



ARTS3483

DfcZYgg]cbU`': fYbWk '6

HYfa 'H\ fYY`##'&\$%-

7ci fgY`Cj Yfj JYk

`GHUZZ7cbhUW`i8YHU]`g`

`7cbj Ybcfg`

B Ua Y	9a U]`	5j U]UV]`]m	@cWU]hcb	D\cbY
J U`Áf]Y`7CA 69 : 9FA 9G	j "W`a VY[Yfa Yg4 i bgk "YXi "Ui	A cbXUm' `!(ž K YXbYgXUm%%!`%& cf`VmiUddc]bħa Ybh	A C F J 9B 6F C K B `&+%	f\$&Ł- ' ,) `! &' %)

GW\cc``7cbhUW`i`bZcfa U]hcb

GW\cc``cZ<i a Ub]h]Yg`UbX`@Ub[i U[Yg

@cWU]hcb. `GW\cc``C Z]WžA cfj Yb`6fck b`6i]X]b[ž`@Yj Y``&ž&),

CdYb]b[`<ci fg.`A cbXUm!`: f]XUmž`- Ua `!`) da

D\cbY. `ž`*%&`- ' ,) `%*, %

: U! . `ž`*%&`- ' ,) `; , +\$)

9a U]: [\U`4 i bgk "YXi "Ui](#)

7 ci fgY'8YHJ`g

7 fYX]h'Dc]bHg '*`

Gi a a UfmicZ\h'Y'7 ci fgY

H\Y': fYbW\!gdYU_]b['k c fX'fYdfYgYbHg'cbY'cZ\h'Y'V][[Ygh`]b[i]gh]WncbYg]b'h'Y'k c fX'k]h' Ub'Ygh]a UH'X &+('a]`]cb': fYbW\!gdYU_Yfg'cb'U``) 'Wcb]bYbHg" `b`di fgi]b['mci f'ghi XmicZ\h'Y'Ub[i U[YZ'mci 'UfY'`c]b]b['U f]W\zj]VfUbhUbX'X]j YfgY'Wca a i b]micZ\WcgY'hc' (- 'a]`]cb''YUfbYfg'k c fX'k]XY''H\]g'Wca fgY'k]`VY'dYfZYWh Zcf'mci 'Zmci 'U'fYUXm\Uj Y'U'ei]h' d'fcZ]WYb]bck'YX[Y'cZ: fYbW' fYei]j U'Ybh'c'gYj Yb'gYa Ygh'f'g'cZ gh Xn]b['Uhi b]j Yfg]m'Yj Y'U'UbX'UfY'`cc_]b['Zcf'Ub']b!XYd'h'YI h'bg]cb'cZU``g_]`g.'mci 'k]`]a d'fcj Y'mci f]gh'Y'b]b['g_]`g'Vm]fU]b]b['k]h' fUX]c'YI W'fd'hg'z'mci 'k]`fYUX'gca Y'Wcb]h'Ya d'cfUfm']h'fUhi fY'Ug'k Y``Ug''YUfb hc'gmb'h'Yg]gY'h'YI hg'Z'ca 'j Uf]ci g'a YX]U'UbX'X]gW'gg'W'fYb]h'Yj YbHg'UbX'W'cgg]W'h'fU'`]ggi Yg'fY'Yj Ubh'c h'Y': fYbW\!gdYU_]b['Wca a i b]h'Yg" Mci 'k]`]Z]bU'm[Yh'c'fYZYWh'cb'mci f'YUfb]b['YI dYf]YbW'UbX'YUfb'hc XYj]gY'gh'fU]h[]Yg'hc'`_YYd'XYj Y'cd]b['mci f'Ub[i U[Y'g_]`g'UbX']a d'fcj Y'mci f'gY'Z'YUfb]b["

7 ci fgY'@YUfb]b['Ci h'Wca Yg

%' I bXYfghUbX'XYHJ]YX'Uf[i a YbHg]b'Wca d'YI ': fYbW' h'YI hg'f'k f]h'Y'b'c'f'gdc_Yb'U'UbX'fY'Wca [b]gY]a d']W]h'a YUb]b['Z]bW' X]b[``]h'fUfm]Z'fa "

&" D'fcXi W'U'WYUf'z'k Y'`!g'f'i W'i fYX'Z'XYHJ]YX'k f]h'Y'b'c'f'gdc_Yb' h'YI h'cb'U'k]XY'fUb[Y'cZgi V'Y'W'g'z g\c'k]b['Wcb]h'c''YX'i gY'cZcf[Ub]gU]h'cbU'dU]h'f'Ub'UbX'Wca'Yg]j Y'XYj]W'g"

