

NEWS

Announcing the 2018 Journal of Experimental Biology Outstanding Paper Prize shortlist and winner

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Journal of Experimental Biology has always prided itself on encouraging early-career researchers and nurturing young talent. Many of today's leading PIs learned their earliest lessons about publishing through peer review at the hands of previous JEB Editors-in-Chief, including John Treherne, Charlie Ellington and Bob Boutilier; some have even gone on to become Editors in their own right. In 2005, we launched the JEB Outstanding Paper Prize in memory of Boutilier, to recognise excellence in the next generation. This year we are delighted to announce the shortlist of papers that the journal editors nominated for the 2018 award. Featuring topics as wide-ranging as the development of oxygen transport in snapping turtle embryos, the factors that cause cold flies to fall into a coma and the visual features that influence flying hoverflies, the shortlist celebrates the journal's diversity and we have made all of the papers available for free on the journal website for the next month.

'This year we had a great selection', says Hans Hoppeler, JEB Editor-in-Chief, who nominated Julia York's investigation of the different respiration strategies adopted by two high-altitude species of geese (jeb170738). 'This paper addresses an iconic question', says Hoppeler, adding, 'York and colleagues have used an ingenious combination of state-of-the-art techniques to add yet another piece of information to this intriguing puzzle'. Of another comparative study, in which Francis Pan and co-authors investigated the factors that influence larval oyster growth (jeb171967), Raul Suarez says that the paper was distinguished by 'its highly mechanistic approach', adding that it tackles the fundamentally important and ecologically relevant question of how individuals of the same species grow to so many different sizes. Moving on to another study conducted in a developing organism, in which Marina Sartori investigated oxygen transport in developing snapping turtle embryos (jeb185967), Katie Gilmour describes the data as unique and says, 'I was impressed by the authors' ability to collect data on cardiovascular function in developing turtle embryos in the egg!', adding that the data 'required an impressive amount of work to collect and provide important physiological insights'. Gilmour also recalls Molly Amador's work with Danielle McDonald, characterising the Gulf toadfish serotonin transporter SLC6A4, in *Xenopus* oocytes (jeb170928): 'It was the thorough, comprehensive nature of the study that stood out for me', she says.

Two of the shortlisted papers address the impact of low temperatures on insects, with Lauren Des Marteaux investigating the adaptations that allow malt flies to survive freezing at temperatures of -196°C (jeb189647), while Mads Andersen explored why adult *Drosophila* fall into a coma when they get chilly (jeb179598). 'Andersen's paper separates the impact of cold on the central nervous system from that on the musculature', says Julian Dow, while Craig Franklin comments on Des Marteaux's

nominated paper, saying, 'We are intrigued by the potential to cryopreserve human cells, tissues, organs, even heads. The paper by Des Marteaux provides us with a fascinating insight into how insects are able to modulate their ability to tolerate freezing challenges, and puts forward a mechanism of acquired freeze tolerance'.

With the journal's strong reputations in neuroethology and biomechanics, no Outstanding Paper Prize shortlist would be complete without nominations from those fields. 'I liked the paper by Malin Thyselius and colleagues' (jeb177162), says Almut Kelber, describing the group's analysis of the factors that trigger hoverflies to leave flowers when approached by other insects, adding 'The researchers noticed something that has been seen innumerable times, but asked a new question'. Michael Dickinson also praises Maximilian Bothe's investigation of an exotic sense – the detection of infrared radiation (jeb185611) – in an unconventional creature. 'Working with rattlesnakes required enormous luck and creativity, and the results provide a key insight into how all animals extract salient features from a complex sensory background', he explains. In another paper designed to understanding the rich sensory world of other species, Jeremy Gibson, from the University of Strathclyde, UK, investigated how male thornbug treehoppers interpret the minute vibrations generated in vegetation by amorous females (jeb175083). Sheila Patek says, 'It is an elegant and insightful study', adding that the



Clockwise from top left: Till Harter, Mike Sackville and Dave Metzinger, who received the 2018 Journal of Experimental Biology Outstanding Paper Prize.

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Box 1. 2018 Journal of Experimental Biology Outstanding Paper Prize shortlist

Amador, M. H. B. and McDonald, M. D. (2018). Molecular and functional characterization of the Gulf toadfish serotonin transporter SLC6A4. *J. Exp. Biol.* **221**, jeb170928.

Andersen, M. K., Jensen, N. J. S., Robertson, R. M. and Overgaard, J. (2018). Central nervous system shutdown underlies acute cold tolerance in tropical and temperate *Drosophila* species. *J. Exp. Biol.* **221**, jeb179598.

Bothe, M. S., Luksch, H., Straka, H. and Kohl, T. (2018). Synaptic convergence of afferent inputs in primary infrared-sensitive nucleus (LTDD) neurons of rattlesnakes (*Crotalinae*) as the origin for sensory contrast enhancement. *J. Exp. Biol.* **221**, jeb185611.

