

# )RRG %LRWHUURULVP

%HWW\ :HGPDQ 6W /RXLV

/LFHQVHG 1XWULWLRQLVW DQG (QYLURQPHQWDO +HDOWK 6SHFLDOLVW 86\$

&RUUHVSRLQGXW\ :HGPDQ 6W /RXLV /LFHQVHG 1XWULWLRQLVW DQG (QYLURQPHQWDO +HDOWK 6SH  
/DUJR )/ 7HO )D[ GU EH(VPLD)EHWW\ ZHGPDQ VWORXLV FRP

5HFHLYHG-0QWBU\ \$FFH)SHVW\ GDWH 3XEODUAFKG GDWH

&RSULJKW ( 6W /RXLV %: 7KLV LV DQ RSHQ DFF\$V V W K H L F O K D U W U L O X H G K D W H W K H W H S W R I P  
GLVWULEXWLRQ DQG UHSURGXFWLRQ LQ DQ\ PHGLXP SURRPHG SRHU GHVHOQWLRQ XWKRU PDUNHU V W  
WUHDWPHQW ZRXOG EH FRPSURPLVHG

\$EVWUDFW

3RWHQWLDO 3ORWV RQ 86 )RRG DQ

(YHU VLQFH 6HSHWPEHU \$PHULFDQ VRFLHW\ KDV KDG LQFUHDVHG DZDUHQHV  
SRVLEOH WKUHDW RI DQRWKHU WHUURULVW DWDFN RQ 86 VRLO 7KH \$PHULFD  
VDIHV IRRG VXSSO\ LQ WKH ZRUOG ZKLOH D IRRG VFLHQFH FRPPLWHH UHS  
FULWFL]HG WKH DELOLW\ RI WKH )\$ WZR YHOHSH HORGHW\ SWRWLXHYDQZHSJ  
%RDUG 7KH %RDUG LQGLFDWH ERWK DW D O H Z W H F K A R R S U R Y L G H P P A D K W L F A  
PDUNHW WKH )\$ LV XQDEOH WR NHRS XS ZLWK WKH VFLHQWLIF UHVHDUFK WR D E Y  
FKHPLFDQV DUH URXWLQHO\ DOORZHG RQ WKH PDUNHW DQG RQO\ UHPRYHG LI SUR  
FXWDQHRXVO\ JDVWURLQHWV WLQDOO\ DG

.HIZRUGV %LRWHUURULVP )\$ &RQWDPLODWR 2QH VEKHPH XVHG VSRUH FRQWDPLQDWI  
6LQFH LW LV GLIILFXOW WR NLOO WKH VSR  
WURXJK ZRUNHUV QRW YDFFLQDWHG ZRXO

## ,QWURGXFWRQ

(YHU VLQFH 6HSHWPEHU \$PHULFDQ BEVWW\ WR V \$DQDQV SHDHA RYHU JU  
DZDUHQHV RI QDWLRQDO VHFUXLW\ DQQRXKH SRVLEOH DWKLDWV RMHPQRW DQ  
&HQWHU IRU )RRG 6DIHW\ DQG \$SSOLHG 1XWULWLRQ DQG &90 &HQWHU IRU  
9HWHULQDU\ OHGLFLQH VLQFH WKH KDYH GUDZ D W S Q R W L R Q R O Y G U W K H Z K H W  
DZD\ IURP )\$ V DELOLW\ WR GHYHORS WR K A P L W J P X U W K H L Y D D V R U X P L W J P  
QHHGHG WR HIILFLHQWO\ SURYLGH URXWLQH V X G Y H Z L O N A H W L B H E R P E F R X O G  
LQYHVWLJDWLRQV WR SURWHFW WKH \$PHULFDQ FRQVXPHU 6XEFQGY ZHUH FRQ  
6FLHQFH WHUURULVW JURXS FURVVHV LQWR WKH OI  
DQWKUDI SRZGHU WR WKH IORXU PLOOV RI  
H W F H ) H Z S H U S W L R Q R X X G H Y Q V F R Q V I H Z H U

\$Q DVVLJQPHQW IRU ODVWHUV RI 6FLHQFH)H Z S H U S W L R Q R X X G H Y Q V F R Q V I H Z H U  
<RUN &KLURSUDFWLF &ROOHJH LQ )RRG W K H Q R X U F Q D R V W R F X Y L O O Q H W K H R Z C  
VHFUXLW\ RI RXU IRRG VXUYHLOODQFH WR V G R P D ( D W K W D X G H F D Z O V R W R X G H Y H O R S  
WHUURULVW VFKHPH WKDW ZRXOG D U R A X W K L R Q R I M R I P L V X S S O O D W K H D O . D V  
ELRFKHPLFDO DJHQW FRXOG EH IRRG RU ZDWHU EDVHG DQG QHHGHG WR EH  
VXIIILFLHQW WR SURGXFH D UHDOLVWLF (FRPPLE WRVWHY LURP DQWKUDI V W  
QDWLRQ V FRQILGHQFH LQ RXU IRRG VXSSO\ V W J H U L Q J 7 K R X V D Q G V R I S H R S O H Z R X O

7HQ RXW RI WKH WZHQW\ VWXGHQWV SURYLGHG RXWVWDQGLQJ IRRG DQG  
ZDWHU WHUURULVW VFKHPH WKDW LOOXVWUDWHG KRZ HDV\ ELRORJLFDO ZHDSR  
FRXOG FDXVH PDVVLYH LQMXULHV HFRQRPLF GLVUXSWLRQ DQG HURGH  
FRQILGHQFH LQ WKH IRRG VXSSO\ 7DEOH

