

## CONVERSATION

## JEB@100: an interview with Monitoring Editor Stuart Egginton

Journal of Experimental Biology is celebrating 100 years of discovery in 2023 and, as part of our reflections, we are inviting Journal Editors to tell us their thoughts about the journal and to look to the future. In this Conversation, Monitoring Editor Stuart Egginton tells us why he thinks comparative physiology has a lot to offer the biomedical field and that he would advise his younger self to trust his instincts more.

### What is your area of scientific expertise and how did that introduce you to Journal of Experimental Biology?

I would say that my interests are quite varied but cover cardiovascular and muscle physiology, with an emphasis on oxygen transport limitations to animal performance ranging from responses to extreme challenges – such as cold exposure (hypothermia) and hypoxia – to exercise versus muscle overload. I am also interested in how insights from these experimental observations may have translational benefits: from understanding an animal's resilience to climate change to providing inspiration for treatments to help alleviate human health problems. Cardiovascular and muscle physiology appeared in the journal right from the start. One of the first papers I published as an independent researcher was in JEB, when Bob Boutilier was Editor-in-Chief. I think Bob's influence was pivotal to me wanting to contribute to the journal because it reflected his values, which were evident whenever we met at the Society of Experimental Biology annual meetings. He was encouraging and I remember how he conscientiously guided that paper through peer review. As an Editor, I've tried to maintain those personal interactions; I don't reject a paper without a list of reasons why and suggestions for how the authors can modify it to make it potentially publishable. I think it's really important that we keep that personal touch because JEB is a community science publication that also provides encouragement and advice for early-career researchers.

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### What do you think is the secret of JEB's longevity and success?

In addition to the concept of the journal as a community publication, it has a long history of covering important topics across a broad spectrum of interests while maintaining high-quality scientific presentation; often those two priorities conflict. A lot of journals have a broad base but are not taken seriously, whereas JEB manages to maintain a balance of breadth and quality really well. It's also a journal that pursues novel ideas and exciting avenues of investigation and it is backed by encouraging editors and a very supportive in-house editorial team. It's quite unusual nowadays to have that amount of input from a journal to craft the final output, but I think it is really helpful, particularly for those early in their careers.

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### What are the current big outstanding questions in your field?

I think it's the crosstalk between cardiovascular and muscle responses to physiological challenges. In the past, we've tended to do a lot of science in separate silos – you're considered a cardiovascular physiologist or you're a muscle physiologist – but increasingly, we're realising that one doesn't exist without the other. We're starting to see a lot more interaction between these systems, in terms of communication and modulating the response of one by activity of the other. We also need to broaden the range of species examined. The tendency is to publish findings that are considered to be 'unusual', but I suspect that more often than not researchers are unlikely to be describing a unique feature of a particular animal. It's more likely a reflection of the limited baseline data that we have. If all you have to compare the physiology observed in an exciting South American animal with is your local homebred mouse or lab-based species, then yes, the response that you have recorded may well be completely different, but that doesn't mean that it's unique. I think the comparative field has got a lot to offer the biomedical field in this respect. For example, mouse models to investigate disease are replacing the variety of different animals that were used previously, even though we know that the mouse is an absolutely terrible proxy for a lot of human conditions. The big pharmaceutical companies are likely to be developing drugs on a model that is inappropriate. That's a serious problem where the comparative field can help, because we know that there are a range of vertebrate responses to physiological challenges that we can learn from to develop more effective therapies.

## The comparative field has got a lot to offer the biomedical field

### Where do you think research in your field is currently going?

I think the dominant theme in most areas now is molecular. Increasingly, that means that the physiology presented in papers from other journals is often relegated to a token figure, which purports to show some functional relevance of the molecular biology that the paper dwells on but misses the point about the complex interrelatedness of the different ecological, physiological and anatomical factors that define the observed response. But not JEB – that's why it is the standout journal in this area. JEB offers a home for those adopting a holistic approach taking into account all levels of biological organisation, which has to be the ultimate goal of our science. The days of studying one aspect of biology at a time have gone, so we need to embrace other disciplines in order to identify the unifying themes that exist across the amazing diversity of life. We tend to focus on novelty, which is interesting because it often points to an area of limited understanding, but then we need to integrate the analytical advances we've seen from various 'omics' approaches – such as transcriptomics and metabolomics – to appreciate the range of individual responses that make up adaptive capacity at a population level. That will then give us a real chance of determining why a particular species responds to an environmental challenge in one way whereas another uses a completely different strategy. Understanding why there are different physiological solutions to the same problem has always been a big challenge and will also be key in designing personalised medicine.

