Sweating the small stuff

Tiny creatures often play outsized ecological role, say scientists who study them

Grace Chu

Many a biologist has got her start reading books, visiting zoos or watching nature documentaries as a child. Yet some of earth’s small denizens, housing in deep-sea colonies or marching across the surface of the planet, are less charismatic than monkeys or elephants, barely of note to the average human unless they sting or bite.

The scientists who study these creatures are a different breed. They go on scuba dives and trudge about beaches to collect what lives in fish gills or hides under rocks. Or they pore over microscopes for hours staring at dung flies.

What drives them to do so?

Often, it’s chance, the lure of finding something new, or the knowledge that the small stuff often plays an outsized ecological role, they say.

British biologist J.B.S. Haldane once noted that it is a Creator’s function, he or she must have “an inordinate fondness for beetles.”

Indeed, beetles and other insects are so numerous that the weight of all of them put together has been estimated to be more than the weight of all humans combined, pointed out National University of Singapore (NUS) evolutionary biologist Rudolf Meier, who studies the evolution of septipod flies.

“In some tropical rainforests, the main plant-eaters are insects, the main predators are again insects. “Whoever only studies vertebrates and ignores insects will never understand these environments,” Professor Meier said.

To study these less-than-charismatic creatures, one must be a little peculiar.

In secondary school, Prof Meier said, he liked dissecting insects whose juvenile forms looked different from their adult ones.

“What could be more interesting than seeing caterpillars turning into butterflies?”

And when asked why he was interested in bryozoans, Dr Kevin Tilbrook of the Queensland Museum joked: “Isn’t everyone?”

Bryozoans, living gently in an ocean current, might look like corals, but they are colonies of tiny animals, each with its own organs and digestive systems.

In the ecosystem, they provide food for other animals, and researchers are fascinated by their diversity range of shapes and forms. But more importantly, because they fossilise, they can provide key evidence that warmer of land were once under water millions of years ago.

It was chance that drew Dr Tilbrook into studying bryozoans. He started out in the United Kingdom studying fossils, then moved to the tropics where they are less well-studied, to look at live ones.

In fact, those in Singapore have never been studied before. During a dredging this year, Dr Tilbrook found “the whole seafloor covered with bryozoans – not what I expected at all!”

These bryozoans were found living on mangrove leaves at Lim Chu Kang. Bryozoans might look like corals, but they are colonies of tiny animals, each with their own organs and digestive systems.

Singapore’s water tends to be clouded with sediments, but fast currents might provide the clearer water bryozoans prefer. It’s not all field trips in exotic locales, though.

Prof Meier might spend as much time breeding dung flies, sequencing their genes and peering down a microscope at their private parts as travelling the Congo for rare flies.

Dr Niel Bruce, also of the Queensland Museum, has been looking to study tropical isopods as an undergraduate on “fake pretenses.”

“There was one project that said ‘Ecology of isopods of the Red Sea’ – it sounded like you could go and do field work there.” While this turned out to be untrue, his fascination with marine isopods carried on.

Isopods are mostly tiny, delicate creatures similar to woodlice. In the ocean, they are scavengers, and can serve as a barometer of water quality and habitat disturbance.

“In an expedition here earlier this year, he found Singapore has some 60 to 70 species – most of which have never been scientifically documented,” Dr Bruce said: “I don’t want to just describe new species. You have to place them into new genus or form, or whether your finding extends a known species’ range. You’re looking for added value.”

Sometimes that value helps stave off an invasive species infestation.

For example, ornamental fish from Southeast Asia or other regions may carry isopods parasites. If they get into the Australian or Singaporean ornamental fish trade, “there’s no saying what they would do,” said Dr Bruce.

So it’s important to know what species those parasites might be, to work out what to do about them.

Likewise, bees play such a large ecological role as pollinators of crops and native vegetation, so it’s important to study how environmental changes affect their number, size and behaviour, said NUS bee researcher John Acher.

And even tiny bryozoans contain compounds, such as bisatins, that have been found to have anti-cancer properties.

Still, some researchers’ exotic fields haffle even their nearest and dearest.

“At parties, I tell people I’m a marine zoologist first,” said Dr Meier.

Prof Meier also tells others he’s a biologist, as some people may react with disgust to insects.

And 15 years ago, Dr Tilbrook found his first new bryozoan species, and, delighted, named it after his much-loved daugher.

“I’m sure she’s phenomenally proud of me,” he said. “But I’m still not sure she completely understands what I do.”

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“In New York, we only have one species of honeybee, the domestic European honeybee. In Singapore, there are three species – giant, Asian honeybee, and dwarf – and many are not well known. A lot of the work on domestic honeybees has not been replicated on these species. There are also stingless bees here – small, harmless ones that live in highly social colonies. I rarely have bad stings from the bees I study, as most are not at all aggressive or dangerous. The most dangerous species is actually the well-known honey bee. Most native species pose no threat at all to researchers or to the public.”

BEE RESEARCHER JOHN ASCHER, an assistant professor of biology at the National University of Singapore.