



ARTS2690

GYa Ubh]Vg'UbX'DfU[a Uh]Vg

HYfa 'H\fYY'##'&\$&\$

7 ci fgY`Cj Yfj]Yk

GhUZZ 7icbWV18YHU]`g

7 cbj Ytbaffg

7ci fgY'8YHJ]`g

7fYX]hDc]bqg`*`

Gi a a UfmcZh\Y'7ci fgY

h\]g`Wci fgY`mci`k`j`YI d`cfY`h\Y`bUhi fY`UbX`gWc`dY`cZgYa Ubh]Wg`UbX`dfU[a Uh]Wg`UbX`h\Y]f`d`UW`k`]h`]b
@]b[i]gh]Wg`Hcd]Wg`]b`gYa Ubh]Wg`]bW`XY.`h\Y`bUhi fY`UbX`UbU`mg]g`cZ`YI]WU`a YUb]b[gZ`h\Y`fY`Uh]cbg\]d
VY`k`YYb`a YUb]b[`UbX`Wc[b]h]cbz`h\Y`fY`Uh]cbg\]d`VY`k`YYb`gYa Ubh]Wg`UbX`[fUa a Ufz`UbX`gYa Ubh]W
W\Ub[Y`Hcd]Wg`]b`dfU[a Uh]Wg`]bW`XY.`gdYYW\`UW`h\Y`cfmz`dc`]h`bYgg`h\Y`cfmz`]a d`]WU`h`fY`UbX
dfYgi ddcg]h]cb`Mci`k`j`Y`Uj`Y`h\Y`cddcfh`b]h]m]c`Yb[U[Y`k`]h`UbX`UbU`mgY`[Ybi`]bY`]b[i]gh]WXUHU`Mci
k`j`Udd`m`h\Y`gY`]XYUg`bchcb`m]c`9b[`]g\z`Vi`h]c`c`h\Y`f`Ub[i U[Yg`mci` `_bck`"

7ci fgY`@YUfb]b[`Ci hWca Yg

%`8`]gh]b[i]g`Ua`cb[`h\Y`Wc`bW`dfg`cZgYb`h`bW`a YUb]b[ži`hY`fUbW`a YUb]b[`UbX`gdYU`Yf`a YUb]b[
&`5dd`miUddfcdf]UH`XYgW]d]h]j`Y`UbX`UbU`m]h]WU`dfcW`Xi`fYg`h`c`h\Y`Z]Y`X`cZ]bei`]fmcZdfU[a Uh]Wg`UbX
]h]g`fY`Yj`Ubh]Wc`bW`d]i`U`Uggi`a`d]h]cbg
'`5dd`miUddfcdf]UH`XYgW]d]h]j`Y`UbX`UbU`m]h]WU`dfcW`Xi`fYg`h`c`h\Y`Z]Y`X`cZ`YI]WU`ž`d`fUgU`UbX
gYb`h`b]h]U`gYa`Ubh]Wg
(`5bU`mgY`]b[i]gh]WXUHU`UbX`Uf[i Y`h\Y`a`Yf]h]g`cZ`h\Y`UbU`mg]g"

HYUW\]b[`GhfUH[]Yg`

H\]g`Wci fgY`]g`Ub`]b]h[fU`Wca`dcbYbhcZh\Y`i`bXYf[fUXi`UH`]b[i]gh]Wg`W`ff]W`i`a`" `h`c`f`Y`f`h`c`i`b`X`Y`f`g`h`U`b`X`
h\Y`Wc[b]h]j`Y`UbX`gc`W]U`X]a`Ybg]cbg`cZ`Ub[i U[Y`]h]g`YggYb]h]U`h`c`]b]j`Yg]h[UH`h\Y`cf[Ub]nUh]cb`cZ`h\Y`
gYa`Ubh]Wgmg]hYa`ž`UbX`h\Y`bUhi`fY`cZ`h\Y`df]bW]d`Yg`cZdfU[a Uh]Wg`"

9UW`k`YY`_`h\Y`fY`k`j`VY`U`h`c`!`ci`f`Y`W`h`fY`f`K`Y`g][`b`Y`X`h`c`Y`U`V`c`f`U`h`c`b`UbX`W`U`f`]z`m]b`Z`c`f`a`U`h]cb`]b`h\Y`V`cc`_`g`
fY`W`c`a`a`Y`b`X`Y`X`z`d`i`g`U`c`b`Y`!`ci`f`h`h`c`f]U`"Hi`h`c`f]U`g`k`j`VY`a`U]b`m`X`Y`j`c`h`Y`X`h`c`X]g`W`gg]b[`UbX`YI`d`U]b]b[`h\Y`
Ub`g`k`Y`f`g`h`c`h\Y`YI`Y`f`W]g`Y`g`d`f`c`j`]X`Y`X`"