5LFLQ

5LFLQ LV D SURWHLQ WR[LQ IRXQG LQ WKH SXOS RI FDVWRU EHDQ SODQWV > @ 2QFH ULFLQ HQWHUV WKH FHOOV RI WKH ERG\ LW LQKLELWV FHOOV IURP PDNLQ SURWHLQV WKH\ QHHG WR VXUYLYH \$V FHOOV EHJLQ WR GLH WKH RUJDQV EHJ VKXWWLQJ GRZQ DQG WKH ERG\ GLHV > @ 5LFLQ FDQ EH LQJHVWHG LQKDOHG RI LQMHFWHG DV D WR[LQ ZLWK GLIIHUHQW V\PSWRPV UHVXOWLQJ IURP WKH URXWH H[SRVXUH > @ 7KH PRVW GHDGO\ IRUP RI ULFLQ LV WKH SXULILHG SRZGHUHG IRUP DQ DPRXQW WKH VL]H RI D SLQKHDG FDQ NLOO DQ DGXOW > @

%LRORJLFD	06\$B8QWPV	&RQWDPLQDWLRQ
\$QWKUD[	9RPLW GLDUUKHD V\PSWRPV	QDUD\HCV FOXHDLQV IORXU
5LFLQ	9RPLW GLDUUKHD 'HK\GUDWLRQ VHL]XU +\SRWHQVLRQ	)RRQDXWSHD\HG RQ HXIIHW %HHU EUHZHU\
6KLJHOOD	9RPLW GLDUUKHD PFXV VWRRO	FDRSXEJ )HYFHLRQ RI VXSHUPDUNHW
&ORVWULGL &U\SWRVSRJ	9RPLW K\SHU VHFUH V\GLWFP VKXW GRZQ \$EGRPLQDO 3DLQ )HY	DLRQ MRRCUWRXWDXUDQW %RPRWOLQDPVHD 6SUD\ RQWR SURGXFH VXSHU PDUNHW
6D[LWR[LQ	/XQJ SDUDO\VLV 'HD	WRELDVSEUDHG DV DHURVRO LQ SODQHV
&RPSRXQG 6RGLXP 0RQRIOXURD	+\SRWHQWLRQ '\VU\WKPLDV 5HVSLUDFHWDWH	3BHS)XWHG IRRGV DWHUVXSSQ\ )UXLW -XLFHV

7DEOJRRG DQG :DWHU %LRWHUURULVP \$JHQWV

0RVW V\PSWRPV DVVRFLDWHG ZLWK LQJHVWLRQ RI ULFLQ PDNH D SHUVRQ EHOLHYH WKH\ KDYH IRRG SRLVRQLQJ RU D IOX VR WUHDWPHQW ZRXOG EH GHOD\HG DQG GHDWK VRRQ IROORZV

\$ QRYHO LGHD RI XVLQJ ULFLQ DV D WHUURULVW SORW LQYROYHV WZR SRVLE

6D[LWR[LQ

6D[LWR[LQ LV D GHDGO\ WR[LQ WISL... SURYLGH ZDWHU VHUYLFHV WR PRUH WK...  
DEV RUEHG KLJK FRQFHQWUDWLRQV RI UHG WLG... \$UJXDEOL WKHVV VLVWHPV UHSUHVH...  
LV UHVSQRVLEOH IRU LVRODWHG GHDWKV... FRQWDPLQDWHG VKHOOILVK SDVV XQQ...

6\QWKHVLV RI VD[LWR[LQ IRU D WHUURULV... GLQRIODJHOODWHV LQ D UHPRWH RU XQG...  
DGHTXDWH WR[LQ LV SURGXFHG LW FDO... DLUSODQHV WUDLQV RU EXVHV %UHDW...

\$V D WDVWHOHV FRORUOHVV WR[LQ... LQ WKH V DQG XVHG LQ D FDSVXOH...  
SLORWV \$ WHUURULVP SORW RI VSUD... UHDLVWLF DQG GLIILFXOW WR GHWHF...  
WHVWLQJ LV WKH RQO\ NQRZQ PHDQV... WKLV WLPH

6RGLXP 0RQRIOXRURDFHWDWH

\$ SRWHQWLDO WHUURULVW DJHQW ZLWK... PRQRIOXRURDFHWDWH RU &RPSRXQG...  
VROG DV D SHVWLFLGH IRU URGHQWV... FRORUOHVV RGRUOHVV DQG OLJKWO\...  
WKH IRRG VXSSO\ 7KH '& GRHV QRW... VRGLXP PRQRIOXRURDFHWDWH IRU...

5HSHDWHG ORZ GRVH H[SRVXUHV... YHU\ GDQJHURXV IRU WHUURULVP...  
PLQXWHV WR KRXUV DIWHU H[SRVXUH... KRXUV 1R NQRZQ DQWLGRWH LV...

&RPSRXQG LV PDQXIDFWXUH E\... \$ODEDPD GHVSLWH LWV EDQ LQ WKH...  
LQ D SRZGHUH IRUP OLNH WKH RQH... +XVVHLQ V FKHPFDQ WHUURULVP...  
DGGLWLRQ H[SRUWHG EDQQHG SURGX... \$PHULFDQ IRRG VXSSO\

6HYHUDO PHWKRGV E\ ZKLFK &RPSRX... DV D WHUURULVP DJHQW LQFOXGH...  
UHVWDXUDQWV RU FDWHUHG HYHQWV... SDUW\ RU LQWURGXFHG LQWR WKH...

**\$ UHSRUW E\ &RQJUHVVLRQDO 5HVHDFK 6HUYLFHV WDWWH**

\$ IDLUOI VPDQO QXPEHU RI ODUJH... XWLOLWLHV ORFDWHG SULPDULOI LQ...  
XUEDQ DUHDV DERXW RI WKH VLVWHP