

Molecular Epidemiology of SARS in Hong Kong

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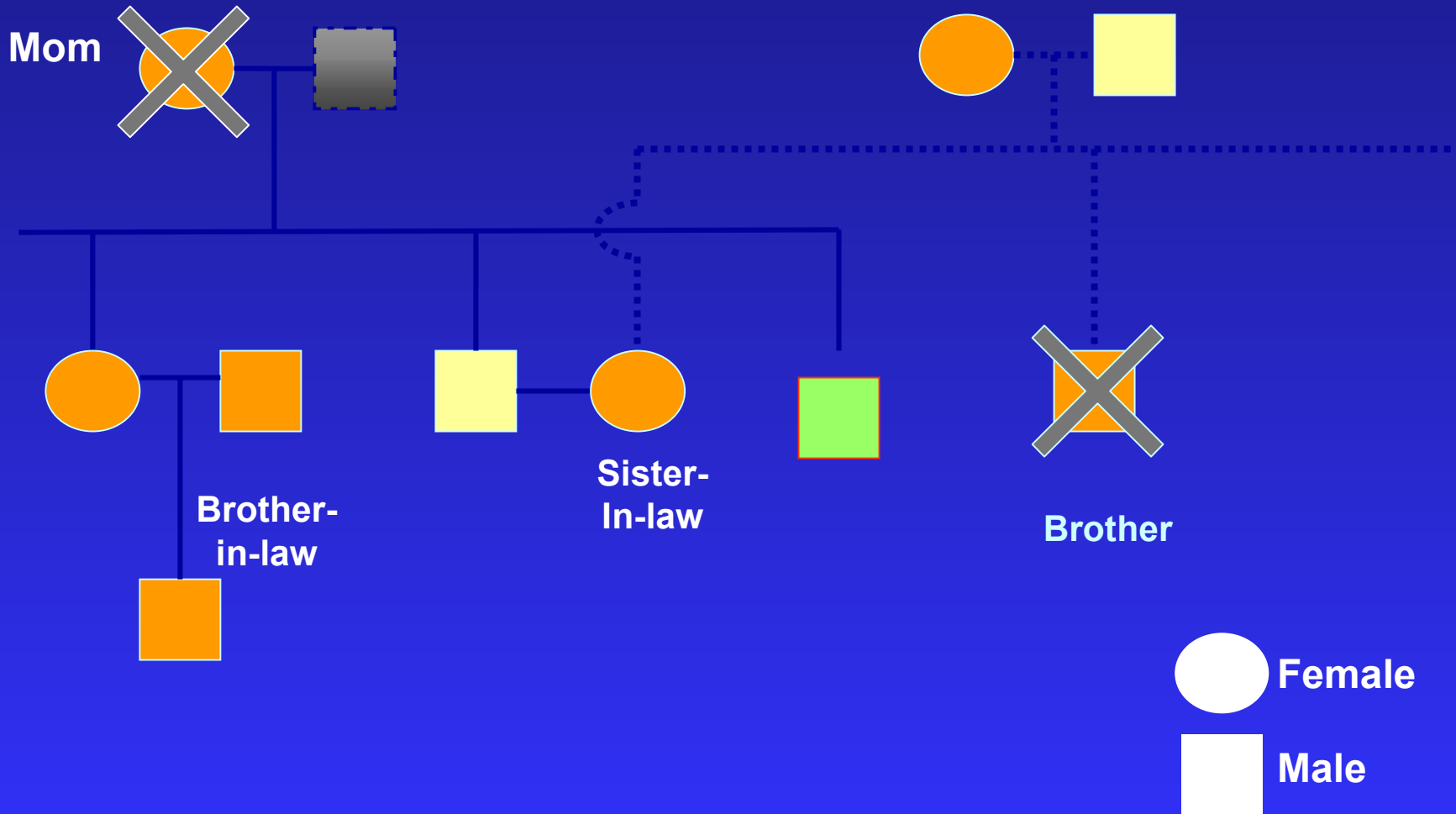
ORIGINAL ARTICLE