Cohen, K. E., Hernandez, L. P., Crawford, C. H. and Flammang, B. E. (2018). Channeling vorticity: modeling the filter-feeding mechanism in silver carp using μ CT and 3D PIV. *J. Exp. Biol.* **221**, jeb183350.

Des Marteaux, L. E., Štětina, T. and Košťál, V. (2018). Insect fat body cell morphology and response to cold stress is modulated by acclimation. *J. Exp. Biol.* **221**, jeb189647.

Gibson, J. S. and Cocroft, R. B. (2018). Vibration-guided mate searching in treehoppers: directional accuracy and sampling strategies in a complex sensory environment. *J. Exp. Biol.* **221**, jeb175083.

Harter, T. S., Sackville, M., Wilson, J. M., Metzger, D. C. H., Egginton, S., Esbaugh, A. J., Farrell, A. P. and Brauner, C. J. (2018). A solution to Nature's haemoglobin knockout: a plasma-accessible carbonic anhydrase catalyses CO₂ excretion in Antarctic icefish gills. *J. Exp. Biol.* **221**, jeb190918.

Pan, T.-C. F., Applebaum, S. L., Frieder, C. A. and Manahan, D. T. (2018). Biochemical bases of growth variation during development: a study of protein turnover in pedigreed families of bivalve larvae (*Crassostrea gigas*). *J. Exp. Biol.* **221**, jeb171967.

Sartori, M. R., Kohl, Z. F., Taylor, E. W., Abe, A. S. and Crossley, D. A., II (2018). Convective oxygen transport during development in embryos of the snapping turtle *Chelydra serpentina*. *J. Exp. Biol.* **221**, jeb185967.

Thyselius, M., Gonzalez-Bellido, P., Wardill, T. and Nordström, K. (2018). Visual approach computation in feeding hoverflies. *J. Exp. Biol.* **221**, jeb177162.

Wang, Z. Y. and Ragsdale, C. W. (2018). Multiple optic gland signaling pathways implicated in octopus maternal behaviors and death. *J. Exp. Biol.* **221**, jeb185751.

York, J. M., Scadeng, M., McCracken, K. G. and Milsom, W. K. (2018). Respiratory mechanics and morphology of Tibetan and Andean high-altitude geese with divergent life histories. *J. Exp. Biol.* **221**, jeb170738.

authors also used 'excellent scholarship, writing and figures to bring their study to life.' Moving from communication in insects to Yan Wang's investigation of the signalling mechanisms that regulate the behaviour of octopus mothers after laying their eggs

(jeb185751), Hoppeler says, 'I feel that this paper best represents an example of the kind of science that JEB wants to publish and promote', while Deputy Editor-in-Chief Andrew Biewener describes Karly Cohen and Callie Crawford's paper analysing the flow patterns of silver carp (jeb183350) as elegant. He adds that the suction mechanism 'likely enables the fish to enhance their filter feeding capability', but warns that their impressive suction power could underpin their success as an invasive species in US freshwater systems.

However, after much deliberation, the editors selected 'A solution to Nature's haemoglobin knockout: a plasma-accessible carbonic anhydrase catalyses CO₂ excretion in Antarctic icefish gills' (jeb190918), from Colin Brauner's lab at the University of British Columbia (UBC), Canada, as the winner of this year's Outstanding Paper Prize. 'Antarctic icefishes are fascinating because every other vertebrate depends on haemoglobin, but they don't', says Pat Wright, who was responsible for overseeing peer review of the article. 'The paper is outstanding because it answers an important fundamental question using a comparative approach and places the findings in an evolutionary context; what could be better than that?' she laughs.

Reacting to the news, Brauner said, 'I am thrilled! It is fantastic to be recognised', before crediting his early-career colleagues, Till Harter, Mike Sackville and Dave Metzger, who will share the award. 'I have been interested in the idea that plasma-accessible carbonic anhydrase must exist in the gills of icefish to permit CO₂ excretion for over 20 years', explains Brauner, adding that the opportunity to investigate his hypothesis only came along when he learned that his UBC colleague Tony Farrell was going to Palmer Station, Antarctica, with Kristin O'Brien, Lisa Crockett and Stuart Egginton. 'The biggest challenge was to get the samples from Antarctica to UBC', remembers Brauner. Acknowledging the outstanding contributions of Harter, Sackville and Metzger, Brauner says, 'Till focused on all aspects related to carbonic anhydrase and cloned the gene in the lab of Andrew Esbaugh, Mike focused on aspects related to blood buffer capacity, and we invited Dave later... to help with sequencing and expression of the carbonic anhydrase gene'.

Reflecting on the papers that have been recognised in this year's shortlist, Hoppeler applauds all of the early-career researchers who are building their careers and says, 'We feel that these papers are excellent examples of hypothesis-driven physiological, biomechanical and biochemical research uncovering novel – sometimes unusual – solutions to the challenge of survival for a particular species'.