

ARTS1090

A YX]Už7i `hi fY'UbX'9j YfmXUm@]ZY

GYa YghYf'C bY''##'&\$%

7ci fgY Cj Yfj]Yk

GHJZZ7cbHJWh8YHJ]`g`

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUhjcb	D\cbY
GWcthiG\UbYf	g"g\UbYf4 i bgk "YXi "Ui	H\i fgXUmg"!(da / : f]XUmg ‱'\$!%'\$da	K YVghYf" %%9	-',) '*, \$(

'Hi hcfg'

BUa Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
@ _Y G\Ufd	`"g\Ufd4 i bgk "YXi "Ui]b'WUgg'h]a Yg'cb`m		
GhYd\Yb^CkYb	ghYd\Yb"ck Yb4 i bgk "YXi "Ui			
A c\Ua a UX A U]	gUa 4 i bgk "YXi "Ui]b`WUgg`h]a Yg`cb`m	a ca U_]% , * 4 [a U]`"Wta	
NU]bUV`>Ug]a	gUa 4 i bgk "YXi "Ui]b`WUgg`h]a Yg`cb`m	nU]bUV"^Ug]a 4 gmXbYm'YXi "Ui	
A Y`Ub]Y'F cVgcb	a "fcVgcb4 i bgk "YXi "Ui]b'WUgg'h]a Yg'cb`m		

GWXcc~7cbhJWh~\pdataZcfa Uh]cb

Fcca '' &&ž`Yj Y`' FcVYfhK YVghYf'6i]`X]b[

D\cbY. f\$&Ł'-',) '(,) *

9a U]`. 'gUa 4 i bgk "YXi "Ui

K YVq]hY. '\hda.##qUa "Ufhq"i bak "YXi "Ui

 $\label{eq:hamiltonian} $$HY'GWKcc``cZhY'5ftg'UbX'AYX]U'kci`X``]_Y'hc'FYgdYWM\cong \cong m5W_bck`YX[Y'h\Y'HfUX]hjcbU``7ighcX]Ubgžh\Y'6YXY[U'`fPYbg]b[hcb'WJadigŁž'; UX][U'`fP]hmUbX'5fh\/'8Yg][b'7UadigYgŁ'UbX'h\Y'B[ibbUkU`dYcd'Y'fbighfU`]Ub'8YZYbW': cf\W'5\WJXYam]b'7UbVYffUŁ'cZh\Y'`UbXg'k\YfY'YUW\'WJadig'cZIBGK']g`c\WJhYX''$

5 hyb XUb WY F Yei]fYa Ybhg

5 'ghi XYbhi]g'Yl dYWYX'hc'UhhYbX'U```WUgg'WebhUWi\ci fg'Zcf'U'ZUWY!hc!ZUWY'fl &: Ł'cf'V`YbXYX'Wei fgY'UbX Wea d`YhY'U```UWfj]hjYg'Zcf'U'V`YbXYX'cf'Z ``m'cb`]bY'Wei fgY''

5 'ghi XYbhik \c'Uff]j Yg'a cfY'h\Ub'%) 'a]bi hYg'`UhY'a Um'VY'dYbU`]gYX'Zcf'bcb!UhhYbXUbWY'''=Zgi W\'U'dYbU`hm]g']a dcgYXž'h\Y'ghi XYbha i gh'VY']bZcfa YX'j YfVU``m'Uh'h\Y'YbX'cZWUgg'UbX'UXj]gYX']b'k f]h]b['k]h\]b'&(\ci fa"

⊋Uʻghi XYbhYl dYf]YbWrgʻ]``bYggža]gUXj Ybhi fYʻcfʻch\YfʻcVWi ffYbWrʻh\Una U_YgʻUVgYbWr'zfca ʻU WUgg#UWfj]hmi bUj c]XUV`YžcfʻYl dYWngʻhcʻVY`UVgYbhzfca ʻUʻzcfh\Wca]b[ˈWUgg#UWfj]hmi'h\Ymg\ci `XʻgYY_dYfa]gg]cbʻzfca ʻh\Yʻ7 ci fgYʻ5i h\cf]hmi'UbX`k \YfY`Udd`]WUV`Yž'h\Y]fʻfYei Yghg\ci `X`VY`UVWca dUb]YX`VmUb

