



# ARTS3991

5 frg`UbX`GcWU`GWYbWg`7 UdghcbY

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

7ci fgY`Cj Yfj ]Yk

`GHUZZ7cbhUWhi8YHU]`g`

`7cbj Ybcfg`

B Ua Y	9a U]`	5j U]`UV]`]m	@cWU]hcb	D\cbY
DYHf`G`YnU_	d"g`YnU_4 i bgk "YXi "Ui	6mUddc]bha Ybh	Fcca " % ž A cfj Yb`6fck b	- ' , ) ! & ( &&

GW\cc``7cbhUWhi`bZcfa U]hcb

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

@cWU]hcb. `GW\cc``C Z]W žA 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]hDc]bmg \*`

Gi a a UfmicZhY'7 ci fgY

H\Y'5ftg/`GcWU`GWYbWg'7UdgrcbY]g'U'a i`h!X]gWd]bUfmVei fgY`hUhdrcj`XYg'mci`k`h`Ub`cddcfh`b]m  
rc`fYZYWhcb`mci`fX]gWd]bUfmgh`X]Yg'cj`Yf`hY`dfYj`ci`g`h`fY`Yj`Y`g`cZgh`Xm`b`d`UffW`Ufz`hY`Vei`fgY`k`j`  
Vebg]XYf`WUgg]Vg`]b`hY`j]h`fU`fY`cZ`VYfU`YXi`W]hcb`rc`Ug`\_`rc`k`U`hYI`h`bh`mci`f`gh`Xm`Ug`j]`YX`i`d`rc`hY`  
j`Uf]ci`g`VebW`dhcbg`UbX`j]XYU`g`cZU`i`b]j`Yfg]mYXi`W]hcb`"Mci`Uj`Y`U`W`UbW`rc`h`]b`UVci`h`mci`f`ck`b`  
X]gWd]bY`]b`Vebj`YfgU]hcb`k`]h`gh`XYbmg`Zca`c`hYf`X]gWd]bYgzk`\\]Y`XYj`Y`cd]b[`mci`f`ck`b`Uk`UFYbYgg`cZ`  
hY`X]gWd]bUfm`\_bck`YX[`Y`UbX`i`bXYfghUbX]b[`mci`Uj`Y`UVei`]fYX"

H\Y`Vei`fgY`]g`U]a`YX`UhUgg]gh]b[`mci`k`]h`hY`fUbg]hcb`Zca`mci`f`W`ffYbhXY[`fY`rc`mci`f`fc`Y`]b`hY`k`cfX`  
Ug`W]h`hYbg]b`Ya`d`cma`Ybhc`f`Z`f`hYf`YXi`W]hcb`"

BchY.`H\Y`Vei`fgY`k`j`VY`a`UXY`Uj`U]UV`Y`Zcf`Gi`a`a`Yf`gYgg]cb`dfcj`X]b[`a`cfY`ZYI`j]`]mZcf`gh`XYbmg`  
a`YYh]b[`h`]g`fYei`]fYa`YbhcZhY]f`dfc[`fUa`#`U`cf`ghfYUa`":`cf`gh`XYbmg`Zcf`k`ca`gi`a`a`Yf`]g`bchmci`f`Ugh`  
gYgg]cb`cZYbfc`a`Ybhc`mci`a`i`ghcVhU]b`Uddfcj`U`Zca`mci`f`a`U`cf`Vebj`Ybcf`rc`Ybfc`]b`hY`WUdgrcbY`  
dfcj`j]YX`mci`Uj`Y`Vea`d`YhX`hY`bYW`ggUfmVei`fgYg`]b`mci`f`a`U`cf`ghfYUa`"9bfc`a`Ybh]b`hY`WUdgrcbY`  
fYei`]fYg`ZUW`mUddfcj`U`"D`YUgY`VebUWh`hY`[:UW`hmGh`XYbh7YbhfY`"](#)

## 7 ci fgY@YUfb]b[`Ci hVca Yg

%`5ftg`U`hY`Ub`i`bXYfghUbX]b[`cZhY`hY`c`fYh]W`UbX`a`Y`h`c`X`c`c[`]WU`df]bWd`Yg`cZhY]f`X]gWd]bY`  
&"`8Ya`cbghfU`h`Vea`dfY`Ybg]cb`cZYh`]WU`UbX`gcWU`fYgdcbg]V]`]hYg`]b`hY`dfUW]W`cZhY]f`X]gWd]bY`  
'`"5ftg`U`hY`hY`k`Um]g`]b`k`\\]W`hY]f`X]gWd]bUfm]fU]b]b[`Vei`X`VY`i`gYX`]b`Z`f`hYf`gh`Xmcf`hY`k`cfX`  
cZk`cf`  
("7ftg]W`mYj`U`i`U`hY`UbX`fYZYWhcb`\_YmUf[`i`a`Ybmg`UbX`XYVU`hYg`]b`hY`\\i`a`Ub]hYg`UbX`gcWU`  
gWYbWg`"

