Thought Leadership

AIBS: Enabling access to biological science

Dr Joseph Travis is the current President of the American Institute of Biological Sciences (AIBS). This is a non-profit organisation that advocates on behalf of research in the biological sciences, tackling the current challenges faced by scientists and society, while also ensuring that reliable scientific information remains accessible not only to legislators, biologists and funders, but the wider general public as well.

The study of life is vital to advancing our understanding of evolution and biology. Due to numerous technological advances throughout the years, from the invention of the microscope in the 19th century to the emergence of the Human Genome Project in the early 1990s, biology lies at the heart of science – and its practice is only going to get stronger, despite some of the modern-day challenges it faces.

At the forefront of research into this area is the American Institute of Biological Sciences (AIBS) – a society comprised of over 100 member institutions. Since their foundation in 1947, the non-profit association has dedicated its time, research, and funding to biological research and education for the welfare of society, working to ensure that the public, legislators, funders, and biologist community have access to information that guides biological decision-making. Dr Joseph Travis, the President of AIBS, spoke with us at *Research Features* to discuss this and more.

Hello Dr Travis! Could you tell us some more about AIBS, its background and what you do there?

AIBS is a scientific society, but it's a little unique in that we have both individual and institutional members. We have more than 130 professional scientific societies and research organisations as members. All the subfields of biology – genetics, cell biology, evolution, ecology, botany, ichthyology, and so forth – are represented.

The organisation has a lot of programmes, one of which is the Scientific Peer Advisory Review Services. This provides peer review of grant applications and ongoing research programmes, and provides research programme support services for private foundations like the Doris Duke Charitable Foundation, Foundation for Physical Therapy, state and federal agencies, and non-profit organisations such as the Gulf of Mexico Research Initiative and the Paralysed Veterans of America.

We also have a public policy office in Washington, which does a variety of things. For example, it tracks and analyses legislation. We work with our members to help them understand how policy developments affect their science, and we help the community translate their science so that it is useful to decision-makers. For example, we recently shared the scientific community's concerns with NSF when it proposed to suspend funding for an important research infrastructure programme. As a result, NSF reversed its decision. We've also worked with the community to help make the case for new investments in research. AIBS was an important leader in efforts that led to multi-year, multi-million dollar investments in new research infrastructure. NEON – the National Ecological Observatory Network – and Advancing Digitization of Biodiversity Collections, are two examples.

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AIBS also offers professional development training programmes in which we help scientists develop communication skills and the knowledge needed to work effectively in team or interdisciplinary research settings.

The Guppy Project Team rebuilds the artificial stream facility in Trinidad. These artificial streams are used for a variety of controlled ecological experiments

We have something called Congressional Visits Day, where we bring people to Washington. They learn how to communicate with policymakers, how science policy is made, how funding is allocated, and then they visit their members of Congress. This programme provides scientists with a first-person perspective about how science policy is made.

Another major AIBS product is our publication, *BioScience*, which is a journal of review and synthesis papers. We've also branched out into doing podcasts and webinars: podcasts that feature some of the papers.

You mentioned that AIBS has previously worked with the US Army. Could you elaborate on the sort of research that the army was interested in?

It was biomedical research. The US Army has a very large research programme, and we facilitated the peer, or merit, review of research applications received in response to formal Requests for Applications the Army released. The programmes included a wide variety of research topic areas that focused on human health research programmes that impact military personnel and their beneficiaries. In general, they were largely interested in things like infectious diseases, host pathogen problems, and antibiotic resistance. They were also interested in trauma research, especially head trauma. They're interested in the wide variety of medical issues that confront the armed forces – from contagious diseases to wound treatment, through to the psychological and emotional issues that confront soldiers.

What are some of the main issues dealt with by biological scientists today?

If you asked a bunch of biological scientists, they'll all tell you that one of the main issues is the increasing competition for research dollars at the federal, state and private foundation level. So, for example, in the programmes to which I apply as a population/evolutionary biologist, the funding rates, counting from the pre-proposal stage onward, are down at around just 4–5%, maybe even 3% some years. NIH funding rates will be higher, but they're certainly below 20%. In this climate, it's very hard to stay funded, and to keep research going. It's especially hard on young faculty members who have to learn the system, and learn how to write proposals – it's very discouraging for many of them. So, I'm sure that all biological scientists will tell you that the competition for research funding is the big issue right now.

They would probably also tell you that a second issue is the increasing amount of non-science business that takes up much of their time. This can range from things we always did like teaching and outreach, to the increasing burden of administration that comes with scientific research. We have multiple protocols for every set of experiments we do and the regulatory and administrative demands that come with this have gotten very high. And of course, those kinds of things combine into a third kind of issue which is the difficulty of keeping abreast of one's field. There are so many journals now and the pace of publication has become so rapid that it is harder than ever to keep up with developments in your field, which you must do if you want to be competitive for funding. So, I would say that those are the three big issues.

On your website, it states that the AIBS works to ensure that the public, legislators, funders and the community of biologists have access to, and use information that will guide them in making informed decisions

Left: Congressman Spencer Bachus of Alabama meeting AIBS Emerging Public Policy Leadlers on a visit to Washington with Dr Travis and, at the far right, Julie Palakovich-Carr from AIBS

about matters that require biological knowledge. What are AIBS's forums and methods for doing this?