5 '7 ci fgY '5 i h\cf]hma UmYI W gY 'U'ghi XYbhZica 'WUggYg'cf'UWjj]hJYg'Zcf'i d'hc'cbY'a cbh\"'< ck Yj Yfz'h\Ym a UmUgg][b'UXX]hJcbU``UbX#cf'U'hYfbUhJj Y'hUg_g'hc'Ybgi fY 'Wca d`]UbW''' 5 '7 ci fgY '5 i h\cf]hm'Wcbg]XYf]b['th\Y [fUbhJb['cZUVgYbW'a i gh'VY 'gUhJgZ]YX'U'ghi XYbhk]```gh]```VY'UV'Y'hc'a YYhh\Y'Wci fgY'g'`YUfb]b['ci hWca Yg UbX#cf'j c'i a Y'cZ`YUfb]b["'5 'ghi XYbhgYY_]b['Uddfcj U``hc'VY'UVgYbhZcf'a cfY'h\Ub'cbY'a cbh\'a i gh'Udd`m]b'k f]hJb['hc'h\Y'8YUb'UbX'dfcj]XY'U``cf][]bU``cf'WfhJZYX'gi ddcfhJb['XcW a YbhUhJcb"

 $: cf'a\ cfY']bZcfa\ Uf]cb'UVci\ hih\Y'UfhYbXUbWY'dfchcWc`g']b'h\Y': UWV`hmicZ5fhg'UbX'GcW]U`\\ GW]YbWYg.'\underline{\ hdg.\#k\ k\ k''Ufhg''i\ bgk''YXi''Ui\ \#W\ ffYbHghi\ XYbhg\#UWUXYa\]W]bZcfa\ Uf]cb\#dfchcWc`g![i\]XY`]bYg\#UWUXYa]W]bZcfa\ Uf]cb#dfchcWc`g![i\]XY`]bYg\#UWUXYa]W]bZcfa Uf]cb#dfchcWc`g![i\]XY`]bYg\#UWUXYa]W]bZcfa Uf]cb#dfchcWc`g![i\]XY`]bYg\#UWUXYa]W]bZcfa Uf]cb#dfchcWc`g![i\]XY`]bYg\#UWUXYa]W]bZcfa Uf]cb#dfchcWc`g![i\]XY`]bYg#UWUXYa]W]bYbZcfa Uf]cb#dfchcWc`g![i\]XY`]bYg#UWUXYa]W]bYg#UWUXYa]W]bYbYybYa Uf]cb#UYA [I\]XY`]bYg#UWUXYa]W]bYbYbYa Uf]cb#UYA Uf]cb#UYA$

5 WUXYa]W = b Zcfa Uh]cb

: cf`YggYbh]U``ghi XYbh`]bZcfa Uh]cb`fY`Uh]b['hc.`fYei Yghg`Zcf`Yl hYbg]cb/fYj]Yk 'cZa Uf_g/cWW dUh]cbU``\YU`h\
UbX`gUZYhm'Yl Ua]bUh]cb`dfcWXi fYg/gdYW]U``Wcbg]XYfUh]cb`]b'h\Y`Yj YbhcZ]``bYgg`cf`a]gUXj Ybhi fY/
ghi XYbhYei]hmUbX`X]gUV]`]hm'UbX`ch\Yf`YggYbh]U``UWUXYa]W]bZcfa Uh]cbž
gYY`\hdg.#k k k "Ufhg"i bgk "YXi "Ui #W ffYbhghi XYbhg#JWUXYa]W]bZcfa Uh]cb#dfchcWc`g![i]XY`]bYg#

