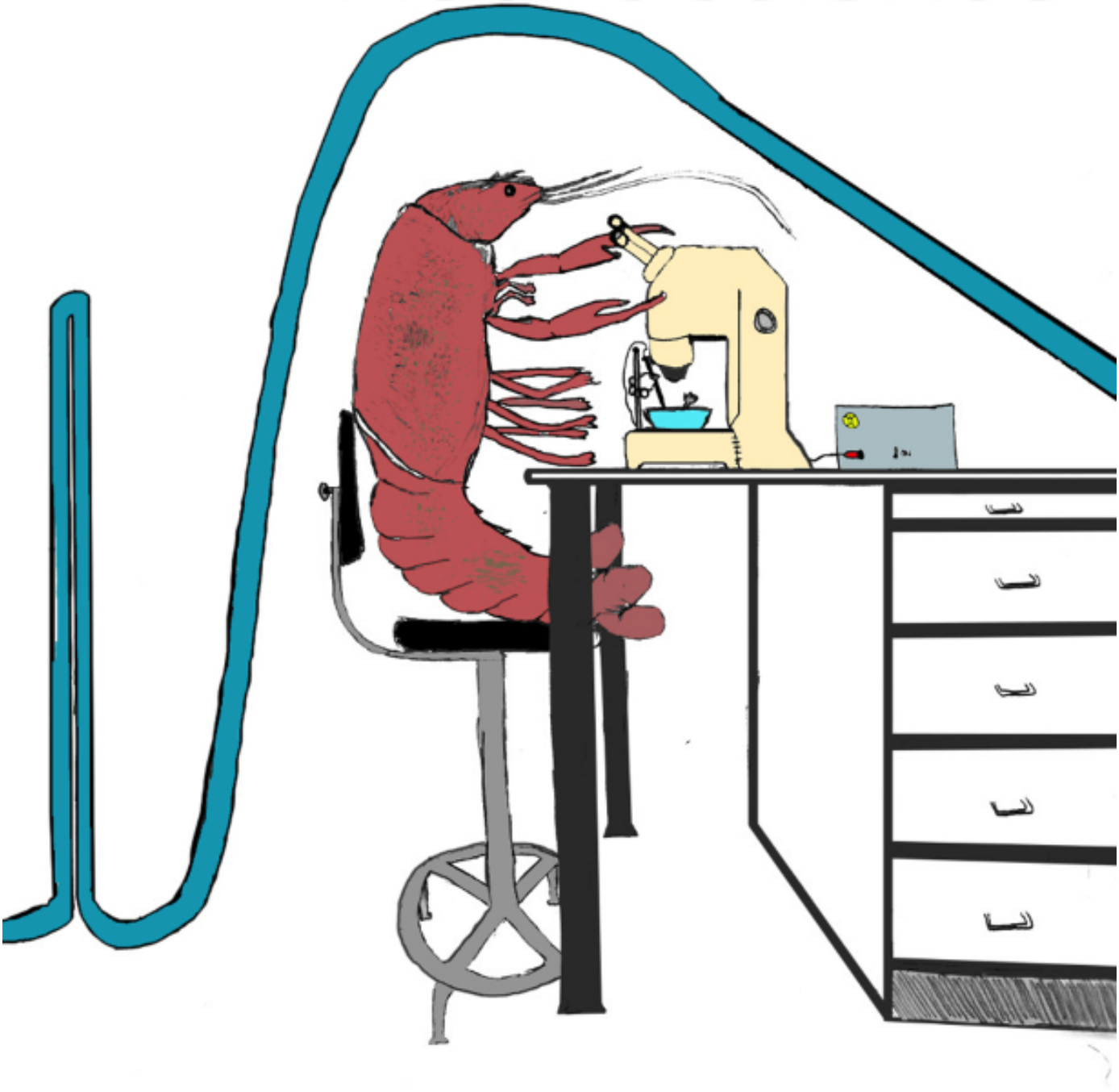
Pioneering Neuroscience



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It is my pleasure to present the sixteenth volume of *Pioneering Neuroscience: The Grinnell Journal of Neurophysiology.* The articles collected in this volume represent original contributions to the field of neuroscience offered by students *in the fifteenth offering* of Biology 150: Introduction to Biological Inquiry - the Language of Neurons. As has been true for fourteen previous classes of Bio 150, this course was taken by most of the students during their first semester in college. For all of the students, this was their first college-level biology course!

Amyotrophic lateral sclerosis, or ALS, is a progressive neurological disease that leads to a debilitating and ultimately fatal loss of muscle control. These symptoms result from the degeneration of the cells and the synaptic connections responsible for activating muscle contraction. Insufficiently controlled oxidative stress is thought to play a major role this degeneration. In humans and their more commonly studied mammalian surrogates, mice and rats, the motor symptoms are preceded by deficits in synaptic signaling between motor neurons. These synapses, which use the excitatory neurotransmitter glutamate, resemble the synapse used by invertebrate animals such as crayfish to activate their muscles. Thus, students in this year's Bio 150 class used the crayfish neuromuscular junction (NMJ), as this specialized synapse is called, to interrogate possible cellular mechanisms that might lead to the pathological changes that develop in ALS.

Two of the projects reported in this issue explored the influence of homocysteine, a non-protein amino acid that is elevated in patients with ALS. Evidence is presented that both supports and refutes a role for homocysteine in sensitizing the crayfish NMJ to oxidative stress. In contrast, although nitric oxide was shown in one study to augment post-tetanic potentiation, it was also shown using two different approaches to sensitize the NMJ to oxidative stress. The final three projects tested some methods to reduce oxidative damage. All three demonstrated some benefits, allowing this issue to conclude on an optimistic note.

I wish to thank the students of Biology 150 for their hard work and collegiality. None of this would have been possible without the contributions of Ashley Wolterstorff, the lab instructor, and the excellent work of mentor/lab assistant Julia Petrusan'18 and writing mentor Timothy Burnette'19. The cover picture was created and illustrated by Andrew Tucker'21 and the back page illustration was the work of Cara Keleher'21.

Clark Lindgren, Editor
December, 2017
Grinnell, Iowa