' " I gY'h'Y': fYbW'Ub[i U[Y'k]h'U'`][\XY[fY'cZU'W'W'fU'W'h'XYa cb'gh'fU]h]b['U[ccX'Wca a UbX'cZ]X]ca U]h'WYI d'fYgg]cbg'UbX'h'Y'Z'fa U'fY[]gh'f'g'i]h'U'V'Y'`]b'Ub'U'W'X'Y'a]W'c'f'd'fc'Z'Y'gg]cbU'Wcb]h'YI h' (" 7\ccgY'gi]h'U'V'Y'`YUfb]b['gh'fU]h[]Yg'hc'Wcb]h]bi U'mYb\UbW'UbX'YI dUbX'U'Wai]fYX'g_]`g"

HYUW\]b['G'fU]h[]Yg'

H\Y'Wca fgY']g'VUgYX'cb'h'Y'df]bW]d'Y'h'U'h'Ub[i U[Y'UbX'W'h'fY'UfY']b]f]bg]W]`m']b_YX'UbX'Z'fa 'U'gcW]U' gm]h'Ya z'h'Y'fY'Z'fY'`Ub[i U[Yg'UbX'W'h'fYg'UfY'`YUfb]h'a c'fY'YZZY'W]j Y'mik \Yb'gh'XYbHg'\Uj Y'h'Y'cdd'cf]h' b]m hc' i gY'h'Y'`Ub[i U[Y']b'Wcb]h'YI h'`H\]g']g'U'W\]Yj YX']b'WUgg'h'f'ci [\Wca'`U'V'c'fU]h]j Y'dY'Y'f']b]h'fU'W]cb'UbX]bW'i g]j Y'h'U'W\]b['gh'fU]h[]Yg'z'U``gi d'c'f'h'X'Vm]U'j Uf]Y'h'c'Z'Ui h'Yb]h'W'X'c'W'a YbHg'z'hc[Y'h'Y'f'k]h'`cb!]bY a U]h'f]U'g'UbX'U'W]j]h'Yg'" `b'U'X'X]h]cb'z'h'Y'h'U'W'Y'f'k]`Y'bXYU'j ci f'hc'X'fU'k 'cb'mci f'dY'f'g'cbU'`YI dYf]Y'bW'g']b'U W]a U]h'`c'Za i h' U'fY'g'dY'W'h'V'Y'h' Y'Y'b'U``dU]h]W]d'Ub]h'g'z'k]h' h'Y'U]a 'c'Za U_]b['h'Y'`YUfb]b['YI dYf]Y'bW'`a c'fY fY'Yj Ub]h'UbX'Yb[U[]b["

5ggYgga Ybh

GHUfhXUHY. 'Bch5dd`]WVY

@Yb[h.) \$'a]bi hYg

8YHU]`g. '%\ci f-'Gh XYbhg'k]''gHb'UbX'fYgdcX'hc'Ub'YI WfdhZca 'U'fUX]c'dfc[fUa' f) 'hc'; 'a]bi hYgE'
: YYXVUW_j]U]b!WUgg'X]gW'gg]cb'fZ ''Wc'ffYW]cb []j YbE" Gh XYbhg'WU'Wcbgi 'h'kY''YWh' fYf'cf'h' hcf'Zcf
Z f'h'Yf'ZYXVUW"

Hi fb]h]b'gYH]b[. 'H\]g]g'bchU'Hi fb]h]b'Ugg][ba Ybh

5ggYgga Ybh(. :]bU''YI Ua]bUH]cb

GHUfhXUHY. 'Bch5dd`]WVY

@Yb[h. &'\ci fg

8YHU]`g. '&\ci fg''H\]g]g'h'Y'Z]bU''UggYgga YbhZcf'UH'YbXUbW' 'di fdcgYg''Gh XYbhg'k]''k f]h'Ub'YggUmicb'U
dfYdUfYX'UbX'fYgYUfWYX'hc'd]WGH XYbhg'k]''fYW]j Y'U'a Uf_'UbX'ZYXVUW_k]''VY' []j Yb'i dcb
Wcbgi 'hUH]cb'k]h'kY''YWh' fYf'ffi Vf]Wg'k]h']bX]j]Xi U'Wca a YbhgE"