5ggYgga Ybh

@YWh fYg`k]`VY`dfcj]XYX`UgmbWfcbci`g`mž`h`Uh]gž`mci`k]`VY`UV`Y`fc`]]ghYb`cb!`]bY`Uh`h`Y`gW`YXi``YX`
`YWh`fY`hja`Yž`UbX`fYd`Um]hZc`f`mci`fgY`Z`Uh`Ubmich`h`Yf`hja`Y`"

Hi`fcf]U`g`k]`VY`cb`]bY`UbX`]]`Yž`Gh`XYb`tg`UfY`YI`dYW`YX`fc`VY`dfYgYbh`UbX`d`Ufh]W]d`UHy`]b`UW]j`]h]Yg`"
DfYgYbh]h]cbg`k]`VY`XcbY`]b`fYU`hja`Y`h`fci`[`\`h`Y`a`YX]i`a`c`Z6`UW`Vc`UfX`7`c`UV`cf`UHy`"

Gh`XYb`tg`k]`VY`dfcj]XYX`k]h`cb`]bY`UW]j`]h]Yg`YUW`k`YY`_`fc`Xc`]b`h`Y]f`ck`b`hja`Y`"

5ggYgga YbhHUg_g`

5ggYgga YbhHUg_	K`Y][`\`h`	8i`Y`8`UHy`	Gh`XYbh@YUfb]b[Ci`hW`a`Yg`5ggYggYX`
DfYgYbh]h]cb`	&\$i	cb[`c]b[`]b`h`fcf]U`g`	&Z`
DfcV`Ya`GYh`	&\$i	&(`#/#&#&\$&\$`%`%`\$`\$`DA`	(`
7`Ugg`HYg`tg`%`UbX`&`	*`\$i	%`)#`\$`#&\$`%`%`5`A`/`%&`#`%`#&\$&\$` %`%`\$`\$`5`A`	%ž&Z`

5ggYgga Ybh8YhU]`g`

5ggYgga Ybh%`DfYgYbh]h]cb`

GhUfhXUHy`. `&, `#`\$-`#&\$&\$`\$&.`\$`\$`DA`

8YhU]`g`.

C`b`W`]b`h`Y`h`Y`fa`Y`UW`g`h`XYbh]g`Ugg][`b`YX`fc`dfYgYbhU`h`fcf]U`fYUX]b[`UbX`Yb[`U[`Y`h`Y`c`h`Yf`g`h`XYb`tg`]b`

H\]g']g'h\Y`Z]bU`Ugg][ba YbhZcf`UHYbXUbW`di fdcgYg" H\]g']g'U`hU`Y`\ca Y`Ugg][ba Ybh]b`k` \]W\`gh`XYbhg`k`]`W`ca`d`Y`h`U`g`Y`h`c`Z`d`f`c`V`Y`a`g`U`b`X`#`f`Y`I`Y`f`W`]g`Y`g`h`U`h`U`ck`'h`Y`a`'h`c`'U`d`d`m`h`Y`W`c`b`W`d`h`g`W`c`j`Y`f`Y`X`']b`h`Y`W`c`i`f`g`Y`"H\Y`h`a`Y`f`Y`e`i`]f`Y`X`']g`U`d`d`f`c`l`]a`U`h`Y`m`&`\`c`i`f`g`"

Hi fb]h]b`g`Y`h]b[. H\]g']g`b`c`h`U`Hi`fb]h]b`Ugg][ba Ybh

5ggYgga Ybh' . '7`Ugg`HYg`h`g`%`U`b`X`&

GhUfhXUHY . Bch5dd`]WUV`Y

8YhU]`g.

- \$`a`]bi`h`g`Y`U`W`""` \$i`'Y`U`W`"HYg`h`g`W`c`j`Y`f`W`c`b`h`b`h`d`f`Y`g`Y`b`h`X`']b`"Y`W`h`f`Y`g`U`b`X`'h`h`c`f`]U`g`"K`f`]h`Y`b`U`b`X`'c`f`U`Z`Y`X`V`U`W`_`

5XX]h]c`b`U`'X`Y`h]`g.