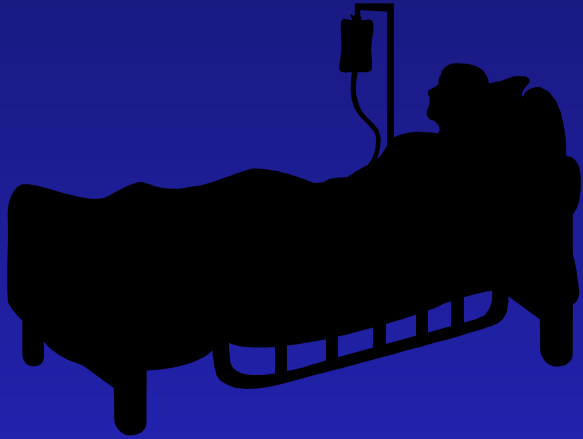
A Major Outbreak of Severe Acute Respiratory Syndrome in Hong Kong

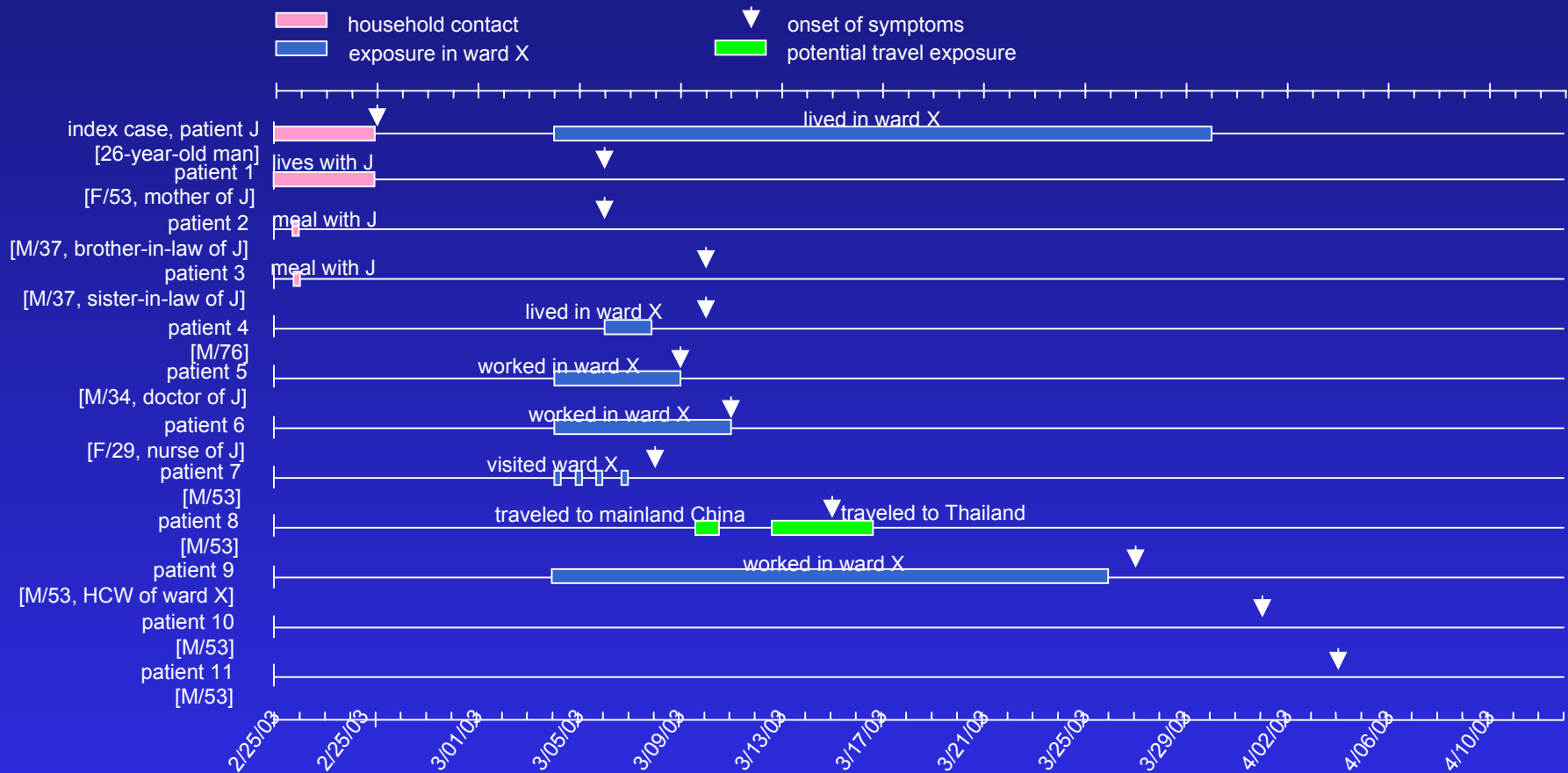
Nelson Lee, M.D., David Hui, M.D., Alan Wu, M.D., Paul Chan, M.D., Peter Cameron, M.D., Gavin M. Joynt, M.D., Anil Ahuja, M.D., Man Yee Yung, B.Sc., C.B. Leung, M.D., K.F. To, M.D., S.F. Lui, M.D., C.C. Szeto, M.D., Sydney Chung, M.D., and Joseph J.Y. Sung, M.D.



