





ORZ RUOXRQWUDDILQRVH IDPLO\ RI ROLJRVDFFKDULGHV 7KH  
DVVLVWHG VHGHSFWRVPHDQGR I QHZ VR\EHDQ RU UHODWHG F  
IHHG SURGXFWLRQ

, DOVR KDG WKH RSSRUWXQLW\ WR OHDUQ IURP 'U %LO\HX  
FURVVLQJ EQRIKWURDQWQGXFHG PXVEDQHWGLDQSRISKEDSVLHR  
JHQRW\SH VDPSOLQJ IRU PROHFXODU JHQHWLF DQDO\VLV  
)XUWKHUPRUH , DWWHQGHG WKH ZHHNO\ ELRLQIRUPDWLF\  
RQ WKH SURJUHVV DQG RXWFRPHV RI WKELGHQDQVIRVLDQWLF  
VWXRG\ 'UV %LO\HX\ V DQG 6FDERR\ V JURXS DQG WKHLU 3K' F

'U %LO\HX\ V ZRUN RQ JHQH GLVFRYHULHV PDLQWHQDQFH D  
UHVXRUFHV JHQHWLF DGYDQFHPHQW DQG SUHFLVLRQ EU  
GHYHORSHPHQWLPISQRZHQGURS FXOWLYDUV , WUHDVXUH L  
PDNH RXU UHVHDFK SURJUDPV LQQRYDWLYH DQG DW WK  
VFLHQFH

Genomic data analysis

, GUDIWHG D WH[WERRN RQ UHVHDFK PHWKRGRORJ\ IRU W  
LQ DJULFXOWXUDO VFLHQFHV SRVWJUDGXDWH VWXGHQW  
DJULFXOWXUDO HGXFDWRUV DQG UHVHDFKFWILUWHQJLQJLQJ  
DQG JHQRPLF GDWD DQDO\VLV GXULQJ WKLV VFLHQWLILF  
UHYLHZHEGWLKHSULQRISSHFXORU JHQHWLF SDUDPHWRU DQG  
PROHFXODU GDWD DVVHPEO\ DQG DQDO\VLV WRLFRVFXWDHQ  
GHGXFH SRSXODWLRQ VWUXFWXUHV RI WHVW JHQRW\SHV L  
GDWD DQDO\VLV ZHUH FUXFLDO WR GHYHORSLQJ WKH GUD  
XQGHUJUDGXDWH DQG SRVWJUDGXDWH SODQWEDQDQV





A

B

C

D

)LJXUHR\EHDQ URRW SKHQRW\SLQJ DW 5ROOLQV ERWWRP  
\$ URRW LPDJH DQDO\VLV IURP GLIIHUHQW DQJOHV GURC  
,

1HWZRUNLQJ DQG FRSSORDJ\RXU\DLWLRQ\

x ,Q WKH ODVW ZHDNLRIY\XO\UGVWRID\H 0HUVKD\TV ODE DW W  
RI &LQFLQQDWL 2KLR JH\OH\DD\QHGQW\SHD\XHHQV\IQQIRUPDWL  
WRROV DQG FORXG FRPSXWLQJ SURJUDG\WO\WHL\XODORUHEV  
SODQW JHQ\YR\LYFLVQJ PXOWLGLVFLSOLQDU\ WHDPV

x , YLVLWHG WKH 8QLYHUVI&K\DRSD\DJQLQ8\B& 8P&D&XVW  
DOORZHG PH WR GLVFXVV ZLWK W&K\HUGRAE\BIDK, Q&Q&D&R  
DQGHH W&B FDPSXV DQG 5HVH\BDS\RDG\FLWEXMVLRQ ZLWK  
6,/ WHDP LQF&X\W\HJ \*R\OGVPLWK %ULDQ 7KHUDEB&G 5LV  
YLVDQ\G LQWHZLD\OWS\RW\HQWLD\OO\ IRUJH FROODERUDWLRQ

7KURXJK W&H\DGQHRW\H FURSSLQJ V\VWHPV VSDQQLQJ WK  
DQG ,OOLZRV\H[FLWHGHVZRJ\W&GHUW\WHLRQ PDLJH YDULHW\ Z  
SODQW HUHFW\H\B\DLWH\SH VKRD\Q\G SOD\Q\W&K\HLJ&DQW  
GHQV\W\XUH



x 'U )HOL[ )ULW ~~WFKD~~ PDVG 0HJKQDWK IQ ~~DDQF~~ DQ \$ Q B UHZ 6DFE  
DQG WKH %D\ )DUP WHDP & ~~BUQOVREQ~~ DQ ~~GGHI~~ ~~DNOS~~ ~~ERRUDW~~  
x 'U 5LWD 0I ~~RDP~~ UDQJLQJ DQ \GYK ~~WRW~~ & QJ  
x 'U 7HVID\H 0I ~~RUV~~ ~~WIK~~ H ~~DQ~~ YK ~~RVHW~~ K ~~GJ8~~ WRYHUFLLQ ~~Q~~ DRM & LQ  
x 7KH VWDII RI WKH 8QLYHUVLW\ \$LU%Q% 1DQFS ~~®~~ ~~4~~ ~~N~~ ~~6~~ ~~W~~ ~~D~~