H\YfY`UfY`&`]b!WUgg`h`Y`g`h`g`" H\Y`Z`]f`g`h`]g`c`b`%`#`\$`U`h`%`%`5`A`'U`b`X`'h`Y`'g`Y`W`c`b`X`']g`c`b`%`&`#`%`U`h`%`%`5`A`

Hi fb]h]b`g`Y`h]b[. H\]g']g`b`c`h`U`Hi`fb]h]b`Ugg][ba Ybh

K YY_*. %' C WtcVYf!'& C WtcVYf	C b`]bY'5Wlj Jlm	Gh XYbhtg`k UHW`Mci hi VY`j JXYcg`UbX`Wca d`YH UWlj`jHYg`cb`]bY"
K YY_+. '&*`C WtcVYf!' \$ C WtcVYf	@YWh fy	DUfh]W]dUbhtg`]b`GYbhtYbW`A YUb]b[GUYX`7`UdHYf`*
	Hi hcf]U`	8]gW gg`7`Ugg`HYgh%
	C b`]bY'5Wlj Jlm	Gh XYbhtg`k UHW`Mci hi VY`j JXYcg`UbX`Wca d`YH UWlj`jHYg`cb`]bY"
K YY_-. '&Bcj Ya VYf!'* Bcj Ya VYf	@YWh fy	7 cbhYI hUbX`-bZYfybW GUYX`7`UdHYf`+
	Hi hcf]U`	GUYX`7`UdHYf`*
	C b`]bY'5Wlj Jlm	Gh XYbhtg`k UHW`Mci hi VY`j JXYcg`UbX`Wca d`YH UWlj`jHYg`cb`]bY"
K YY_-.-`Bcj Ya VYf! %`Bcj Ya VYf	@YWh fy	7`Ugg]W@]b[i]gh]WDFU[a Uh]Wg 7`Uda Ub`7`UdHYf`'`UbX`(.
	Hi hcf]U`	GUYX`7`UdHYf`+
	5ggYgga Ybh	7`Ugg`HYgh& H]a YX`hYghcb`]bY`Xi f]b[`h`Y`YWh fy`dYf]cX
	C b`]bY'5Wlj Jlm	Gh XYbhtg`k UHW`Mci hi VY`j JXYcg`UbX`Wca d`YH UWlj`jHYg`cb`]bY"
K YY_%. %*`Bcj Ya VYf! &\$`Bcj Ya VYf	@YWh fy	A cXYfb`DFU[a Uh]Wg 7`Uda Ub`W`UdHYf`) .
	Hi hcf]U`	7`Uda Ub`z`W`UdHYf`'`UbX`(.
	C b`]bY'5Wlj Jlm	Gh XYbhtg`k UHW`Mci hi VY`j JXYcg`UbX`Wca d`YH UWlj`jHYg`cb`]bY"

Gi Va]gg]cb`cZ5ggYgga YbhiHUg_g

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

Ʒmci`YbWci bHYf`U`dfcV`Ya`k` \Yb`UH`Ya` dh]b[`hc`gi`Va`]hmc`i`f`Ugg][`ba`Ybhi`h`fci`[`\`Hi`fb]h]b`z`d`Y`Ug`Y`
HY`Yd`l`cb`Y`9I`HY`fb`U`Gi`ddc`fh`cb`-`,`,)`````%`cf`Ya`U]`h`Ya`i`cb`YI`HY`fb`U`HY`hgi`ddc`fh`4`i`bgk`"YXi`"Ui`""`Gi`ddc`fh`
l`ci`fg`UfY`,`.\$\$Ua`-`-%\$.\$\$da`i`cb`k`YY`_XUmg`U`bX`-`.\$\$Ua`-`,`)`. \$\$da`i`cb`k`YY`_YbXg`f`l`*)`XUmg`U`m`Y`Uf`l`"Ʒmci`
UfY`i`bUV`Y`hc`gi`Va`]hmc`i`f`Ugg][`ba`Ybhi`Xi`Y`hc`U`Z`Ji`h`k`]h`Hi`fb]h]b`mci`i`a`Um`Udd`m`Z`f`U`b`YI`HY`bg]cb`z`Vi`hmc`i`
a`i`gh`f`Y`h]b`mci`f`h]W`Y`hbi`a`VY`f`Z`ca`9I`HY`fb`U`Gi`ddc`fh`f`U`cb[`k`]h`U`b`m`c`h`Y`f`f`Y`Y`U`b`h`X`c`W`a`Y`b`h`g`k`h`c`
]b`Wi`XY`U`g`Y`j`]X`Y`b`V`W`hc`gi`ddc`fh`mci`f`YI`HY`bg]cb`Udd`]W`h]cb`"Ʒmci`Ya`U]`9I`HY`fb`U`Gi`ddc`fh`mci`k`]`
Ui`h`ca`U`h]W`U`m`f`Y`W`]j`Y`U`h]W`Y`hbi`a`VY`f`z`Vi`h]Z`mci`HY`Yd`l`cb`Y`mci`k`]`b`Y`Y`X`hc`gd`Y`W`Z]W`U`m`Ug`_`Z`f`c`b`Y`"
Hi`fb]h]b`U`gc`d`fc`j`]X`Y`g`i`d`X`U`h`Y`g`c`b`h`Y`]f`g`m`g`h`Y`a`i`g`h`U`h`g`c`b`H`k`]h`Y`f`"