Hi fb]h]b'gYH]b[. 'H\]g]g'bchU'Hi fb]h]b'Ugg][ba Ybh

	Hcd]W	<p>≈ a][fUhc'b'UbX'YI]Y"</p> <p>H\Y'dfYgYbhdUfh]W]d'Y'UbX' [Yfi bX]j Y'Z'dUgg]j Y Zcfa g</p>
K YY_'.%%Bcj Ya VYf! %) 'Bcj Ya VYf	5ggYgga Ybh	<p>Gi Va]hDcfhZ'c' ;]b'A ccX'Y'VYZcfY'A cbXUm%&'da "</p> <p>: YYXVUW_DcfhZ'c'k YY_g' ('hc '*"</p> <p>@]ghY'b]b['7 ca dfY\Ybg]cb'HYghf&\$i Ł]b'h hc]U' WUgg"</p>
	Hcd]W	<p>H\Y'j Uf]ci g'Zcfa g'cZhfUj Y`</p> <p>F Ygh]W]cb'UbX'W'cbX]h]cbU`</p>
K YY_%.% 'Bcj Ya VYf! &&'Bcj Ya VYf	5ggYgga Ybh	<p>Gi Va]hDcfhZ'c' -]b'A ccX'Y'VYZcfY'A cbXUm%&'da "</p>
	Hcd]W	<p>; fUa a Uf'fYj]g]cbg"</p> <p>DfYdUfU]cb'Zcf'hY'Z]bU`YI Ua 'fb>S bWf[fWX'WVW ? a`e]Mgd>[ZŁ</p>

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

- 6CI FA 5M5B`5"z@C -G95I`MzF -A 69F H`C "zH5 -@@5B8 -9F`="z; fUa a U]fY`9ggYbhY`Y`Xi : fUbW]g`!`6&z9X]hcbg`8]X]Yf"
- 7@5I`89@D"z@U`dYH]Y`Z`Y`XY`A cbg]Yi f@]b\z@Y`@j`fY`XY`DcWXY"

F YWca a YbXYX`F Ygci fWg

- J 9F 7C @@9F`5"YhUz8]Z]W`hAg`Yi d`jei AYg`Xi`Z]UbAU]g`Zcf`9b[`]g\`GdYU_Yfgz7`@9`-bhYfbU]hcbU"

H\]g:[`fUa a Uf`Vcc_`Wca dUfYg`gca Y`UgdYWg`cZ9b[`]g\`UbX`: fYbW\`[`fUa a Ufg`UbX`]g] Yfmi gYZ`Zcf gh`XYbhg`k`c`UW`WcbZXYbW`]b`XYU`]b[`k`]h`9b[`]g\`[`fUa a Uf"

Mci`k`j`U`gc`bYXX`hc`UWci`jFY`U`[`ccX`X]W]hcbUfm`k`Y`fYWca a YbX`hUhmc`i`Vi`mVch`U`: fYbW\`X]W]hcbUfm UbX`U`V`]b[`i`U`fi`fYbW!`9b[`]g\`#9b[`]g\!:`fYbW\`E`X]W]hcbUfm`Mci`g\`ci`X`Vi`mi`h`Y`V][`[`YghX]W]hcbUfm`mci`W]b`U`Z`cfX.`U`dcW_Y]h]g]nY`cf`WcbW]gY`X]W]hcbUfm`k`j`ei`]W`mdfcj`Y`]bUXYei`UH"

- 7c`]bg!F`cVYfh: fYbW!`9b[`]g\`#9b[`]g\!:`fYbW\`8]W]hcbUfm`7`c`]bg"
- CI`Z`cfX!<`UWXY`hY`: fYbW\`8]W]hcbUfm`CI`Z`cfX"

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

Mci`f`ZYXVUW`]g]`ja`dcfhUbh`hc`i`g`UbX`mci`k`j`VY`UV`Y`hc`hY`i`g`k`Uhmci`h]b_`UbX`\`ck`h`Y`Wci`fgY`W]b`VY`ja`dfcj`YX`VmidUfh]W]dU]h]b[`hc`h`Y`A`m9I`dYf]YbW`gh`XYbhYj`U`i`Uh]cbg`Uh`h`Y`YbX`c`Z`h`Y`hY`fa`"@UghmY`Uffg]`Wc\`cfh`Zci`bX`h`Y`Wci`fgY`]bhY`fYgh]b[`UbX`W`U`Y`b[`]b[`" `H\YmidUfh]W`UfmYb`e`mYX`h`Y`k`YY`_`migi`Va`]gg]cbg`]b`h`Y`dcfh`Z`c`VYW]i`gY`]hYbUV`YX`h`Ya`hc`a`cb]hc`f`h`Y]f`dfc[`fYgg`UbX`fYW]j`Y`ZYXVUW`h`fci`[`l`ci`h`h`Y`k`c`Y`Xi`fU]h]cb`c`Z`h`Y`Wci`fgY`" `H\YmZci`bX`h`Y`hY`h`cc_g`ci`hc`Z`X`U`h`z`k`\]W`]g`k`\`mi`h]g`mY`Uf`k`Y`XYW]XYX`hc`W]Ub[`Y`h`Y`[`fUa a Uf`Vcc_`UbX`Z`cW`g`a`cfY`cb`Ui`h`Y`bh]W]XcW`a`Ybhg"