7ci fgY 8YW] g

7 fYX]hDc]bhg * *

Gi a a UfmcZh\Y'7ci fgY

Gi VYWh5fYU. A YX]Už7i hff YUbXHYW.bccc[m

A YX]Už7i `hi fY`UbX'9j YfmXUm@]ZY`cZZYfg`Ub`UVWYgg]V`Y`[fci bX]b[`]b`h\Y`HfUX]h]cbgždYfgdYWhj Yg`UbX WcbWYdhg`cZa YX]U`ghi X]Yg"`GHUfh]b[`k]h\Y`X]ZJa]`]Uf`UbX`h\Y`Yj YfmXUmžh\]g`Wci fgY`]bHcXi WYg`mci `hc`h\Y VfYUXh\`cZWcbhYa dcfUfma YX]U`ghi X]Yg`Zfca `hY`Yj]g]cb`UbX`h\Y`HfUX]h]cb`cZa Uggʻa YX]U`ghi X]Ygžhc hY`Yd\cbmUbX`h\Y`ghi XmcZbYłk cf_YX`a YX]U`UbX`Wca a i b]WUh]cb`hYW\bc`c[]Yg"`K]h\`Ub`YmY`cb`h\Y`k Um h\Uh'Y`Yj]g]cb`UbX`hY`Yd\cbm\Uj Y`UXUdhYX`hc`W\Ub[]b[`fYU`]h]Yg`cj Yf`h\Y`XYWUXYgžh\]g`Wci fgY`YI d`U]bg\ck`a YX]U`UbX`Wca a i b]WUh]cb`hYW\bc`c[]Yg`\Uj Y`HfUbgZcfa YX`h\Y`f\mh\a g`cZYj YfmXUm`]ZYžh\Y cf[Ub]gUh]cb`cZXca Ygh]WgdUWYžh\Y`Vci bXUf]Yg`VYlk YYb`df]j UhY`UbX`di V`]WžUbX`ci f`gYbgY`cZ]bj c`j Ya Ybhk]h\`bUh]cbU``UbX`di V`]WWc``YWhj]h]Yg"`\d\cbmg\UdY`h\Y`Yi dYf]YbW'`cZh]a YžX]gHUbWYž a YX]Uhljcb`VmYI d`cf]b[`\ck`Vch\`hY`Yj]g]cb`UbX`hY`Yd\cbmg\UdY`h\Y`YI dYf]YbW'`cZh]a YžX]gHUbWYž]a a YX]UVmUbX``]j YbYgg"

5 hh Y WcbWi glcb cZh lg Wci fgY h Y gh XYbhk] ` VY UV Y hc

- %" g\ck 'Wa dYhYbWm]b'Zci bXUh]cbU`'WabWdhg']b'a YX]U'h\Ycfm
- &" Wf]h]WU``m`UbU`mgY`UbX`]bhYffc[UhY`h\Y`gcW]U``UbX`W``hifU``XmbUa]Wg`cZaYX]U`hYW\bc`c[]Yg`UbX`h\Y]fiqYg`UbX`]adUWg`cb`YjYfmXUm`]ZY
- '"ihj`]gY`g_]``g`fYei]fYX`]b`gWkc`Uf`m]bei]fmž`gdYWJZJWU``m`Wf]hJWU``h\]b_]b[ž'UbU`mhJWU``fYUX]b[`UbX kf]hJb[ž]bXYdYbXYbh`YUfb]b['UbX']bhY``YWhU``Uihcbcam
- ("igY'dfY`]a]bUfmg_]`g`]bfYgYUfWXXYg][b'UbX'aYh\cXgž'UbX`]b]bZcfaUh]cb``]hYfUWn

HYUWX]b['GhfUhY[]Yg'