The Prince of Wales Outbreak







HCW: health care worker

Patient 10 and patient 11 were admitted to hospital B which is 20 km away from hospital A. They did not recall any contact with the index patient nor travel to hospital A.

1

Mom

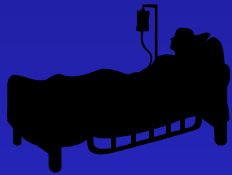
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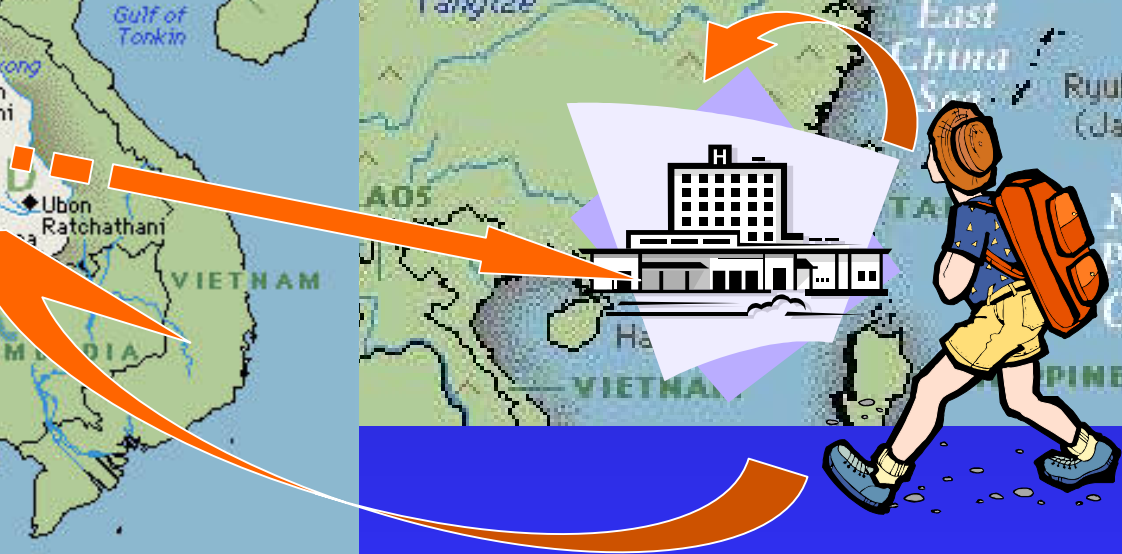
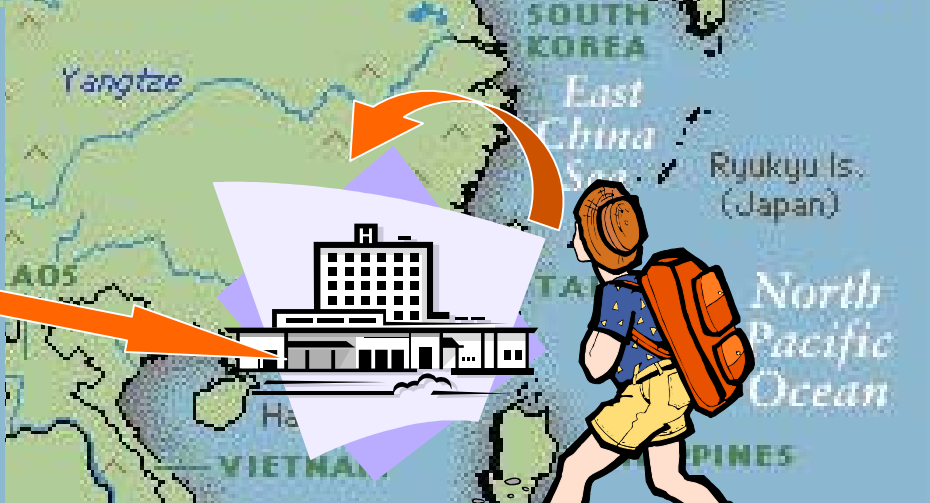
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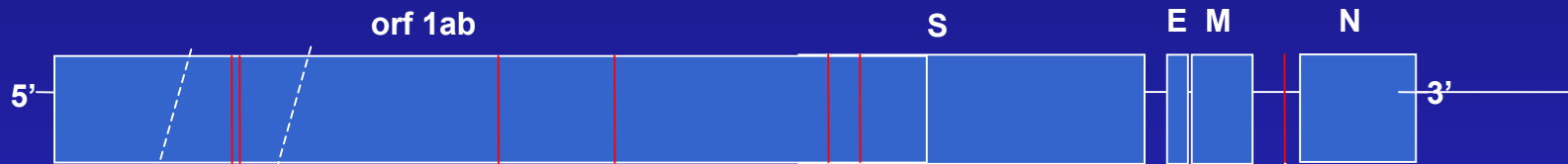


7



Spike gene sequencing





Position	9404	9479	17564	19064	21721	22222	27827
Su-10 nucleotide sequence (amino acid)	T (Val)	T (Val)	T (Asp)	A (Glu)	G (Gly)	T (Ile)	T
CUHK-W1 nucleotide Sequence (amino acid)	C (Ala)	C (Ala)	G (Glu)	G (Glu)	A (Asp)	C (Thr)	C

Implications

More than one strains of virus already in
Hong Kong at the beginning of the
epidemic

The pre-Metropole era

An early SARS case

- visited sick mother in Guangzhou
- presented 17 Feb 2003
- 2-day history of fever, dry cough
- serological evidence of SARS-CoV infection
- infected 4 household members and 2 HCWs



Nucleotide Position*	GZ01 AY278489	BJ01 AY278488	W1 AY278554	L2	Su-10 AY282752	Tor2 AY274119	Urbani AY278741
3582	T	T	T	T	T	T	T
9404	C	C	C	T	T	T	T
11493	C	C	C	C	C	C	C
17564	G	G	G	G	T	T	T
19838	G	G	A	A	A	A	A
21721	A	A	A	A	G	G	G
22222	C	C	C	C	T	T	T
27243	T	T	C	C	C	C	C
27827	C	C	C	C	T	T	T
	Not linked to hotel M				Linked to hotel M		





