'Oddball science' has proven worth, say biologists

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Without decades of basic research on unusual animal adaptations, including the anatomy of gecko feet and toes, scientists would miss opportunities to develop innovations and applications of great potential benefit in medicine, agriculture, industry and technology, biologists argue. Credit: University of Massachusetts Amherst

Scoffing at or cutting funds for basic biological research on unusual animal adaptations from Gila monster venom to snail sex, though politically appealing to some, is short-sighted and only makes it more likely that important economic and social benefits will be missed in the

long run, say a group of evolutionary biologists at the University of Massachusetts Amherst.

Writing in a recent issue of *BioScience*, researchers Patricia Brennan, Duncan Irschick, Norman Johnson and Craig Albertson argue that "innovations often arise from unlikely sources" and "reducing our ability to creatively examine unique biological phenomena will ultimately harm not only education and health but also the ability to innovate, a major driver of the global economy."

First author Patricia Brennan, known for her duck genitalia studies that could eventually aid human medical science points out, "Basic science has increasingly come under attack, and there is a growing perception that studying 'odd' science ideas with no clear societal benefits should be stopped. But we feel that these are the precise sorts of investigations that may lead to major innovations in biomedicine, technology and military applications."

She and colleagues point to several specific examples where advances in understanding basic biological evolutionary adaptations led to successful technological applications, sometimes decades after the original work. Without basic work first published in 1967 on the enzyme Taq polymerase, for example, science wouldn't have the immensely powerful DNA replication technique known as polymerase chain reaction, PCR, now providing "vast benefits" in medicine, agriculture and criminal justice.

A recent invention from UMass Amherst underscores the value of basic science, the authors add. After more than 50 years of basic research on gecko ecology and the remarkable anatomy that allows these lizards to walk up smooth walls and across the ceiling, a UMass Amherst research team invented Geckskin, an adhesive that can attach a 700-lb. weight to a smooth surface on an index-card-sized pad.

Functional morphologist Duncan Irschick, a member of that team, says, "Gecko adhesion stands as a classic example where long-term research on a seemingly frivolous topic has led to a major innovation with enormous potential for making an economic contribution." He and colleagues say experts have identified more than 2,000 instances of technology inspired by evolutionary innovations, including highly efficient solar panels, insulated glass and body armor inspired by mantis shrimp appendages.

The public is already interested in "oddball science" and related success stories, the authors add, and "the abundance of organismal biology science stories in the news shows that [such] studies have mass appeal. This suggests they can play a role in education," particularly in a nation where only 40 percent of the public acknowledges evolution.

Evolutionary developmental biologist Craig Albertson notes, "It's easy to assume that innovation happens from well-planned research, but the history of innovation does not tell that story." Norman Johnson adds, "We are not suggesting that applied science is unimportant, far from it. We are merely pointing out the long-term value and innovations that arise from what is commonly viewed as wasteful spending."

Provided by University of Massachusetts Amherst

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