

MUSC4705

DYfZcfa UbWY @UVcfUhcfmi8 fA i g]W7 fYUhjj Y DfUWfWŁ

HYfa 'C bY''# '&\$&\$

7ci fgY[·]Cj Yfj]Yk

GHJZZ:7cbHJWh:8YHJ]`g`

7cbj Ybcfg

B Ua Y		

7ci fgY 8YW] g

7 fYX]hDc]bhg'('

Giaa UfmcZh\Y 7ci fgY

Gi VYWf5fYU. ? $ge[U BWbXad_S`UW]$? $ge[U 5a_bae[f[a`l? ge[U 7`eW_TW] BWbXad_S`UW5goSf[a`leath]]$

A I G7 (+\$) 'DYfZcfa UbW' @UVcfUrcfm8 'fA i g]W7 fYUh] Y'DfUW]W' L']g'h\Y'Zci fh\ 'UbX'Z]bU' 'DYfZcfa UbW' @UVcfUrcfm8' fA i g]W7 fYUh] Y'DfUW]W' a U'cf" 'Mci 'k]``'Wcbgc`]XUhY' h\Y'a]'YgrcbYg' UW]Yj YX]b 'YUf]Yf'DYfZcfa UbW' @UV'Wci fgYg'h\fci [\'h\Y'UXj UbWa YbhcZmci f'hYW\b]WU'ž'WYUh] Y'z]bhYfdfYh] Y'UbX W fUhcf]U`'g_]``g"'H\Y'Wci fgY'ZcW gYg'cb'h\Y'dYfZcfa Uh] Y'zWfYUh] Y'UbX'W 'h fU`'Y'Ya Ybhg'cZa i g]Wa U_]b[hc'Ui [a Ybhmci f']bX]j]Xi U`'UbX'Wc``YWh] Y'dYfZcfa UbW''YI dYf]YbW''UbX'YI dYfh]gY"' \dangle UXX]h]cbzmci 'k]`` Wf]h]WU``mYI Ua]bY'h\Y'bUh fY'cZdYfZcfa UbW''UbX'h\Y'j Uf]YX'k Umg'X]ZYfYbh_]bXg'cZa i g]WJUbg'UbX'Uff]ghg

5ggYgga Ybh

5ggYgga YbhHUg_g

5ggYgga Ybh'tUg_	K Y][\h	8iY'8UhY	Gh XYbh@YUfb]b[CihWca Ygʻ5ggYggYX
9bgYa V`Y`Wcblf]Vi ljcbž dYfZcfa UbWYgždUfhWXYW_]b[lYgh	&\$ı	Bch5dd`]WUV`Y	&
A UʻcfʻdYfZcfa UbWYʻcf Wca dcg]hjcbʻdfcYWi	*\$1	Bch5dd`]WUV`Y	%
K f]thYb'DcfhZc`]c'	&\$I	9bX°cZK YY_°+	%

5ggYgga Ybh8YHJ]`g

5ggYgga Ybh% 9bgYa V`Y'Wcblf]Vi ljcbždYfZcfa UbWgždUfhWXYW_]b['hYgh

GhUfhXUhY. Bch5dd`]WUV`Y

8 YHJ]`g. '9 bgYa V`Y`dUffi\W.YW_]b['k]``VY`i bXYffU_Yb`]b`H\&`H&`UbX`H' "'+\D]]Xi U``mcf`]b`ga U```[fci dgž gfi XYbhg`k]```dYfZcfa 'k cf_g`cf`Yl Wfdhg`cZk cf_gžgfi X]YX`UbX`dYfZcfa YX`Xi f]b['h\Y`hf]a YghYf"'`K\YfY Uddfcdf]UhYžYl WYfdhg`k]```VY`gY`YWhYX`Vmh\Y`dUffi\W.YW_]b['Yl Ua]bYf"8]fYWfZYXVUW_Xi f]b['fY\YUfgU`g UbX`k cf_g\cdg`UbX`U`Zcfa U``fYdcfhUhih\Y`WcbWi g]cb`cZh\Y`gYgg]cb"'Ghi XYbhgfWcbhf]Vi h]cb'hc`YbgYa V`Y dYfZcfa UbW'g`UbX`k cf_g\cdg`k]```VY`UggYggYX`h\fci [\`U'dUffi\W.Y\W_]b['Yl Ua]bUh]cb"