@YWhi fYq

Hi hcf]U`q

Hi hcf]U`g`UfY`ga U``Yf`[fci dg`k \YfY`ghi XYbhg`\Uj Y`U`W\Ub\W`hc`Ug_'ei Ygh]cbg`UbX`j YfVU`]gY`h\Y]f i bXYfghUbX]b[`cZh\Y`Wci fgY`WcbhYbhk]h\`U`a Ya VYf`cZh\Y`Wci fgY`ghUZZdfYgYbh'`Nci `k]```U`gc`VY`[]j Yb hUg_g`UbX`YI Yf\]gYg`hc`Wca d`YhY`]b`WUgg`Zcf`gca Y`k YY_gž`gc`mci '```bYYX`hc`W\Y_'h\Y`Wci fgY`@A G`]b UXj Ub\W`cZYUW\`h hcf]U`"

H\Y`U]a `cZh\YgY`hi hcf]U`g`]g`hc`YbWci fU[Y`XYVUhY`Ua cb[ghghi XYbhg"`±i]g`h\fci [\`hU`_]b[`UbX`X]gW gg]cb h\Uh]XYUg`Wca Y`U`]j Y`UbX`X]ZYfYbhdYfgdYWf]j Yg`VYWca Y`Uj U]`UV`Y`hc`i g"`HYUW\Yfg`UfY`h\YfY`hc`\Y`d ZUW]`]hUhY`X]gW gg]cb`UbX`Vi]`X`U`Wca a i b]hmcZ]bei]fmž'bchhc`[]j Y`Ubch\Yf``YWhi fY"`Gc`mci `bYYX`hc`VY dfYdUfYX`VYZcfY`YUW\`a YYh]b[`hc`d`UmiUb`UWf]j Y`fc`Y`]b`h\YgY`X]gW gg]cbg"

5ggYgga Ybh

5ggYgga Ybh'HUg_g'

5ggYgga Ybh'hUg_	K Y][\h	8i Y [.] 8UhY	Gh XYbh@YUfb]b[Ci hWca Yg 5ggYggYX
@ hYfUhi fY`fYj]Yk`	' \$1	%+#\$) #&\$% `\$).\$\$`DA	%ž&Ž Ž(
:]bU`YI Ua	' \$ı	Bch5dd`]WUV`Y	%ž&
5bbcHJHYX'V]V`]c[fUd\mi	&\$I	% #\$(#&\$% `\$).\$\$`DA	%ž&Ž Ž(
7 cbW/dhfYZYWjcb	&\$ı	&&#\$' #&\$% `\$).\$\$`DA</td><td>%ž&Ž</td></tr></tbody></table>	

5ggYgga Ybh'8YHJ]`g

5ggYgga Ybh% @jhYfUhi fY fYj]Yk

GhUfh'XUhY.

Hi fb]hjb gYhjb[. H\]g]g bchU Hi fb]hjb Ugg][ba Ybh

 $5ggYgga Ybh' . 5bbcHJhYX V]V^c[fUd\m]$

GhUfh XUhY.

8 YHJ]`g. `, \$\$`k cfXg"`Gh XYbhg`k]```fYWY]j Y`U`a Uf_`UbX`[fUXY"`5XX]h]cbU``mcb`]bY`k f]hhYb`ZYYXVUW_`UbX fi Vf]WJbX]wUh]b['h\Y`gHUbXUfX`cZUW\]Yj Ya Ybhcb`]bX]j]Xi U``UggYgga YbhWf]hYf]U`k]```VY`dfcj]XYX"

Hi fb]h]b gYh]b[. `H\]g Ugg][ba Ybh]g gi Va]hhYX h\fci [\`Hi fb]h]b UbX gh XYbhg Xc bchgYY Hi fb]h]b g]a]`Uf]hmfYdcfhg"

5ggYgga Ybh(. 7cbWdhfYZYW)cb

GhUfh XUhY.

