kit for Parks Canada to clean up oil and fuel spills. But the potential goes much farther, Simard says. Milkweed can also be used for cold-weather clothing (Simard plans to launch a garment line in 2016 with a Chicoutimi, Que.-based manufacturer) and in transportation as a base material for lightweight thermo-formed panels. It can be blended with other fibres to make textiles for clothing, too.

What makes milkweed so useful are its hollow fibres, which are lightweight so seeds can float away on the breeze. This property makes the fibres extremely absorbent, which is why Encore3 is launching its product line with spill kits for Parks Canada. It also makes them good insulators, ideal as a replacement for goose down in winter wear (a thought that appeals to Simard's own strong feelings about the ethical treatment of animals).

Additionally, milkweed fibres are covered in a waxy substance that repels water. Thus, they are more efficient as an absorbent and useful in winter wear, since they don't get soggy.

To meet its demand for milkweed, Encore3 has created a co-op of farmers who are now growing the plant commercially. Twenty have signed up, committing to grow at least 10 hectares each. Another 40 are on the co-op's waiting list. The potential benefit to monarchs is significant. Each hectare under cultivation is capable of supporting as many as 10,000 butterfly births. With more than 300 hectares of new milkweed, Encore3's launch already has the potential to add three million butterflies to the monarch population.

These projections are theoretical, of course. But Simard says he's already seeing improvements. "In the first fields... the ones we planted in 2012, we've seen lots of monarchs where we didn't necessarily see many. It's noticeable and we're only starting."

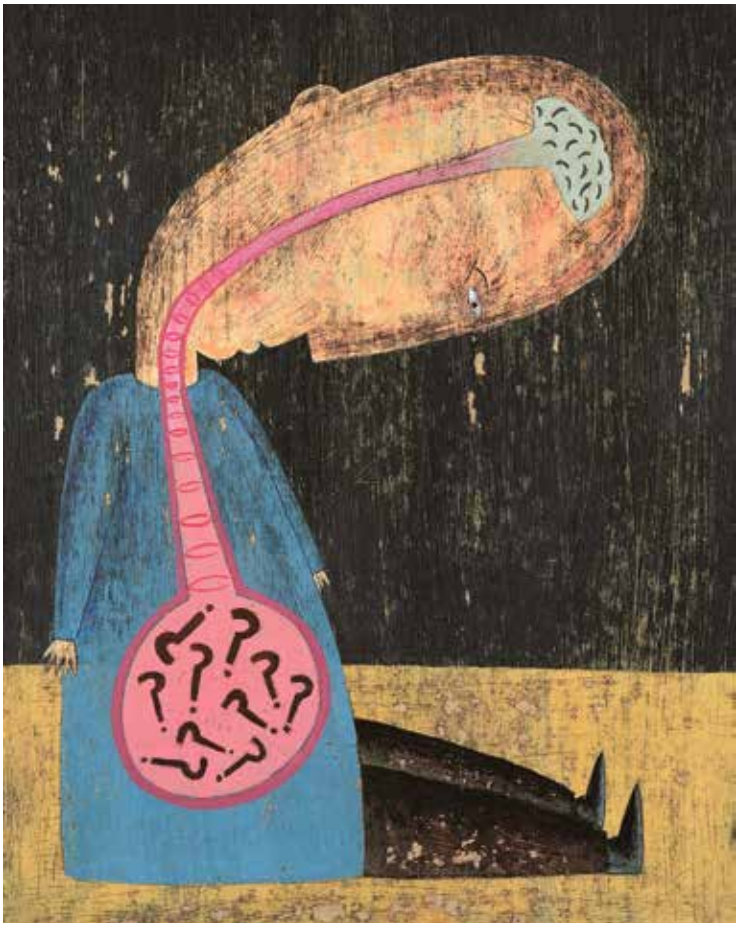
The significance of Encore3's innovation, however, shouldn't be measured in mere numbers. The larger point is that there are options when it comes to putting conservation into business. (It's worth noting that milkweed is also a sustainable crop. It grows naturally on marginal lands and doesn't require chemical fertilizers or pesticides.) Innovation is the key. And Encore3 is delivering on the monarch front and many more.