5ggYgga Ybh& A U'cf dYfZcfa UbW cf Wca dcg]hjcb dfc YWh

GhUfhXUhY. Bch5dd`]WUV`Y

@Yb[h\."\$#&\$*a]bihYg

8 YHJ]`g. :: cf'dYfZcfa UbW'`UbX`Wca dcg]hjcbʻghi XYbhgž'Uʻa Uʻcf'dYfZcfa UbW'`k]```VY`i bXYfhU_Yb`]bʻH' cZ '\$!a]bi hYgʻ]b`Xi fUhjcbʻZcf'dYfZcfa YfgʻUbX`&\$`a]bi hYgʻ]b`Xi fUhjcbʻZcf'Wca dcgYfg"'H\]gʻk]```VY`h\Y`ZbU` DYfZcfa UbW'`@UV`UggYgga YbhHJg_`Zcf'7 fYUhji Y`DfUWJW'`ghi XYbhg''Ghi XYbhgʻk]```U`gc`dfYgYbhUb`]b!WUgg 'k cf_!]b`dfc[fYgg''dYfZcfa UbW'`]b`HYfa gʻ%UbX`&"'H\Y`a Uʻcf'dYfZcfa UbW'`k]```VY`Ub`cf][]bU`ž WcbW'dhi U`]gYX`UbX`W fUhYX`dfc[fUa k\]W\`a UmHJ_Y`h\Y`Zcfa `cZU`gc`c`dYfZcfa UbW'`z]bghU``Uhjcbz``YWhi fY! fYVJhU`zj]bhYfX]gWJd`]bUfmWc``UVcfUhjcbz`cf'ch\Yf'Uddfcj YX`Zcfa Uh'``: cf'Wca dcg]hjcb`ghi XYbhgz'h\Y`a Uʻcf]hm cZh\Y`dcfhZcja i ghVY`dYfZcfa YX``]j Y": YYXVUW_. 'U`k f]hhYb`fYdcfhZca 'YI Ua]bYfg"

Gi Va]gg]cb bchYg.@jj Y DYfZcfa UbW

5ggYgga Ybh' . K f]hYb DcfhZc`]c

GhUfhXUhY. Bch5dd`]WUV`Y

@Yb[h\.a UghYfWUgg Wf]hjei Yg!) \$\$ k cfXg YUWX/fYgYUfWX dUdYf %\$\$\$ k cfXg

8YHJ`g. '%) \$\$'k cfXg'''''Gh XYbhg'UfY'hc'Wca d'YhY'hk c'f&£'fYdcfhg'dfcj]X]b['Wf]hJWU`fYZYWfjcb'UbX Wca dUf]gcb'cZ]ggi Yg'fU]gYX']b'Zci f'a UghYfWUggYg'UhYbXYX'cj Yf'HYfa g'%%'&'UbX'' ž'UbX'U'fYgYUfW.

dUdYf`]bj Ygh][Uh]b[`U`bcb!hfUX]h]cbU``dYfZcfa UbWY`dfcYWiVmiYghUV`]g\YX`Ufh]gh#Ufhg cf[Ub]qUh]cb": YYXVUW_j | |U'@A G

5XX]h]cbU`XYhU]`g.

F YgYUfW Dfc YWh

±0 'h\Y 'fYgYUfW\'dUdYf'f%\$\$\$ k cfXgŁ'mci 'k]``Yl d`cfY 'UbX']bj Ygh][UhY 'U'bcb!hfUX]h]cbU``Ufhg#dYfZcfa UbW\'dfc YWhWfYUhYX'UbX'fYU`]gYX'Vm'Ub'YghUV`]g\YX#dfcZYgg]cbU``Ufh]ghicf'Ufhg'cf[Ub]gUh]cb']b'h\Y 'Wca a i b]hmž 5i qhfU`]U!k |XY'cf'±bhYfbUh]cbU``m'

Mci 'k]```fYgYUfW.'U'dfcYWi]bj c`j]b['bcb!ffUX]r]cbU``UbX'cf][]bU``dfYgYbfUr]cb'Zcfa Ubz'gi W.'Ugz'Zcf]bgfUbW'z'a i `r]a YX]U'cf']bhYfX]gW]d`]bUfmUddfcUW.'rc'dYfZcfa UbW'/i b]ei Y'UbX']bj Ybr]j Y'i gY'cZbcb! ffUX]r]cbU``dYfZcfa UbW''j Ybi Yg'cf'gfU[]b['UddfcUW.Yg/cf][]bU`z'WfYUr]j Y'UbX'i bcfr\cXcl 'WcbW'dh'bcb! cfr\cXcl 'Ui X]YbW''Yb[U[Ya Ybr\UbX'dUfr]W]dUr]cb/UWr]j Y'Wca a i b]rmYb[U[Ya Ybr\cf'Yb[U[Ya Ybr\k]h\ gcW]U'#dc`]r]WU`]ggi Yg'r\fci [\'dYfZcfa UbW''"