The Amoy Gardens

The Amoy Gardens



- Alleged index case: renal patient (patient 1)
- Normally lived in Shenzhen
- Regular haemodialysis
- Visited Amoy Gardens on 14 and 19 March 2003
- Amoy SARS outbreak peaked 24 March 2003

Block E

Unit 8

Light well

Unit 7

Patient 2 (23 Mar)

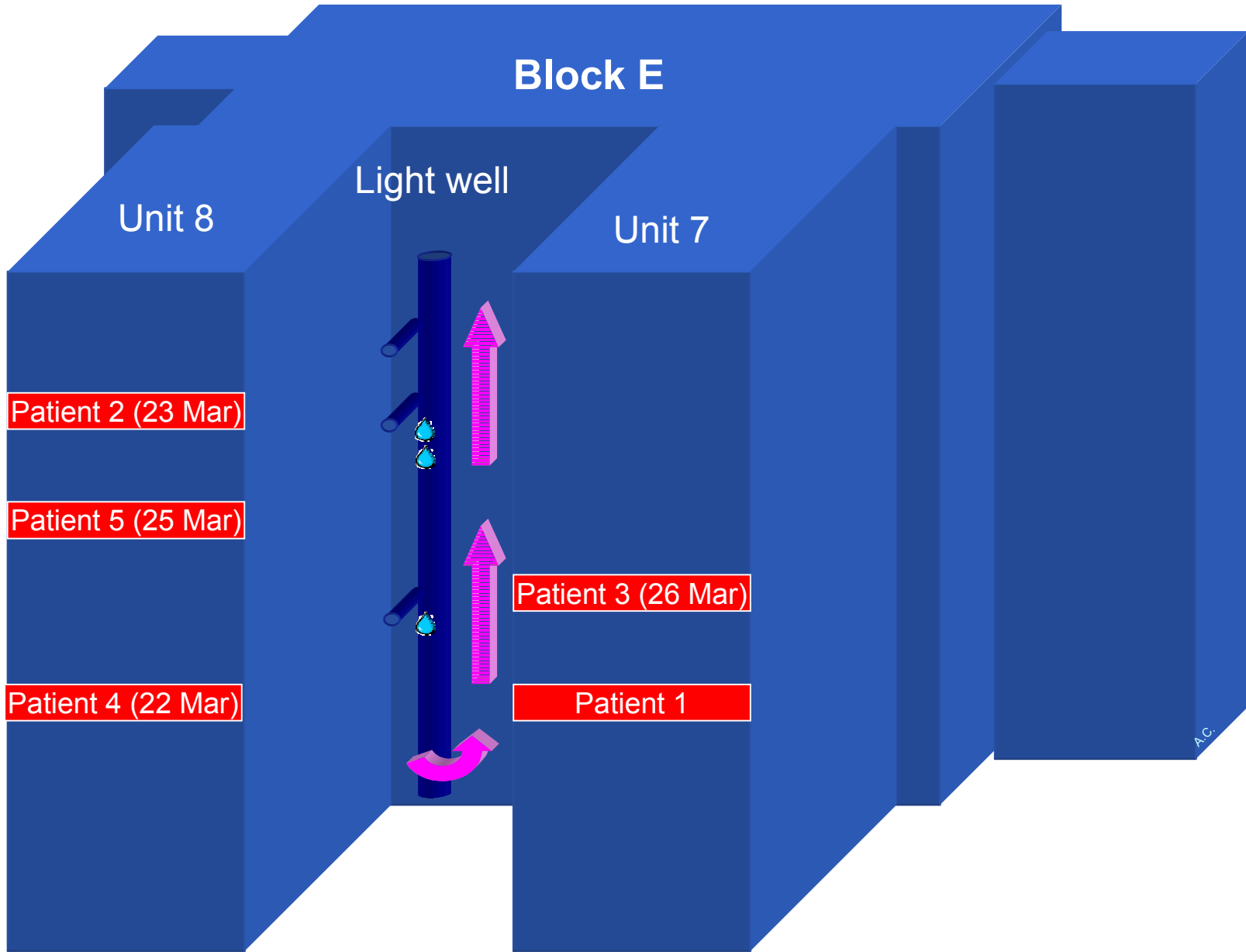
Patient 5 (25 Mar)

Patient 4 (22 Mar)

Patient 3 (26 Mar)

Patient 1

A.C.





