ACCT. NO.

401-00-683

C. ELEGANS Meeting, May 15 - 19, 1985

Registration  
Room and Board

146  
244

TOTAL

390

Deposit

112

BALANCE DUE

278

PART III

PLEASE INCLUDE OUR INVOICE NUMBER WHEN MAKING PAYMENT

COLD SPRING HARBOR LABORATORY  
Cold Spring Harbor, N.Y. 11724

(516) 367-8346 from 9 a.m. - 12 p.m.

REGISTRATION:

All participants must register at Blackford Hall (3rd building on your right) upon arrival.

PARKING:

If you drive to the Laboratory, DO NOT PARK in any of the Laboratory parking lots as ALL SPACES are reserved for employees. You will be informed at registration where your car should be parked.

MEALS are served at Blackford Hall:

Breakfast	7:30 - 9:00 a.m.
Lunch	11:30 - 1:30 p.m.
Dinner	5:30 - 7:00 p.m.

HOW TO REACH THE COLD SPRING HARBOR LABORATORY:

BY CAR:

Using Long Island Expressway, Exit 41 North (Rts 106-107). Stay on 106-107 and bear right at fork (106-Oyster Bay). Take Route 106 to intersection of Routes 106-25A (East Norwich). Make right turn onto 25A; go about 5 miles to top of steep hill. At foot of hill, to the left, a three-story, gold Victorian house marks the Lab entrance. If you pass the Fish Hatchery on right-hand side, you have gone too far.

BY PLANE:

Kennedy and LaGuardia Airports are most convenient to the laboratory. Transportation to the Laboratory from either airport is provided by several limousine services; the most frequently used are Long Island Airports Limousine Service and Transport Limousine of Long Island. It is important to note that the limousine will deliver and/or pick you up at the Laboratory at Blackford Hall, if you ask the driver to do so. Limousines may be reserved by using the free direct phones available in most of the terminal buildings or inquire at any Information counter.

BY TRAIN FROM MANHATTAN:

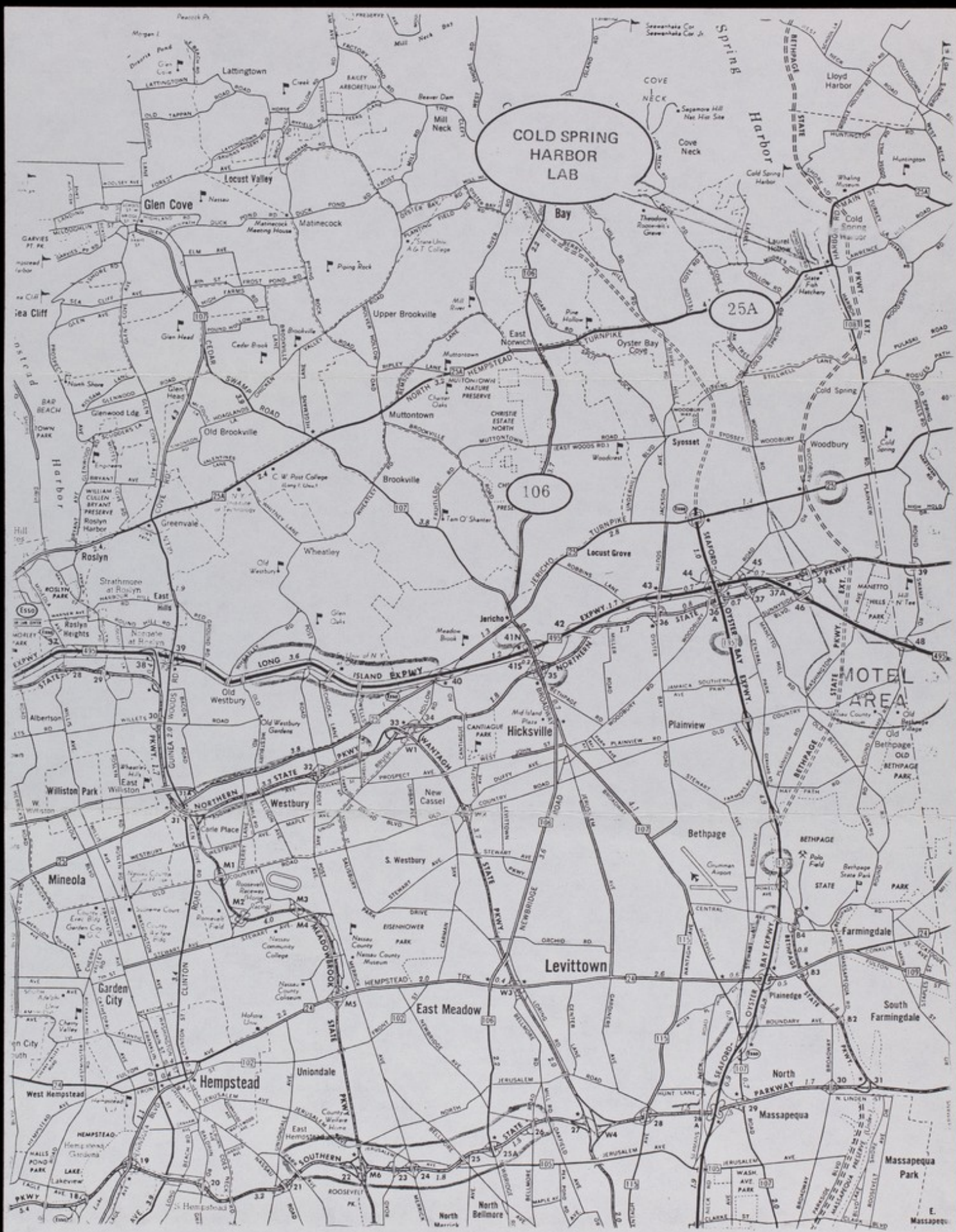
Alternatively one may use the Long Island Railroad which is located on the lower level of the Pennsylvania Station (34th Street and 7th Avenue.). Take the PORT JEFFERSON BRANCH train to SYOSSET.

NOTE: All passengers using the Port Jefferson Branch might possibly change at Jamaica Station.

Take taxi from Syosset to the Laboratory (about 4 miles). Taxis usually meet arriving trains, but in the event that none are available call:

Orange and White Taxi - 271-3600  
Syosset Taxi Service - 921-2141









## Cold Spring Harbor Laboratory

P.O. Box 100, Cold Spring Harbor, New York 11724

C. elegans Meeting  
May 15-19, 1985

### PROGRAM:

The first session begins at 7:30 p.m. Wednesday, May 15, and the last session begins at 9 a.m. Sunday, May 19, 1985. You will receive program information upon arrival at the Laboratory; we do not give it out beforehand.

### ACCOMMODATIONS:

If (coming from the West Coast or overseas) you find that you must arrive earlier than the first day of the meeting, please advise us well in advance so that your accommodations will be ready. There is also a \$60 housing/food charge for each day prior to or beyond the meeting itself.

### RETURN FLIGHT AND LIMOUSINE ARRANGEMENTS:

It will expedite your departure if you sign up upon arrival at the Laboratory - giving us the airport, flight time and airline - we will write in the departure time from the laboratory. Generally, the limousine companies plan on a two-hour trip to the airports because of the congestion on the Long Island Expressway. Signup sheets for airport limousines will be posted in the lower level of Blackford Hall by the Meetings Office.

The last session begins at 9 a.m. on Sunday, May 19, and will probably end between 12 - 1 p.m., followed by lunch; therefore you should plan your return flight after 4 p.m. if you are leaving on the last day.

### CANCELLATION:

If you must cancel out or if someone else will be replacing you, please let us know immediately.

Gladys Kist  
Meetings Coordinator  
(516) 367 8345

Enclosure