## HYUW]b[`GhfU`hY[`]Yg`

H\Y'5ftg/`GcWU`GWYbWg'7UdgrcbY`dfcj`XYg`gh`XYbmg`k`]h`hY`cddcfh`b]mrc`fYZYWhcb`hY]f`  
X]gWd]bUfmgh`X]Yg'cj`Yf`hY`dfYj`ci`g`h`fY`Yj`Y`g`cZgh`Xm`5g`k`Y`Ug`XYa`cbghfU]b[`hY]f`i`bXYfghUbX]b[`  
cZhY`a`U`cf`hY`c`fYh]W`UbX`a`Y`h`c`X`c`c[`]WU`df]bWd`Yg`k`]h`]b`hY]f`X]gWd]bY`Z`gh`XYbmg`k`j`Vebg]XYf`hY`  
Yh`]WU`UbX`gcWU`fYgdcbg]V]`]hYg`UggcWU`hY`X`k`]h`hY]f`UfYU`cZgh`Xm`UbX`k`j`cc`\_`rc`hY`Z`h`fY`rc`  
i`bXYfghUbX`\\ck`hY]f`gh`X]Yg`Uj`Y`dfYdUfYX`hY`a`Zcf`U`WUfYf`cf`Z`f`hYf`gh`Xm`

H\Y`Vei`fgY`k`j`VY`gh`XYbhW`bhfYX`UbX`gYa`]bUf`Xf]j`Yb`"H\Y`a`U`cf`UggYgga`YbhUg`\_k`j`VY`U`fYgYUfW`  
YggUm`k`\\]W`k`j`U`ck`gh`XYbmg`rc`XYa`cbghfU`hY`hY]f`UW]Yj`Ya`YbhcZhY`:`fUXi`U`hY`5ftf]Vi`hYg`Zcf`hY]f`  
UfYU`cZgh`Xm`5`ei`fbU`dcfZc`]c`k`j`VY`\_Ydhi`h`fci`[`\\`hY`Vei`fgY`k`\\]W`k`j`U`ck`gh`XYbmg`rc`fYZYWhcb`  
hY]f`YUfb]b[`cj`Yf`hY`h`fY`Yj`Y`g`cZhY]f`a`U`cf`"

H\Y`Vei`fgY`k`j`]b]c]j`Y`gYa`]bUf]gmiY`]bhYfUW]j`Y`X]gW`gg]cb`VUgYX`cb`hY`]XYUg`UbX`gh]a`i`i`g`cZk`YY`\_m`  
fYUX]b[`g`"DUffW]dUbhg`k`j`VY`fYei`]fYX`rc`a`U`\_Y`rk`c`dfYgYbU]hcbgZ`YUX]b[`X]gW`gg]cb`Vm[`]j`]b[`U`W]h]WU`  
UbU`mg]g`UbX`cj`Yf`]Yk`cZ`\_Ym]XYUg`]b`hY`fYUX]b[`g`Ug`hYgY`VYUf`cb`hY]f`ck`b`X]gWd]bY`UbX`j`]Yk`g`  
7ftg]W`z`UbU`m]h]WU`h`]b`\_b[`k`j`U`gc`VY`XYj`Y`cdYX`h`fci`[`\\`Ub`YI`h`bXYXz`W]h]WU`UWUXYa`]WYggUmcb`U`  
rcd]Wrc`VY`W`cgYb`]b`Vebgi`fU]hcb`k`]h`hY`Y`W`i`fYf`"

## 5ggYgga Ybh

Gi [ [ YghYX`YggUmhcd]Mg`k ]`VY`dfcj ]XYX`cb`A ccXY"

5bmWt`bj Ybh]cbU`UWJXYa ]WfYZfYbW]b[ `gmghYa `]g`UWVY`dHUV`Y"

## 5ggYgga YbhHUg\_g`

5ggYgga YbhHUg_	K Y][ \h		

fYdcftg"

5ggYgga Ybh' . 'A ]X!hYfa 'hJ\_Y!\ca Y'Ugg][ ba Ybh

GHUfhXUHY . '& #/\$#&\$%- '%&.\$\$'5A

@Yb[ h\ . %) \$\$'k cfXg

8YhU]`g.