Amoy Gardens Patients

Nucleotide positions*	Open reading frame*	Tor2 †AY274119	Urbani †AY278741	Mother of J Su-10 †AY282752	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5
3852	orf1a	T Serine	T Serine	T Serine	C Serine	C Serine	C Serine	C Serine	C Serine
11493	orf1a	C Tyrosine	C Tyrosine	C Tyrosine	T Tyrosine	T Tyrosine	T Tyrosine	T Tyrosine	T Tyrosine
17166	orf1b	A Isoleucine	A Isoleucine	A Isoleucine	A Isoleucine	A Isoleucine	G Valine	A Isoleucine	A Isoleucine
28102	orf11	A Asparagine	A Asparagine	A Asparagine	A Asparagine	A Asparagine	C Threonine	A Asparagine	A Asparagine
28696	Nucleo- capsid protein	G Glycine	G Glycine	T Cysteine	G Glycine	G Glycine	G Glycine	G Glycine	G Glycine

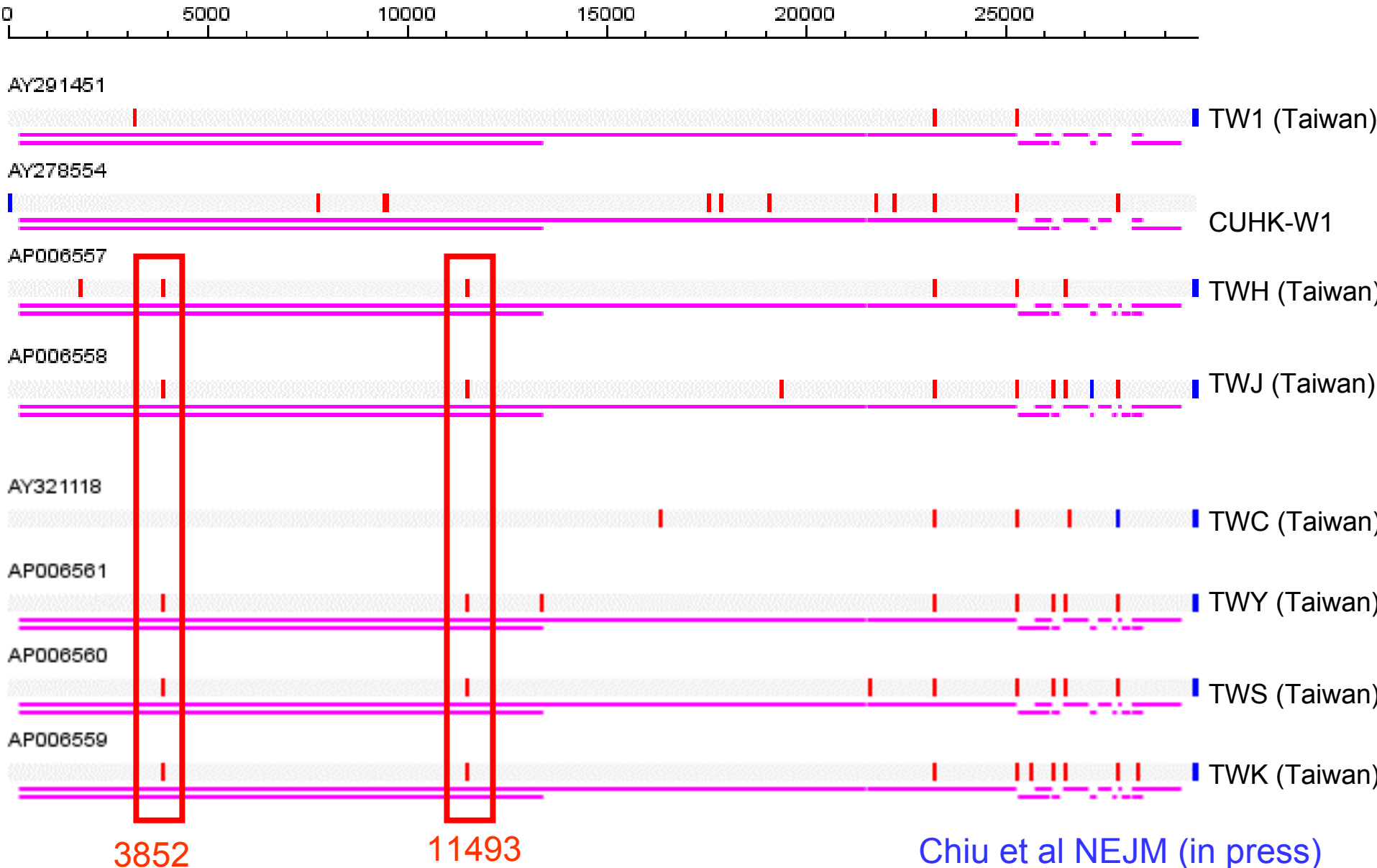
Deductions

- Renal patient likely to be the index of the Amoy outbreak