8 YHJ]`g. `, \$\$`k cfXg"``Gh XYbhg`k]```fYWY]j Y`U`a Uf_`UbX`[fUXY"`5XX]h]cbU``mcb`]bY`k f]hhYb`ZYYXVUW_`UbX fi Vf]WJbX]WJh]b[`h\Y`ghUbXUfX`cZUW\]Yj Ya Ybhcb`]bX]j]Xi U``UggYgga YbhWf]hYf]U`k]``VY`dfcj]XYX"

Hi fb]hjb'gYhjb[.'H\]g'Ugg][ba Ybh]g'gi Va]hhYX'h\fci [\'Hi fb]hjb'UbX'gh XYbhg'Xc'bchgYY'Hi fb]hjb g]a]'Uf]hmfYdcfhg"

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

ł `G][b]Z]\WbhmUZZY\Wimci f`dYfZcfa Ub\Wr`]b`UggYggUV`Y`k cf_ž`VY`]h'U`Zcfa U``YbX!cZgYa YghYf`Yl Ua]bUh]cbž`U`\WUgg`hYghž`U``UVcfUhcfmihYghž`U`gYa]bUf`dfYgYbhUh]cb`cf`Ubmch\Yf`Zcfa 'cZUggYgga Ybh'

5 WUXYa]W<cbYghmUbX D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b['h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX`dfYgYbh]b['h\Ya `Ug`mci f`ck b"'\lefi\Wb'hU_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b['hc`UVW]XYbhU`mWcdm]b['Zfca `U`gci f\W' k]h\ci hUW_bck `YX[Ya Ybh'

IBGK [fcidgdu[]uf]ga]bhch\YZc``ck]b[WuhY[cf]Yg.

7 cdm]b[.'i g]b['h\Y'gUa Y'cf'j Yfmg]a]`Uf'k cfXg'hc'h\Y'cf][]bU`hYl h'cf']XYU'k]h\ci h'UW_bck `YX[]b['h\Y gci fW'cf'i g]b['ei chUh]cb'a Uf_g"'H\]g'U`gc'Udd`]Yg'hc']a U[Ygž'Ufh'UbX'XYg][b'dfcYWhgž'Ug'k Y``'Ug dfYgYbhUh]cbg'k \YfY'gca YcbY'dfYgYbhg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h'WfYX]h'

±DUddfcdf]UhY`dUfUd\fUg]b[.'W\Ub[]b['U'ZYk'kcfXg'UbX'd\fUgYg'k\]`Y`acghmfYhJ]b]b['h\Y`cf][]bU`ghfi WhifY`UbX`]bZcfaUh]cb`k]h\ci hUW_bck`YX[YaYbh'H\]g'U`gc'Udd`]Yg`]b'dfYgYbhJh]cbg'k\YfY`gcaYcbYdUfUd\fUgYg`Ubch\Yf'g`]XYUg`cf'kcfXg'k]h\ci hWfYX]h''±iU`gc'Udd`]Yg`hc'd]YW]b['hc[Yh\Yf'ei chYg'UbXdUfUd\fUgYg`]bhc'U'bYk'k\c`Yžk]h\ci hfYZ/fYbW]b['UbX'U'ghi XYbhg'ck b'UbU`mg]g`hc'Vf]b['h\Y`aUhYf]U`hc[Yh\Yf''

7 c``i g]cb. 'k cf_]b['k]h\ 'ch\ Yfg'Vi h'dUgg]b['c\Z'h\ Y 'k cf_'Ug'U'dYfgcb'g']b\X]j]\Xi U``k cf_"'7 c``i g]cb'U`gc]b\Wi XYg'dfcj]\X]b['mci f'k cf_'hc'Ubch\ Yf'ghi XYbh\ VYZcfY'h\ Y 'Xi Y 'XUhYzcf'Zcf'h\ Y' di fdcgY'cZh\ Ya d`U[]\Uf]g]b['Uh\Ubmh]a Yz'dUm]b['Ubch\ Yf'dYfgcb'hc'dYfZcfa 'Ub'U\WUXYa]\Wh\Ug_z'ghYU']b['cf'U\\ello i]f]b[Ubch\ Yf'dYfgcb'g' U\WUXYa]\Wk cf_'Ub\X'\ello dm]b[']hz'c\ZYf]b['hc'\\ello a d`YhY'Ubch\ Yf'dYfgcb'g' k cf_'cf'gYY_]b[d\una Ybh\Zcf'\\ello a d`Yh\beta d`Y

