Title: 'Flatworm'

Description: Marine flatworm (*Anonymus kaikourensis*), Marlborough Sounds

Photographer's name: Noelle Bennett

Where and when: Shelley Beach, Picton. April 2021.

Sustainability: Look carefully under rocks and in shady spots close to the tide line at low tide and you might just spot what appear to be strange blobs of buff-coloured slime. Keep watching and you might also notice that those blobs of slime are actually gliding across the rocks like some kind of other-worldly shapeshifter.

Taking photographs helps to reveal some slightly unexpected details about these bizarre flatworms which reach a maximum length of just 50mm. The two 'eyes' are probably the most obvious structures here. They are actually light-sensitive structures whose principal job is to direct the flatworm to the shady side of rocks which in turn helps to protect it from drying out and overheating.

Flatworms are part of an ancient and 'primitive' phylum (division) of the animals called the 'Platyhelminthes' – they are considered to be at the third wrung of a 10-step evolutionary ladder … one step up from the jellyfish and sea anemones (#2 Coelenterates), but not as advanced as the round worms (#4 nematodes). They don't have a circulatory system or a true gut – instead the cells that line their inner cavity envelop the microbes and food fragments and then break them down once they have gobbed the fragments into their own cells.

It's important to realise that being 'primitive' in an evolutionary sense doesn't necessarily make a species less successful ecologically – indeed, whatever has led to flatworms persisting for millennia may be their key to ongoing resilience into the future when ecosystems change. There are well over 4,500 flatworm species, some are free-living, other's parasitic; some live on land, others in seawater or freshwater; some are found on sandy beaches, others on rocky shores like the one I photographed.

Some people may wonder why we should save a lowly worm, especially a flat one slithering around under rocks. But

flatworms are surprisingly interesting. Take their sex life for example. Flatworms are hermaphrodites – they are both male and female at the same time. In some species there are several different male parts. They mate to cross fertilise, sometimes having a "penis fencing" duel (adults, go look it up if you don't believe me!) in which the winner takes on the male role and the loser takes the female role of carrying the developing eggs. The sperm have two tails (that's doubling your chances, huh, guys?). But it gets even more bizarre - they can also reproduce "asexually" by "budding" i.e. they grow a replica of themselves and then split. And they are tissue repair artists - if cut in half, they'll regrow their missing bits and become two 'new' flatworms. They are also surprisingly brainy – scientists have taught flatforms to recognise threats or exploit opportunities. Amazingly, if they are then cut trained flatworms in half, the two replacement twins can relearn those tasks faster than clones from untrained flatworms. All those resilient skills aren't bad for such a primitive sack of cells, huh?

Conservation geneticists place particular emphasis on saving very different species rather than just the more 'advanced' ones – the more different or apparently odd they are, the better. You can think of this as a type of insurance policy to keep the ecosystems functioning despite large upcoming changes – the more 'biodiverse' life is, the more chance that some species can step up to dominate ecosystem processes in a very altered new world. It's impossible to tell which species are going to save the day, so it makes sense to hang on to as many of them as possible, especially the oddballs.

Photographer's notes: Taking the time to check out the seemingly uninteresting can be so rewarding and checking out what appears to be boring blobs of slime may seem strange but can ultimately reveal interesting creatures. So often I ignored that weird slime on rocks until the day I thought I saw it move. I'm so glad curiosity got the better of me and I actually took the time to look. Often it's the humble, out-of-sight and out-of-mind, species that keep our ecosystems cycling, but we tend to focus our cameras and concerns on the charismatic animals and spectacular plants instead.

Photo specs: The ideal would have been to use the focus-stacking technique when photographing flatworms to try to ensure they are in sharp focus. But despite the fact they look inanimate, the can - and do - move quite rapidly. So this is a single image. I would have liked to have a faster exposure time but I had already increased the ISO to 800 and was loath to push that any further (striking the balance between speed and noise can be a little tricky at times). Technical specs: The image was taken using a Panasonic DC-G9 camera and a Panasonic Leica DG Macro-Elmarit 45mm f/2.8 macro lens. Exposure details - 1/160 sec at f8 with an ISO of 800 and a focal length of 45mm (90mm full frame equivalent).

Digital specs: 6189 x 5413 pixels (33.50MP) @ 300dpi

Key words: worms, flatworm, Platyhelminthes, Shelley Beach, Picton, evolution, sex, asexual reproduction, budding, learning, conservation genetics, biodiversity, resilience, adaptability, Noelle Bennett, Ecosystems Photography, sustainability.

Price: $250 (incl. GST) for use of the digital image. Visit www.ecosystemsphotography/sales for details & to order, or to get a quote if you would like a high-quality print.

Donation: The price includes a $100 donation to a sustainability organisation or project of your choice, or otherwise to the *Marine Metre Squared* project https://www.mm2.net.nz/.

We recommend that the donation goes to *Marine Metre Squared* to support their citizen science work on monitoring biodiversity on the New Zealand shoreline. The funds would be used to defray costs for schools to participate and learn about the creatures and plants along our extensive coastline.

Image ref: NB#034 (please use this reference in all orders and correspondence).

Noelle Bennett
14 December 2021