C bW/ 'mci '\Uj Y']XYbh]Z]YX'h\Y'dfc YWh\UhgdYU_g'hc'mci 'UbX'mci f'dUfh]W/YUh]j Y'Ugd]fUh]cbgž'U'dfc YWh\Uhi]bgd]fYg'mci 'UbX'a cXY`g'Zcf'mci 'Ufh]gh]Wj U'i Yg'mci fX'`]_Y'hc'Ya i `UhYž'mci 'k]```YUfb'Ug'a i W\'Ug'mci WUb'UVci hh\Y'dfc YWh\fci [\'mci f'ck b'fYgYUfW\'UbX'k]``gi VgYei Ybhm'WcbhUWh\Y'_YmWfYUh]j Y#g]bj c`j YX']b'h\Y'dfc YWhZcf'Ub']bhYfj]Yk "

Mci f'dUdYf'k]``XYHJ]`'h\Y`UgdYWg`cZh\Y`dfcYWhUbX`k\UhUddYU`YX`hc`mci `UVci h]hYY`i W]XUhY`k Umg`]b k\]W\TYgYUfW\]b[''h\]g'dfcYWh\Ug']a dUWYX`cb`mci f'ck b'WYUh]j Y'hfUYWcfm]b'fYU`]g]b[''UbX`XY`]j Yf]b[mci f'WYUh]j Y'dfcYWh]b'h\]g'Wci fgY/UbX`X]gW gg'h\Y``YUfb]b[g'Zfca ']bhYfj]Yk]b['h\Y`fa U_YfficZh\Y'dfcYWh

7 ca dUfUhji Y A UghYfWUgg 7 f]hei Yg.

Gca Y'ei Yghcbg'hc Wcbg]XYf'k \Yb'k f]h|b['h\Y'Wf]h|ei Y.

! '5fY'h\YfY'g]a]`Uf]h]Yg'cf'cj Yf'Udg']b'h\Y]f'WfYUh]j Y'dfcWfgg3'⊋gcž'WJb'mci 'Ufh]W`UhY'h\Ya 3']Zbchžk \YfY Xc'h\Y'X]ZYfYbWfg'`]Yž'UbX'Xc'h\Ymgh]``Uff]j Y'Uhh\Y'gUa Y'Ufh]gh]Wci hWca Y3

 $! K \land UhUfY h Y gdYWZWX]ZYfYbWYg`]b h Y]f`UddfcUWXYg3`K \land UhXc`mci `Uhff]Vi hY h Y X]ZYfYbWYg`hc3`8 c h Y]f`Ufh]gh]W[cU`g`X]ZYfYZ bXUa YbhU``mz`cf`UfY h Ym \(f ghi g)b[`X]ZYfYbha Yh\cXg`hc`UWX]Yj Y g]a]`Uf`[cU`g3`$

! K \UhUddfcUW\ cfik UmcZh\]b_]b[i]gia cfY WcgY`mU`][bYX'hcimci fick bia i g]WU`#Uff]gh]W[cU`g3'K \m3

Gi Va]gg]cb bchYg.Gi Va]thYX j]U A ccX Y

5 http://bxubww.F.Yei]fYa Ybhg

 $\label{eq:continuity} D`YUgY`bchY`h\Uh`YWh fY`fYWcfX]b[g`UfY`bchUj U]`UV`Y`Zcf`h\]g`Wci fgY"`Ghi XYbhg`UfY`ghfcb[`miYbWci fU[YX`hc UhhYbX`U```WUggYg`UbX`WcbhUWhh\Y`7ci fgY`5i h\cf]mnhc`a U_Y`U`hYfbUh]j Y`UffUb[Ya Ybhg`Zcf`WUggYg a]ggYX"$

