

Abstract Submitted
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Is paramecium swimming autonomic? PROMODE R. BANDY-
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fare Center, Newport, RI 02841, USA — We seek to explore if the swimming of
paramecium has an underlying autonomic mechanism. Such robotic elements may
be useful in capturing the disturbance field in an environment in real time. Ex-
perimental evidence is emerging that motion control neurons of other animals may
be present in paramecium as well. The limit cycle determined using analog simu-
lation of the coupled nonlinear oscillators of olivo-cerebellar dynamics (IEEE JOC **33**,
563-578, 2008) agrees with the tracks of the cilium of a biological paramecium. A
4-motor apparatus has been built that reproduces the kinematics of the cilium mo-
tion. The motion of the biological cilium has been analyzed and compared with the
results of the finite element modeling of forces on a cilium. The modeling equates
applied torque at the base of the cilium with drag, the cilium stiffness being phase
dependent. A low friction pendulum apparatus with a multiplicity of electromag-
netic actuators is being built for verifying the maps of the attractor basin computed
using the olivo-cerebellar dynamics for different initial conditions. Sponsored by
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