OCEAN ILLUSTRATION

What Does a Brain Know, Anyway?

When it comes to the right brain-left brain dichotomy, evolution says it might be a simple issue of what to eat — and how not to be eaten

By Jay Ingram



IF you Google "right brain, left brain," then scan the images that turn up, you can revel in one of the most persistent, even pernicious, myths in science: that people are either "right-brained" or "left-brained." The myth argues that artists are right-brained, engineers left-brained. It's entertaining, but wrong. And by dwelling on the myth (and, of course, on ourselves), we ignore the fact that divided brains, if I can call them that, are widespread among animals other than humans.

First let's rid ourselves of the myth. There is no evidence that individuals rely exclusively, or even heavily, on one hemisphere or the other. There definitely are differences in how the human cerebral hemispheres take in and deal with information: emotional expression, for instance, is more right hemisphere while language is almost exclusively left. But none of these dichotomies is absolute. And besides, the human brain is equipped with two hundred million neurons worth of corpus callosum to transmit information from one hemisphere to the other.

So why have two separate hemispheres in the first place? Before it became clear that many other organisms are in the same boat, it was theorized that with the advent of language, a human speciality, the human brain sorted itself out with language on the left side and other attributes on the right. Others claimed that given the enormous variety of conflicting actions that humans must take, dividing them up between the hemispheres ensured smooth operation.

There was little agreement on the various theories. But step away from *Homo sapiens* and the picture becomes more straightforward, though no less puzzling. There's a singular piece of brain anatomy that is the key to left-right differences in animal brains, and that is the crossing over of visual information. The right eye feeds the left hemisphere and vice versa. In animals, especially those with eyes on the sides of their heads, the separation is much more complete than in humans, so each hemisphere is aware *only* of what is seen by the opposite eye. (Those with binocular vision not so much.)

If I were to sum up the vast array of animal studies, I'd say that in general the left hemisphere is specialized for discriminating fine detail, especially when feeding. The right hemisphere is dedicated to scanning the environment for novelty, especially that which is relevant to survival. The species whose brains are divided in this way include chicks, pigeons, lizards, toads, fish and mammals, so clearly this is a deep-rooted anatomical tendency.

Several species of birds either strike at prey or peck at seeds on their right side, using the right eye-left hemisphere combo. A selection of toads do the same, striking more readily at prey that appears on their right side, practically ignoring prey on the left unless it moves into the right eye's view.

Several species of birds strike at prey or peck at seeds on their right side. A selection of toads do the same. They strike at prey on their right side.

On the other hand, predator detection is the reverse: the right hemisphere, through the left eye, reacts to many kinds of sudden change, especially the appearance of danger. For example, common wall lizards track potential predators with their left eye if at all possible, even trying to use it when it has been temporarily patched in the lab. And, in a connection that might not be too far-fetched, several of the organisms I've already mentioned are also quicker to attack members of their own species when those attackees are to the attacker's left. The link here seems to be the recognition of threats, whether to life or status.

It's also notable that horses, when admitted to a pen containing a novel (and possibly worrying) object, spend more time positioning themselves to be able to study it with their left eye — and thus the right hemisphere (though it has to be said that not all horses, of all ages and breeds, behave this way).

This brief description does no justice to the range of organisms that display these tendencies, but it does encourage evolutionary thinking. When did this all begin?

Some have argued that the beginnings of "laterality" — the preferential use of sides of the body, such as right- or left-handedness — can be found in some of the simplest ancient organisms. The modern creature *Amphioxus*, likely the closest thing to the ancestor of all vertebrates, is not even close to being symmetrical, at least anatomically. (Unfortunately, that's about as far as it goes: what passes for the *Amphioxus* brain is at best a slight swelling of the main nerve cord.)

And more recently? The idea that the lateralization of our brains came about as the result of language and tool use starting a couple of million years ago can't be true. At best, our brains represent an exaggeration of what has gone on before. Much before.