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Hummingbird research has implications well beyond the nest

Peter Calamai

What Canada needs, desperately needs, is an articulate national champion for science and technology. First job for that champion: to expose Randy White, a Reform MP from B.C., as the dangerous know-nothing that he is.

White got some cheap publicity this week by sneering at recent federal research grants. One of the two dozen research grants White singled out for scorn was $32,220 to study "behavioral energetics of hummingbirds."

"I just think there is a real question of skewed priorities here. While this government flutters along in a financial daze, I challenge anyone to justify spending even one cent on studying the behaviour of hummingbirds," White's own news release quoted him as saying.

Some challenge. Neither White nor his aides bothered to call professor Lee Gass in the zoology department at the University of British Columbia, not far from White's constituency.

The 53-year-old Gass has been fascinated with hummingbirds since 1969 and he's eager to explain with panache why he studies hummingbirds and why it matters. Listen.

Among the smallest hummingbirds, females have broader, longer wings than males for the same body weight. Or, as Gass puts it, the males are built like fighter planes, the females like bombers. But bombers are more efficient; they burn less energy than males in hovering and flying.

After all, a hummingbird's whole life is a constant struggle to take in energy by sipping nectar faster than it burns energy in flying. Deprive an active hummingbird of sucrose for 90 minutes and it can lose up to 15 per cent of body weight.

So if bomber females are more energy efficient than fighter males, why don't the guys develop long, broad wings as well?

Because of the Ferrari factor, suggests Gass. The male may be less energy efficient but it is more manoeuvrable. At spring breeding time, this matters.

The way to a female hummingbird's heart, as all birdwatchers know, is through a dazzling aerial display of J-shaped dives by the male, up to 40 or 50 in an hour.

"The male with the best manoeuvrability may have the most matings; he's the guy who can drive the Ferrari better."

That's speculation; what Gass and his students do know, however, is that hummingbirds regularly pull almost 2 Gs when accelerating and decelerating in flight, enough force to send a braking car into a skid.

And that derided $32,220 research grant will allow three graduate students this summer to measure whether the difference in manoeuvrability between males and females makes ecological sense. So what if the male can turn around easier and dodge obstacles: Does this make a difference in getting to flower nectar more efficiently?

Even if Gass and his students answer this question (they've got a devilish experiment involving an 18-metre-long tube festooned with interior baffles), why does it matter?

Model for all animals

It matters because hummingbirds are simply a convenient model for all animals. Unravel some basic principles of their behaviour and you've got a good chance of understanding other organisms better as well.

Take the work Gass's group just completed on spatial memory in hummingbirds, whether they can remember where things are. Years of painstaking research demonstrated that hummingbirds don't learn just isolated details about their surroundings; like humans, they learn whole patterns of details. They can return the next day to those specific flowers in a field that have been artificially boosted in sucrose.

So what? Who cares how animals remember?

Actually, governments do. Governments spend a lot of money raising hatchery fish but those fish get gobbled more than wild fish by predators when they're released. The answer may well lie in their learning. So the U.S. government has hired one of Gass's graduates to help solve this problem.

If saving taxpayer money in fish hatcheries isn't a good enough reason, consider this. Some truly elegant research by Gass and his students has shown that hummingbirds can continue to distinguish patterns when current theories about learning say they shouldn't be able to.

Gass explains the significance: "Whatever mechanisms animals use to detect patterns in the environment and respond to them is likely to be very, very general because it is likely to be very, very old. So these processes we're beginning to see in animals might be processes that we humans also use."

And there are links to other animals as well. Research by scientists elsewhere has discovered that a bird of northwestern North America called a Clark's nutcracker (like a big jay) can remember all winter the thousands of places in the ground where it stored conifer seeds. The part of the nutcracker's brain that processes spatial memory should be especially well developed, scientists reasoned. It was.

"We're beginning, just beginning, to be able to predict that in a certain kind of ecological situation we should find a certain kind of capability in the animals and a certain set of characteristics to go with it," explains Gass. Why does this matter, other than because knowledge is always better than ignorance? Because there's lots of evidence that humans don't really know what they're doing when they engineer the environment, deciding, for instance, whether some area can be safely logged without sacrificing some animal population. And because it's too late to start the basic research into questions like animal memory the year the logging decision is made.

This may seem a long way from studying behavioral energetics in hummingbirds but it really isn't, not for anyone who understands the basic principles of science. Or at least anyone willing to learn.

Next week: The enemies within.

Peter Calamai is the Citizen's editorial page editor.

1 Summarize the case the article EM9517 reprinted above makes for federally-funded curiosity-driven research. Indicate briefly how far the case is specific to Prof. Gass's work and how far it is more generally applicable. (Your answer should include clear indentification of the relevant *target* and *study* populations.)

- Explain briefly how convincing you find the case.

2 The subheading *Model for all animals* in the middle column above uses the word *model*; compare and contrast this useage with the way the term is usually applied in the STAT 231 Course Materials (*e.g.*, starting in Chapter 5).

(*continued overleaf*)

3 In the second-last paragraph of the right-hand column overleaf, it is stated that ..... *knowledge is always better than ignorance*. Discuss this statement critically from the perspective of data-based investigating.

- In a similar vein, Kenneth Clark, author of the highly-acclaimed series *Civilisation* (UW Audiovisual reference numbers E88 001 to E88 013), stated near the end of Part 13 (entitled *Heroic Materialism*): *On the whole I think that knowledge is preferable to ignorance* ..... Briefly suggest reason(s) why Lord Clark included the qualifier *On the whole* in his statement.

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