±bUddfcdf]UhY`W]hUh]cb.`7]h]b[ˈgci fW/gˈk \]WX`\Uj Y`bchVYYb`fYUXžk]h\ci hUW_bck`YX[]b[ˈh\Y`″gYWcbXUfm″gci fW/Zfca k \]WX`_bck`YX[Y`cZh\Ya`\Ug'VYYb`cVhU]bYX"

8 i d`]\WUh]cb`ff`gY`Zld`U[]\Uf]ga "Ł`gi Va]\h]b[`mci f`ck b`k cf_ž]b`k \c`Y`cf`]b`dUfhžk \YfY`]h`\Ug`dfYj]ci g`m VYYb`dfYdUfYX`cf`gi Va]\hYX`Zcf`Ubch\Yf`UqqYqqa Ybhcf\Wci fgY`UhI BGK `cf`Ubch\Yf`i b]\Yfq]\m"

7 cffYWhfYZYfYbWb[dfUWhWyg.

• VYHYfa UbU[Ymcifh]a Y

,		

	a cj]b['th\fci [\ 'gdUWY"
Hi lcf]U`	Hi hcf]U`g`h\]g`k YY_`k]```YI d`cfY`Udd`m]b[`'h\Y`]XYUg UggcW]UhYX`k]h\`a YX]U`Wcbj Yf[YbWY`hc WcbhYa dcfUfmYI Ua d`Yg`cZa YX]U`cf[Ub]gUh]cbg"

]bX]j]Xi U`]gYX`cf`W&``YWfj]g]b[3
K YY_'% . '&, 'A Um'! ''	Hi hcf]U`	H\]g`k YY_fg`h hcf]U``k]```hU`_`UVci h'h\Y`:]bU``91 Ua "
>i bY		Mci k]``HJ_Y'U'dfUWfW'HYghfKcbffikcffmž'h\Y'gWcfY
]gʻbchifYVcfXYXŁ'UbX`mci fʻh hcfʻk]``[cʻcj Yfʻh\Y
		Ubgk Yfgik]th imci i Zcfith Yidfi dcgYgicZfYj]Yk "

FYgci fWyg

DfYgWf]VYX F Ygci fWfg

F Yei]fYX'HYI hVcc_'!'A Uf_\Ua ž'H"'? WW[S * 7hWdkVSk >[XW'DU`[fUj Yž'@cbXcbž'&\$%+"

 $H\Y'hY'l'hVcc__']g'Uj'U)'Y'Zcf'difWkUgY']b'h\Y'l BGK '6cc_g\cd'cb'h\Y'a U]b'GmXbYmWUa dig'''7cd]Yg'UfY U'gc'Uj U]'UV'Y']b'h\Y'\][\ \ 'i gY'Wc``YWf]cb'cZh\Y'l BGK '@]VfUfm''=Zmci'k]g\'hc'difWkUgY'h\Y'YVcc_'mci'WUb Zc``ck'h\YgY'']b_g'\YfY'!$

