

The Imperfections of Beetles

by Conrad Vispo

*Beetles should be perfect,
Should embody utter symmetry,
Should have striae that are straight and never vary...*

Those are the opening lines of a poem which I wrote years ago after too many hours at the microscope identifying ground beetles. "Striae", by the way, are the impressed lines that pattern the backs of many beetles.

To identify beetles, one reads through taxonomic keys which ask, for example, how many bristles are found above the beetle's eyes or whether the corners of the shield behind its head are sharp or rounded. What one slowly discovers is that individual beetles vary, just as we humans do. Usually the variation is not enough to stymie identification, but a given beetle might drop a bristle on one side, forget a short stria, or have an unusually strong purple luster.

Of course, there's no reason why beetles should be perfectly symmetrical other than to align with my preconceptions; indeed, such variation may be the modeling clay that helps their line evolve and persist over time. The poem, with all its "shoulds", was not a criticism of beetles but was instead an exploration of my expectations in these and other matters. I came back to these lines recently after again spending hours working with ground beetles, although this time it was their ecology rather than their taxonomy which was the focus.

"Ground beetles" are commonly found ... on the ground. Flip a stone and if a dark beetle scurries away, then it was probably a ground beetle. We have so far found more than 250 species of them in Columbia County. Some species are known to feed on weed seeds and others on pests, so, as a group, ground beetles are usually thought to be beneficial for agriculture. Our program's recent fieldwork has asked, 'in what habitats do you find them?' with the hope that the answer to that question helps us suggest on-farm habitat management that encourages their populations and thus increases their agronomic benefits. Last year, we captured ground beetles in crops fields and in surrounding wilder areas to see if we could derive simple habitat management recommendations. We are now analyzing the data.

What did we expect to see? What would you expect? One vision of 'perfect' beetle ecology would be that a small, diversified organic vegetable farm with plenty of interspersed wetland, woodland, old field, and hedgerow would easily support more beetles and hence more of their benefits than, say, an expansive conventional corn farm. There are however flies of reality in the ointment of our perfect ecology. First of all, 'beneficial' is not an innate trait of a species, rather it is a human judgment that juxtaposes our wants with a creature's actions. As those wants vary, so too does a beetle's reputation. For example, if either of our farms were growing strawberries, then one of the weed-seed eating

beneficial ground beetles might have been renamed a pest when it began eating strawberry seeds, thereby damaging the fruit.

Further, all that natural habitat around our small farm does, in all likelihood, mean greater ground beetle diversity in the landscape as a whole, however many of those species won't become common in crop fields. Meanwhile, those species that are abundant (sometimes very abundant) in the crop fields may have few ties to the surrounding habitats. Finally, the common crop-field beetles are strongly influenced by field management, and tillage and/or ploughing can have a substantial negative impact on beetle populations, perhaps because of direct mortality or because of impacts on their prey. Because organic farms rarely use herbicides (although there are organic herbicides), they often rely much more heavily on tillage for weed control. Thus, if our corn farm practices conventional low-till and if its main pesticides are selective for caterpillars like European Corn Borer, then the ground beetles might prosper.

The point here is not to question the value of organic farming – I know where I would choose to chase butterflies or bees! – but rather to caution us to test or at least try to recognize our preconceptions. Beetles look physically 'perfect' until you spend time studying them beneath the microscope, and then they become either imperfect or 'perfect' in new ways, depending on your perspective. If, to go further, we drop the implicit judgment of 'perfect' and 'imperfect', then we can simply wonder at what we see. Our efforts to understand and work with nature are most likely to be mutually beneficial and our attitude more likely to be reverent, if we approach the organisms we are working with not as predictable automatons or abstract ideals, but rather as unboxed mysteries begging study. In other words, if there is a flaw, it is not the beetle's lack of symmetry, but our expectation of it.