- No significant mutation in Amoy Gardens virus

20 May 2003

8 August 2003

Amoy and Taiwan outbreak



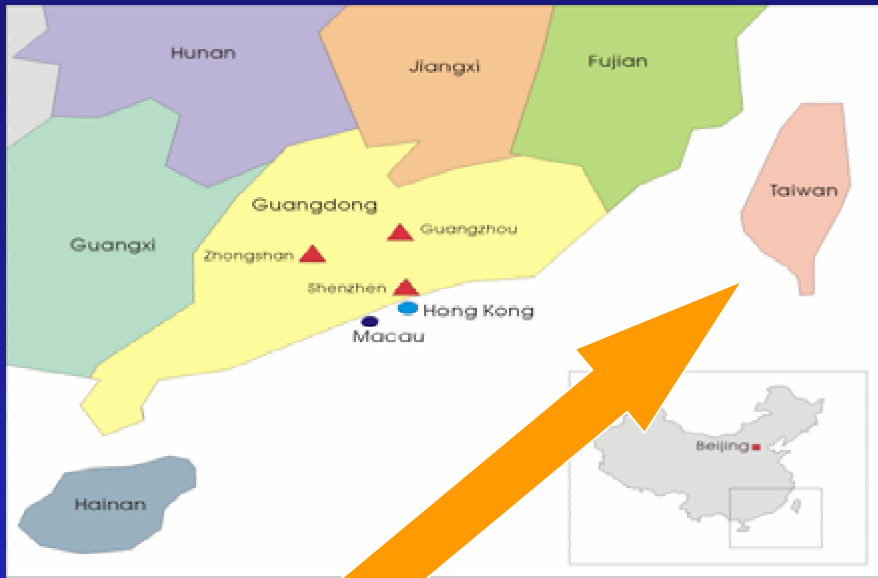
Late Cases

Late Cases

- Phlebotomist from NDH: 18 May 2003 fever onset
- Patient from NDH: 15 May 2003 fever onset

386-nt deletion

- Largest SARS-CoV deletion reported to date
- ?functional implication
- Origin: Hong Kong or elsewhere
- ?clinical implications



Pre-Metropole Period



Metropole Outbreak



Prince of Wales Hospital



Amoy Gardens

Molecular Epidemiology

- Synergy between classical and molecular epidemiology
- History of virus evolution
- Unanswered question: clinical correlation

Acknowledgements

- The Chinese University of Hong Kong
Molecular SARS Research Group
<http://www.hkbic.bch.cuhk.edu.hk/>
- Prof. G.P. Zhao, Chinese National
Genome Center at Shanghai

Thank you