%) 'Bcj Ya VYf		7": YfbUbXYg; 'K ]'X'A Ub ]b'h\Y'K ]b[ g B""7\ca g_m'H\ci [ \hg'cb: bH'`YWñ U'g'UbX'h\Y G\cc`g
K YY_%. % 'Bcj Ya VYf! &&'Bcj Ya VYf	GYa ]bUf	: fYYXca 'cZ'h\Y'DfYgg %">"G"A ]': 'C b '@ VYfmcZH\ci [ \h/ '8]gW gg]cb &"A Ufh\U'Bi ggVUi a .; YbXYf/ ; cj YfbUbW

F Ygci fWg

DfYgW]VYX`F Ygci fWg`

7ci fgY`fYUX]b[ g`k ]`VY`Uj U]UV`Y`cb`]bY`]b`A ccX`Y"

F YWca a YbXYX`F Ygci fWg

BchUj U]UV`Y

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

Gh XYbhZYXVUW\_k ]`VY`h`fci [ \ `]bZcfa U`dYfgcbU`ZYXVUW`UbX`h`Y`Ubcma ci g`cb`]bY`A m9I dYf]YbW  
grghYa "



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`H`Ya`dh]b[`h`c`gi`Va`]h`mci`f`Ugg][`ba`Ybh`h`fci`[`\`Hi`fb]h]b`z`d`YUgY`  
H`Y`d`\`cb`Y`9I`H`fb`U`Gi`ddcfh`cb`-`,`),`"`,`"`,`"`,`%`c`f`Ya`U]`h`Ya`cb`YI`H`fb`U`H`h`gi`ddcfh`4`i`bgk`"YXi`"Ui`"Gi`ddcfh`  
\`ci`fg`UfY`,`.\$\$Ua`-`-%\$.\$\$da`cb`k`YY`XUmg`UbX`-`.\$\$Ua`-`).\$\$da`cb`k`YY`YbXg`f`l`\*)`XUmg`U`m`Y`U`f`l`"≠mci`  
UfY`i`bUV`Y`h`c`gi`Va`]h`mci`f`Ugg][`ba`Ybh`Xi`Y`h`c`U`Z`U`h`k`]h`Hi`fb]h]b`mci`a`Um`U`dd`m`i`Z`f`Ub`YI`H`bg]cb`z`Vi`h`mci`  
a`i`gh`f`Y`h`U]b`mci`f`h]W`Y`h`bi`a`VY`f`Z`ca`9I`H`fb`U`Gi`ddcfh`f`U`cb[`k`]h`Ub`m`c`h`Y`f`f`Y`j`Ub`h`X`c`W`a`Y`b`h`g`l`h`c`  
]b`Wi`XY`U`g`Y`j`]X`Y`b`W`h`c`gi`ddcfh`mci`f`YI`H`bg]cb`U`dd`]W`h]cb"≠mci`Ya`U]`9I`H`fb`U`Gi`ddcfh`mci`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[ YgžUfhUbX`XYg][ b`dfc`YWgžUg`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`i 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'Wcdmf][ \hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'UbX'5WWhU'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
- `cWWh'gYfj ]W'g'UbX' ]bZcfa Uhcb'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 ""

[\hd. #gj V'YWf i \]XYg" \]VfUfm'i bgk "YXi "Ui #` \]gY#JVci h' \]gY](#)

5 WUXYa ]WbZcfa Uhcb`

: cfYggYbh]U`ghi XYbh]bZcfa Uhcb`fY`Uh]b[ `hc.

- fYei Yghg`ZcfYI hYbg]cb/
- `UhY`gi Va ]gg]cbg`[ i ]XY`]bYg/
- fYj ]Yk `cZa Uf\_g/
- I BGK `<YU`h`UbX`GUZY`midc`]WYg/
- YI Ua ]bUh]cb`dfcVWXi fYg/
- gdYW]U`Vc]bg]XYfUh]cb`]b`hY`Yj Ybhcz]`bYgg`cf`a ]gUXj Ybh fY/
- ghi XYbhYei ]hmUbX`X]gUV`]`hm/
- UbX`chYfYggYbh]U`UWUXYa ]W]bZcfa Uh]cbz`gYY

[\hfg.#k k k "Ufng"i bgk "YXi "Ui #W ffYbhghi XYbh\]bZcfa Uhcb`dfc\]Vc`g!\[ i \]XY`\]bYg#](#)

⇒ U[ Y`7 fYX]h

CdYb`UWVYgg`di V`]W]`mUj U]UV`Y`Zca `A Yfcdc`]hUb`A i gYi a žBYk `Mc`f`\_"

7F ⇒ CG

7F ⇒ CG`Dfcj ]XYf`7cXY.`\$\$\$- ;