\htdg.## bgk Vcc g\cd"j]hU`gci fW/"Wca #dfcXi Whg#j - +, \% +(++\% (

 $C \, h \, Yf \, F \, Yei \,]fYX \, F \, YUX]b[\, g. \, '5 \, ``ch \, Yf \, fYUX]b[\, g \, `UfY \, `Uj \, \, U] \, `UV \, `Y \, 'j \,]U \, `h \, Y \, `Wei \, fgY \, `A \, ccX \, `Y \, 'g]hY \, " \, `=h \,]g \, ']a \, dcfh \, Ubh \, hh \, Uh \, mci \, `Wea \, d \, `YhY \, \, `U \, ``fYUX]b[\, g \, 'Zcf \, YUW \, 'k \, YY \, _'df]cf \, 'hc \, `UhhY \, bX]b[\, 'mci \, f'hi \, hcf]U \, "$

FYWca a YbXYX FYgci fWYg

9@G9"! @]VfUfmUbX'Ghi Xm'G_]``g'8Yj Y`cda Ybh'5@'i bXYf[fUXi UhY'ghi XYbhg']b'h\Y]f'Z]fghgYa YghYf'bYYX hc'Wca d'YhY'h\Y'`]VfUfmfg'9@G9'ghi Xm'g_]``g'hfU]b]b['a cXi `Y'VYZcfY'h\Y'YbX'cZK YY_') "'GYY'h\Y''9`]gY''hUV cb'h\Y'`]VfUfm\ca YdU[Y.`\hhd.#gi V'YWf i]XYg"`]VfUfm'i bgk "YXi "Ui #\`]gY'Zcf'Z fh\Yf']bZcfa Uhcb"

: i fh\Yf`]bZcfa Uh]cb`UVci hih\Y`@]VfUfmig`Wc``YWf]cb`UbX`gYfj]WYg`WJb`VY`Zci bX`\YfY`! \hd.#|bZc"`]VfUfmii bgk "YXi "Ui #\ YV#gYfj]WYg#gYfj]WYg"\ha`

H\Y'@YUfb]b['7YbffY'!'H\Y'@YUfb]b['7YbffY'cZZYfg'UWUXYa]Wg_]``g'gi ddcfhirc'U```ghi XYbfg'Ybfc``YX'Uh I BGK "'H\Y]f'gYfj]WYg']bWi XY']bX]j]Xi U``Wcbgi `hUh]cbgž'UWUXYa]Wg_]``g'k cf_g\cdgž'7cbj YfgUh]cb'7UZÅ [fci dgž'UbX'cb`]bY'UWUXYa]Wg_]``g'fYgci fWYg"'Mci 'WUb'a U_Y'Uddc]bha Ybhg'UbX'fYUX'UVci h'U```h\Ym\Uj Y hc'cZZYf'Uh\hd.#k k k"'Wi bgk "YXi "Ui #

7 ci fgY 9j U`i Uh]cb UbX 8 Yj Y`cda Ybh

DYf]cX]WU``mighi XYbhiYj U`i Uh]j Y`ZYYXVUW_`cb`h\Y`Wci fgY`]g`[Uh\YfYXži g]b[`Ua cb[`ch\Yf`a YUbgži BGK fig A m9I dYf]YbW'`dfcWYgg"

Gh XYbhZYXVUW_`]g`hU_Yb`gYf]ci g`mžUbX`Wcbh]bi U``]a dfcj Ya Ybhg`UfY`a UXY`hc`h\Y`Wci fgY`VUgYX`]b`dUfh cb`gi W\`ZYYXVUW_"DfYj]ci g`gh XYbhZYXXVUW_`UVci hh\Y`Wci fgY`fYUX]b[g`UbX`UggYgga YbhHUg_g`\Uj Y VYYb`UXXfYggYX`]b`h\]g`j Yfg]cb`cZh\Y`Wci fgY"`Mci `WUb`fYUX`U`XYgWf]dh]cb`cZW\Ub[Yg`k Y`a UXY`]b fYqdcbqY`hc`dUghqh XYbhZYXXVUW_`]b`h\Y`A ccX`Y"

=a U[Y'7fYX]h

6cX|Yg/ *\phyfZJW/g*&\$%*

7F = 7CG

7F = 7CG Dfc|]XYf 7cXY. \$\$\$-,;