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`U`HYa`dh]b[`hc`gi`Va`]hmc`i`f`Ugg][`ba`Ybh`h`fci`[`\`Hi`fb]h]b`z`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`fI`*)`XUmg`U`mY`UfL`≠mci`
UfY`i`bUV`Y`hc`gi`Va`]hmc`i`f`Ugg][`ba`YbhXi`Y`hc`U`ZU`ihk`]h`Hi`fb]h]b`mci`a`Um`Udd`mi`Zc`f`Ub`YI`HYbg]cb`z`Vi`hmc`i`
a`i`ghfY`hU]b`mci`f`h]W`Yhbi`a`VYf`Zca`9I`HYfbU`Gi`ddcfhfU`cb[`k`]h`Ubmc`h`Yf`fY`Yj`UbhXcW`a`Yb`hg`L`hc`
]bWi`XY`Ug`Yj`]XYbW`hc`gi`ddcfhmc`i`f`YI`HYbg]cb`Udd`]W]h]cb"≠mci`Ya`U]`9I`HYfbU`Gi`ddcfhmc`i`k`]"`

5 WUXYa]W<c bYghmUbX`D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b[`hY`k cfXg`cf]XYUg`cZchYfg`UbX`dfYgYbh]b[`hYa `Ug`mci f`ck b" `hWUb`hU`Y`a Ubm
Zcfa gž`Zca `XY`]VYfUHY`WXYU]b[`hc`UWV]XYbhU`mW`dm]b[`Zca `U`gci fW`k]h`ci hUW_bck`YX[Ya Ybh`

I BGK `[fci dg`d`U[]Uf]ga `]bhc`hY`Zc`ck]b[`WUHY[cf]Yg.

7 cdm]b[.`i g]b[`hY`gUa Y`cf`j Yfmg]a]Uf`k cfXg`hc`hY`cf][]bU`hYI hcf]XYU`k]h`ci hUW_bck`YX[]b[`hY`
gci fW`cf`i g]b[`ei chU]cb`a Uf_g" `H\]g`U`gc`Udd`]Yg`hc`]a U[Ygž`UfhUbX`XYg][b`dfc`YWgž`Ug`k Y`Ug
dfYgYbhU]cbg`k \YfY`gca YcbY`dfYgYbh]g`UbchYf`g]XYUg`cf`k cfXg`k]h`ci hWYX]h`

hUddfcdf]UHY`dUfUd`fUg]b[.`7`Ub[]b[`U`ZYk `k cfXg`UbX`d`fUgYg`k \]Y`a cghmifYU]b]b[`hY`cf][]bU`
ghfi W`fY`UbX`#`f`dfc[fYgg]cb`cZ]XYUg`cZ`hY`cf][]bU`ž`UbX`]bZcfa U]cb`k]h`ci hUW_bck`YX[Ya Ybh`H\]g`U`gc
Udd`]Yg`]b`dfYgYbhU]cbg`k \YfY`gca YcbY`dUfUd`fUgYg`UbchYf`g]XYUg`cf`k cfXg`k]h`ci hWYX]hU`bX`hc
d]YW]b[`hc[YhYf`ei chYg`UbX`dUfUd`fUgYg`]bhc`U`bYk `k \c`Yž`k]h`ci hUddfcdf]UHY`fYZYfYbW]b["

7 c`i g]cb.`k cf_]b[`k]h`chYfg`Vi hdUgg]b[`cZ`hY`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`UbchYf`gh`XYbhVYZc`fY`hY`Xi Y`XUHYž`cf`Zc`f`hY`di fdcgY`cZ`hY`a

- i bXYfghUbx'mci f'f][\hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[]Uf]ga ž'Wc'dmf][\hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5W'W'dhUV'Y'I gY'cZ I BGK '⇒H'F'Ygci f'W'g'Dc`]W'h
- VY'Uk UfY'cZ'Y'ghUbxUfXg'cZVY\Uj]ci f'YI dY'W'X'cZYj Yfmcby`]b'h'Y'I BGK 'W'a a i b]m
- 'cW'W'h'gYfj]W'g'UbX']bZ'fa U]cb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZ'Y'gY'UfY'Ug'k]''VY'ZJa]]Uf'hc'mci ž'c'h'Y'fg'k]''VY'bYk "'; U]b]b['U'gc`]X'i bXYfghUbx]b['cZU''h'Y fY'U'Y'X'UgdY'W'g'cZ9@-G9'k]''\Y'd'mci 'a U_Y'h'Y'a cgh'cZ'mci f'gh X]Yg'Uhl BGK ""

[\h'hd.##gi V'Y'W'f'i \]X'Y'g"'\]VfUfm'i b'gk "Y'X'i "U'i #' \]g'Y'#J'V'ci h' \]g'Y](#)