### JEB offers a home for those adopting a holistic approach taking into account all levels of biological organisation

#### How have you overcome the challenges of being a comparative physiologist in a medical school?

I would say that finding good mentors was key. My PhD supervisor at St Andrews University, UK, Ian Johnston, continued to offer support long after I left, and Bruce Sidell at the University of Maine, USA, gave me great freedom during my first post doc. I joined Olga Hudlická's research group at the University of Birmingham, UK, for my second post doc and she appreciated that we were interested in the same question but approached it from two very different directions; the two of us could make better progress working together than on our own. That was unusual, but very encouraging, and I've tried to emulate that by often seeking collaborations with people doing things quite differently from me. John Coote, Head of the Physiology Department in the Birmingham Medical School, where I had my first permanent position, also encouraged my comparative studies, even though a lot of colleagues were very dismissive. The comparative physiology community was encouraging during that time too: going to meetings to present my research and receiving positive feedback, as well as submitting to JEB and getting constructive reviews, provided a sense of belief that was really valuable and gave me the confidence to continue.

#### If you could time travel, what piece of future equipment would you bring back with you, what would it do and what questions would you use it to answer?

I think less invasive instrumentation is key and the reason for that, as I've always taught my students, is that the Heisenberg Uncertainty

Principle isn't restricted to the realm of physics. He said that the act of observation has an effect and in biology if you intervene, either by experimentation or measurement, you change the thing you're trying to observe. A non-invasive, unobtrusive device to quantify physiological variables in an animal in its natural environment will be key, because then we can analyse responses to the trials of daily life. Living in a natural environment is a challenge, which we saw when we started to do data logging in fishes. We were able to correlate heart rate responses with oxygen consumption in the lab, then we looked at the recorded heart rates of free-living animals to estimate their metabolic rates. However, once you've implanted the logger, you have to wait a suitable time until the animal settles down and the readings return to baseline values, although people often don't wait long enough so they miss key information. For example, if you look at the resting heart rate of any animal in a nice quiet environment, such as an aquarium, and then let that animal loose in the open oceans, the resting heart rate is considerably higher and much more variable. That's because the environment around it is threatening, so they have much higher heart rates than you see in the lab. We need to be able to measure what animals are doing as part of daily life, then we can extend our understanding of their physiological responses to seasonal changes and then to longer-term, time-based studies, such as climate change.

### We need to be able to measure what animals are doing as part of daily life

#### If you had one piece of advice for your younger self, what would it be?

I think it would be to not go chasing after too many exciting avenues of inquiry. I'm interested in so many things that when an opportunity comes along I go for it, but I think that I really should have restricted my interests just a little so I could balance breadth of inquiry with depth of knowledge. You need to trust your instincts. Early-career researchers tend to be at the mercy of the opinion of senior colleagues, funding agencies, referees on papers and so on, which can deter them from pursuing particular lines of enquiry. The timing of ideas is another challenge. For example, in the past I discussed a number of concepts in seminars or grant applications that were dismissed at the time as unreasonable, only to appear in publications by other people a few years later. That was really disappointing. I should have been more resilient to the criticism, stuck to my guns and pursued those ideas.

### You need to trust your instincts

#### If you had to sum up what JEB means to you as an author and researcher, what would you say?

I'd say that the journal is an accessible repository of great science, a source of inspiration and a place to publish where your science will be critically evaluated in an encouraging environment. Seeing the 'weird and wonderful' topics discussed gives us the courage to defy conventional approaches ('model species' should be anathema for experimental biologists). There are amazing jewels of knowledge to be uncovered if you know where to look!

Stuart Egginton was interviewed by Kathryn Knight. The interview has been edited and condensed with the interviewee's approval.