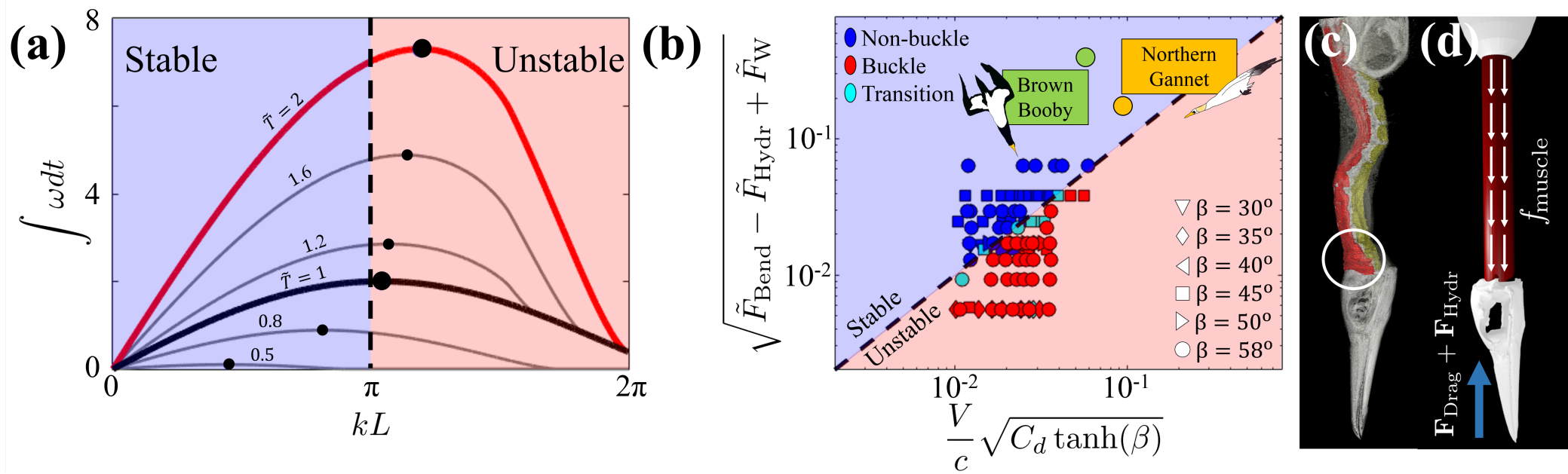

(a)
Stable
Unstable
8
4
0
0
π
2π
$\int \omega dt$
kL
$\tilde{\tau} = 2$
1.6
1.2
$\tilde{\tau} = 1$
0.8
0.5
(b)
Non-buckle
Buckle
Transition
Brown Booby
Northern Gannet
$\beta = 30^o$
$\beta = 35^o$
$\beta = 40^o$
$\beta = 45^o$
$\beta = 50^o$
$\beta = 58^o$
Stable
Unstable
10^{-1}
10^{-2}
10^{-2}
10^{-1}
$\sqrt{\tilde{F}_{\mathrm{Bend}} - \tilde{F}_{\mathrm{Hydr}} + \tilde{F}_{\mathrm{W}}}$
$\frac{V}{c}\sqrt{C_d \tanh(\beta)}$
(c)
(d)
f_{muscle}
$\mathbf{F}_{\mathrm{Drag}} + \mathbf{F}_{\mathrm{Hydr}}$