;`Yb`Y`f`U`m`z`Ugg`Y`gga`Yb`hi`U`g`_`g`a`i`gh`V`Y`gi`Va`]h`Y`X`Y`Y`W`f`c`b]W`U`m`j`]U`Y`]h`Y`f`Hi`fb]h]b`c`f`U`A`cc`X`Y`
Ugg][`ba`Yb`h`i`h`]b`g`h`U`b`V`W`g`k` \Y`f`Y`h`l`g`]g`b`c`h`d`c`g`g]V`Y`z`]h`k`]`V`Y`g`h`U`h`X`c`b`mci`f`W`ci`fg`Y`g`A`cc`X`Y`g`]h`k`]h`
U`h`Y`fb`U`h]`Y`gi`Va`]gg]cb`X`Y`h]g`"

:`cf`]b`Z`fa`U`h]cb`c`b`l`ck`hc`gi`Va`]h`Ugg][`ba`Yb`h]g`c`b]b`Y`j`]U`A`cc`X`Y`.`h`h`d`g`#`g`h`X`Y`b`h`i`bgk`"YXi`"Ui`#`ck`!
gi`Va`]h`Ugg][`ba`Yb`h`a`cc`X`Y`"

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

D`U[]Uf]ga `]g`i`g]b[`h`Y`k`c`f`X`g`c`f`]X`Y`U`g`c`Z`c`h`Y`f`g`i`U`b`X`d`f`Y`g`Y`b`h]b[`h`Y`a` `U`g`m`c`i`f`c`k`b`" `#`W`U`b`h`U`_`Y`a` `U`b`m`
Z`c`f`a`g`Z`Z`c`a` `X`Y`]V`Y`f`U`h`Y` `W`X`Y`U`h]b[`h`c` `U`W`W`Y`X`Y`b`h`U` `m`i`W`c`d`m]b[`Z`c`a` `U`g`c`i`f`W` `k`]h`c`i`h`U`W`_`b`c`k` `Y`X[`Y`a` `Y`b`h`

I`B`G`K` `[`f`c`i`d`g`d`U[]Uf]ga `]b`h`c` `h`Y` `Z`c` `c`k`]b[`W`U`h`Y`[`c`f`]Y`g.

- i bXYfghUbx'mci f'f][\hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[]Uf]ga ž'Wcdmf][\hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5Ww'dhUV'Y'I gY'cZ I BGK '⇒H'F Ygci fW'g'Dc`]Wm
- VY'Uk UfY'cZh'Y'ghUbxUfXg'cZVY\Uj]ci f'YI dYW'X'cZYj Yfmcby`]b'h'Y'I BGK 'Wca a i b]m
- `cWJh'gYfj]W'g'UbX'j]bZcfa Uh]cb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZh'YgY'UfYUg'k]`VY'ZJa]]Uf'hc'mci ž'ch'Yfg'k]`VY'byk "; U]b]b['U'gc`]X'i bXYfghUbx]b['cZU`h'Y fY'UH'X'UgdYW'g'cZ9@G9'k]`Y'd'mci 'a U_Y'h'Y'a cghcZmci f'gh X]Yg'Uhl BGK ""

[\hhd.##ji V'YW'i \]XYg" \]VfUfm'i bgk "YXi "Ui #' \]gY#JVci h' \]gY](#)