7 ci fgY GWX YXi `Y

J]Yk Wugg'ha Yhuv'y

H]a YHJV`Y

8 UhY	HmdY	7 cbh/bh
K YY_"%"%+": YVfi Ufm!"&%	GYa]bUf	≠blfcXiWijcbihcih\YiWcifgY#(cU``gYhhjb["
: YVfi Ufm	DfYgYbHJhcb	DfYgYbłUłjcb
		A UghYfWUgg
		: f]XUmk YY_'%
		D`YUgY'fY[]ghYf'mcif'UhhYbXUbWY'cb'G5A'kYVg]hY
		\hndg.##gUa "Ufhg"i bgk "YXi "Ui #gh XYbhg#Ygci fW/g#a i g]Wgh XYbhg#a UghYfWUggYg#
K YY_'&.'&(': YVfi Ufm!'&, : YVfi Ufm	GYa]bUf	Gh XYbhDYfZcfa UbWYg"
		8]gW gg]cb. 'DYfZcfa UbW' 'Ug'9 dYf]YbW// DYfZcfa UbW!A U_]b[/9 dYf]YbW!8 Yg][b"'A i g]WUg 7 c``UVcfUh]j Y'DfUW]W"
K YY_" ."&"A UfVX"!"* A UfVX	GYa]bUf	Dfc^YWi8Yg][b'-'Wcbglfi Wfb['cjYfUfWX]b[WcbW'dh U'VUg]g'Zcf'gh XYbhg''dfc^YWg"
K YY_^(.^-^A UfVX^!^% A UfVX	GYa]bUf	Dfc^YWi8Yg][b'-'WcbgHi Whb['cjYfUfW\]b[WcbWdh U`VUg]g^zcf'ghiXYbhg''dfc^YWg"
K YY_")."%*"A UfWX"!"&\$ A UfWX	GYa]bUf	Gh XYbhDYfZcfa UbWg
AUIVW		FYgYUfWX`DfcYWn7\YW_! ₺
		±bHYfj]Yk 'DfUW¶WY
	DfYgYblUljcb	DfYgYblUljcb
		A UghYfWUgg
		: f]XUmk YY_')
		D`YUgY`fY[]gHYf`mcif'UHHYbXUbWY'cb'G5A'kYVg]HY
		\hdg.##gUa "Ufhg"i bgk "YXi "Ui #ghi XYbhg#Ygci fW/g#a i g]Wghi XYbhg#a UghYfWUggYg#
K YY*.*&' ^A UfVX^!^&+ A UfVX	F YUX]b[FYUX]b['K YY_"'Ghi XYbhg'k]``'U``cWUhY'YI hfU'h]a Y'hc]bX]j]Xi U`'dfUWh]WYž'dfc^YWhXYj Y`cda Ybh'UbX'Wf]h]WU`

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Hi fb]h]b Gi Va]gg]cb

#mci YbWci bhYf'U'dfcV'Ya 'k \Yb'UthYa dr]b['rc'gi Va]hmci f'Ugg][ba Ybht\fci [\'Hi fb]r]bž'd'YUgY
hY'Yd\cbY'9I hYfbU'Gi ddcfhcb'-',) '''' %cf'Ya U]''h\Ya 'cb'YI hYfbU'hY'hgi ddcfh4 i bgk "YXi "Ui '"'Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY_YbXg'fl *) 'XUmg'U'mYUft'''#mci
UfY'i bUV'Y'hc'gi Va]hmci f'Ugg][ba YbhXi Y'hc'U'ZJi 'hk]h\'Hi fb]h]b'mci 'a Um'Udd'mZcf'Ub'YI hYbg]cbž'Vi hmci
a i ghfYhJ]b'mci f'h]W_Yhbi a VYf'Zfca '9I hYfbU''Gi ddcfhfU'cb['k]h\'Ubmch\Yf'fY'Yj UbhXcW'a Ybhgt'hc
]bWi XY'Ug'Yj]XYbWY'hc'gi ddcfhmci f'YI hYbg]cb'Udd']WUh]cb'''#mci 'Ya U]''9I hYfbU''Gi ddcfhmci 'k]''
Ui hca Uh]WJ''mfYWY']j Y'U'h]W_Yhbi a VYfž'Vi h]Zmci 'hY'Yd\cbY'mci 'k]'''bYYX'hc'gdYW]ZWJ''mUg_'Zcf'cbY''
Hi fb]h]b'U'gc'dfcj]XYg'i dXUhYg'cb'h\Y]f'gmghYa 'gfUh' g'cb'Hk]hYf''

; YbYfU``mž'UggYgga YbhiHug_g'a i ghVY'gi Va]hhYX'Y`YVWfcb]\W)``mij]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ba Ybh'' =b']bgHJb\W'g'k \YfY'h\]g']g'bchdcgg]V`Yž']hk]``'VY'gHJhYX'cb'mci f'\\ci fgY'g'A ccX`Y'g]hY'k]h\ U`hYfbUh]j Y'gi Va]gg]cb'XYhJ]`g''

cfi]bZcfa Uh]cbicbi\ckihcigi Va]hUgg][ba Ybhgicbi]bYij]UiA ccXiY.i\hdg.#gh XYbh'i bgk "YXi "Ui #\ck! qi Va]hUgq][ba Ybha ccXiY