We publish *BioScience* that, in addition to peer-reviewed scientific articles, also includes features and news articles that are written for a general audience. Each month, we host a podcast, *BioScience Talks*, in which our editor has an extended conversation with an author of a current article in *BioScience*. These conversations offer students, science enthusiasts, or scientists from other fields an opportunity to learn more about an area of research in general. Another example is that our public policy office will convene science briefings for policymakers – we'll work with our members to identify experts on a timely policy topic and then help them tell their scientific story to those who need the information to inform their work.

AIBS performs independent peer review and related research evaluation services. What are the challenges and rewards of being an independent scientific review service provider?

The challenges are really to keep the operation moving: it's a contract operation, therefore, you constantly have to ensure you keep your contracts coming in. We have very little fixed funding – it's all on a contract basis – so the challenge really is financial. The rewards are enormous though, especially in terms of knowing that you are advancing science in a way that is going to help people. The other side of these rewards comes from gathering information about the effectiveness of peer reviewed science – trying to contribute to the community's sense of what the best practices are.

We had a symposium last December on the science of peer review. After this, we released a report that is accessible through our website. I think it's pretty rewarding to show people that we know what we're doing – we know what works, we know what doesn't seem to work – and getting that feeling you've given people confidence that the peer review practice actually works well.

How would you assess the current state of biological scientific research, both at home and abroad?

Very, very healthy – there's some wonderful work being done everywhere. I'm 63, so I've been in this business a while and I've watched the science, not just in the US but abroad as well, come a dramatically long way in the last 40 years. The world is no longer the US and the UK, and then everyone else – that's just not true anymore. The quality of research is so high around the globe. It really is very, very impressive and so in that sense, biological research is extremely healthy.

If you go to any science conference or meeting as well, you will see large numbers of young people presenting papers and posters. This tells you that the future of science looks to be extremely healthy. You see large numbers of smart, young people coming into science, and that's very healthy indeed.

I think one of the things that is hard on the current state of biological research is of course the funding pattern. We see more and more people getting discouraged about participating in research. We hear many graduate students say: "I don't really want to have a research career. I want to have a teaching career. I just don't want the stress that comes with a research career." A teaching career is stressful as well – it's just a different kind of stress – but that speaks to the way in which students feel discouraged about the funding for science, the pressure to keep bringing in grant money as well as the pressure of supporting your own students and technicians on grants. So, while I see a lot of young people participating, I worry that many of them will drop out.

Above: Dr Joseph Travis

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What excites you most in biological sciences at present?

Two things really excite me. One is, empirically, we have the technology to answer questions in evolutionary biology and population genetics that we could not answer before. We're now getting tons of data that has especially changed our view of evolution, and that's very exciting.

Conversely, we have some new theory and exciting theoretical ideas that I think offer an opportunity to really change the way we think about things. So, for example, Kim Hughes and I are working on the indirect genetic effects in behaviour, which is an idea that's been around for several years but has been difficult to test empirically. I think this idea might change the way we look at behaviour.

What we know now is an imperfect picture of what really happens, and in 40 years they'll be saying the exact same thing, and they'll wonder how we were so naïve. When you look 40 years back you'll think, "that was a pretty naïve idea", but that's a good outcome – that means the science is advancing, that means we're getting better at describing things.

What do you think will be the key focuses of research for biological scientists over the next decade?

I think gene drives are going to be very important over the next decade because of their potential to minimise infectious diseases. You have vector-borne diseases like Zika, Dengue and Malaria and the potential for gene drives to be used to disrupt transmission of those viruses is enormous. They are already a major topic of research, and I think it's going to do nothing but spread. I'd put that right up at the top of the key foci because it deals with some fundamental issues in population genetics and can be an incredible boon for human health if we get it right.

I think another major focus is going to be the long-distance connectedness amongst ecosystems and ecosystem processes. I think we're already seeing that when we realise that farming practices in Iowa contribute to the formation of the dead zone in the Gulf of Mexico a thousand miles to the south.

I also think quantifying the connection among ecological processes at different scales will be a big topic of research. And, of course, genomics is going to continue to be an emphasis of research. But I think we're also going to see more emphasis on what people call epigenetics, so there will be a lot more work on the epigenetics of cancer cells, the epigenetics of physiological responses, and the way in which generations are linked by transmittable, environmental, maternal and paternal effects.

How can people get involved with AIBS and offer their input?

One way is to become a member. This provides us with a greater understanding of an individual or organisation's needs. We also have a lot of strategic business partners – organisations that share our belief that good decisions are informed by high quality scientific information.

The AIBS is always looking for new ways to serve the community, and we're always open to suggestions and requests. Some of our programmes have really been developed from the bottom up. People come to us and say: "We really want to do X, or we think we should do Y. You guys are in a great position to coordinate all the member societies in doing so." We're always all ears. The organisation is in a unique position of being able to build coalitions, alliances, and teams to tackle problems, and we're always listening for what our member societies think is important.

• If you would like to follow Dr Travis's advice and become a member of AIBS, or simply to find out more information about them or their wonderful journal BioScience, please visit their website www.aibs.org.

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