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

D`U[]Uf]ga i]gii g]b[ih\Yik cfXgicfi]XYUgicZch\YfgiUbXidfYgYbh]b[ih\Ya iUgimci fick b"i±i\WbihU_Yia Ubm Zcfa gžZfca iXYi]VYfUhYiW\YUh]b[ihciU\W]XYbhU`m\Wcdm]b[iZfca iUigci f\Wik]h\ci hiU\w_bck iYX[Ya Ybh'

IBGK [fcidg'd'U[]Uf]ga]bhc'h\Y'Zc``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'

⇒ Uddfcdf]UhY 'dUfUd\fUg]b[. '7\Ub[]b['U'ZYk'k cfXg'UbX'd\fUgYg'k\]Y 'a cghmfYhU]b]b['h\Y'cf][]bU`ghi Wh fY 'UbX#cf'dfc[fYgg]cb'cZ]XYUg'cZh\Y'cf][]bU`žUbX']bZcfa Uh]cb'k]h\ci hUW_bck`YX[Ya Ybh'H\]g'U`gc Udd`]Yg']b'dfYgYbhUh]cbg'k\YfY'gca YcbY'dUfUd\fUgYg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h'WfYX]h'UbX'hc d]YW]b['hc[Yh\Yf'ei chYg'UbX'dUfUd\fUgYg']bhc'U'bYk'k\c`Yžk]h\ci h'Uddfcdf]UhY'fYZYfYbW]b['"

7 c``i g]cb.'k cf_jb['k]h\ch\Yfg'Vi hdUgg]b['cZZh\Y'k cf_'Ug'U'dYfgcb'g']bX]j]Xi U``k cf_"'7 c``i g]cb'U`gc]bWi XYg'dfcj]X]b['mci f'k cf_'hc'Ubch\Yf'ghi XYbhVYZcfY'h\Y'Xi Y'XUhYžcf'Zcf'h\Y'di fdcgY'cZh\Ya d`U[]Uf]g]b['UhiUbmh]a Yž'dUm]b['Ubch\Yf'dYfgcb'hc'dYfZcfa 'Ub'UWUXYa]WhUg_ž'ghYU']b['cf'UWei]f]b[Ubch\Yf'dYfgcb'g'UWUXYa]Wk cf_'UbX'Wcdm]b[']hz'cZYf]b['hc'Wca d'YhY'Ubch\Yf'dYfgcb'g'k cf_'cf'gYY_]b[dUma YbhZcf'Wca d'Yh]b['UWUXYa]Wk cf_"

±bUddfcdf]UhY`W]hUh]cb.`7]h]b[`gcifWrg`k\]W\`\UjY`bchVYYb`fYUXžk]h\cihUW_bck`YX[]b[`h\Y`´gYWcbXUfm´gcifWrZfca`k\]W\`_bck`YX[Y`cZh\Ya`\Ug`VYYb`cVhU]bYX"

8 i d`]\WUh]cb`ffgY`Zd`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`UggYgga Ybhcf\Wci fgY`UhI BGK `cf`Ubch\Yf`i b]j Yfg]\m'

7 cffYWnfYZYfYbWlb['dfUWnWyg.

• DUfUd\fug]b[z'gi a a Uf]q]b[z'YggUmk f]hb['UbX'ha Y'a UbU[Ya Ybh

5 WUXYa]W = b Zcfa Uh cb.

: cf`YggYbhJU``gh XYbh`]bZcfa UhJcb`fY`UhJb['hc.

- fYei Yghg Zcf Yl hYbg]cb/
- `UhY 'gi Va]gg]cbg'[i]XY`]bYg/
- fYj]Yk 'cZa Uf_g/
- I BGK '< YU`h\ 'UbX'GUZYhm'dc`]W[Yg/
- YI Ua]bUhcb dfcWXi fYg/
- gdYWJU``Wcbg]XYfUHjcb`]b`H\Y`Yj YbhcZ]``bYgg`cf`a]gUXj Ybhi fY/
- gh XYbhYei]mUbX X]gUV]`]m/
- UbX'ch\Yf'YggYbhJU`'UWUXYa]W]bZcfa UhJcbž'gYY

\hdg.#k k k "Uffg"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWJXYa]W]bZcfa Uf]cb#dfchcWc`g![i]XY`]bYg#

.

a U[Y'7fYX]h

Gc`c'DYfZcfa UbWY'A U_]b['&\$%

7F = 7CG

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