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INFORMATION SHEET

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Marine flatworms

What are flatworms?

The flatworms – Phylum Platyhelminthes – comprise a very diverse group of worms, with over 10,000 species described. Included within this large phylum are parasitic flatworms, such as tapeworms and liver flukes. Unlike many other kinds of worms, such as earthworms, flatworms do not have a body cavity containing organs – instead the body is a solid mass of tissue. There is no circulatory system either, and flatworms rely on diffusion to convey nutrients and waste products between cells. That is why flatworms are so flat and thin: no part of the interior of the body is far from the surface.

Flatworm *Pseudoceros lividus*
Photographerer / Source: John Chuk

Where are flatworms found?

On land, the most frequently seen kinds of flatworms are called triclads (or Tricladida). Triclads are usually brownish, less than a few centimetres long, and are flat unsegmented worms found in moist places and in fresh waters. Although triclads also occur in the sea, by far the most common marine flatworms belong to a different group, called polyclads (or Polycladida). Triclads and polyclads are all free-living (*ie* they are not parasites). Polyclads are found in most marine habitats, usually on the sea floor among algae, corals, or on rocky reefs. However, they are often hidden in tiny crevices and can be hard to find.

Polyclad identification

Complete description and identification of a polyclad is a difficult and complex process. Living polyclads are very fragile and require special handling and preservation. The internal anatomy (arrangement of reproductive and other organs) differs considerably between different types of polyclad. Although these internal differences are fundamental to flatworm classification, they can only be deduced by making a series of very thin serial sections of specially preserved specimens. These cross-sections reveal the structure of internal organs, and many of them in combination can be used to draw a diagram of the otherwise mysterious interior of a flatworm. Think of taking a series of very thin slices through your garage to try and find the lawnmower and you get an idea of how difficult this can be, and of the advantage for flatworm taxonomy of any short-cuts, such as colour photography.

Ultimately dissections and sectioning of specimens by experts is still necessary to confirm identifications, and to describe new species. But in many cases different species of polyclad are so distinctively patterned that it should be possible to learn to tell some species apart simply from photographs.

Polyclads in Australia

We do not yet know how many flatworm species occur in Australia, nor how many remain undescribed by scientists. Many colourful species occur on coral reefs in tropical regions, and are illustrated in the publications of Leslie Newman and Lester Cannon (see *Further reading*). Much of what we know about flatworm biology has been gleaned from observing the fauna of tropical waters. Museum Victoria and ReefWatch Victoria have initiated a photographic atlas project and we hope to begin to make similar discoveries in the poorly known flatworm fauna of the Bass Strait region in southern Australia (see *Internet resources*).

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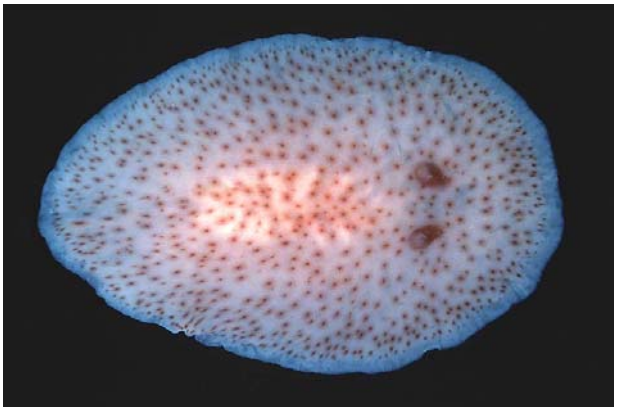
Bizarre behaviour

The world of a flatworm must be a violent existence. They are voracious predators which attack and digest prey with eversible (able to be turned inside out) mouthparts (called a pharynx). Oysters are a favourite food, but no doubt there are many prey preferences and other associations with invertebrates that are yet to be discovered. Many flatworms are strikingly coloured, are toxic to other invertebrates, or mimic other invertebrates (or all three). Sex in flatworms is bizarre. Flatworms are hermaphrodites (each worm has both male and female reproductive systems) and sex may involve "penis fencing" whereby each worm tries to spear sperm into the other. Sort of like a "pin the tail on the donkey" game, albeit with significant family planning consequences.

All these details, and much more besides, are elaborated in a fascinating and beautifully illustrated book recently written by Leslie Newman and Lester Cannon titled *Marine Flatworms – the World of Polyclads* (see *Further reading*).



Flatworm, family Stylochidae
Photographer / Source: John Chuk

Further reading

Cannon, L. R. G. (1986). *Turbellaria of the World. A Guide to Families and Genera.* Brisbane: Queensland Museum. [A short technical overview of free-living flatworms of the world]

Edgar, G. J. 2000. *Australian Marine Life.* revised edition. Reed: Kew, Victoria. 544 pp. [A compendium of photographs of marine life, especially of southern Australia. Includes four polyclads.]

Newman, L. J. & Cannon, L. R. G. (2003). *Marine Flatworms - The World of Polyclads.* Melbourne: CSIRO Publishing. [highly recommended]

Newman, L. J. & Cannon, L. R. G. (2005). *Fabulous Flatworms - A Guide to Marine Polyclads.* Melbourne: CSIRO Publishing. [CD-ROM interactive guide]

Prudhoe, S. (1982). Polyclad flatworms (Phylum Platyhelminthes). In S. A. Shepherd & I. M. Thomas (Eds), *Marine Invertebrates of Southern Australia Part 1* (pp. 220-227). Adelaide: Handbooks Committee of the South Australian Government. [A short chapter describing 16 species from southern Australia. Hard to find – try a library.]

Prudhoe, S. (1985). *A Monograph on Polyclad Turbellaria.* London and Oxford: British Museum (Natural History) and Oxford University Press. [A technical treatise, only for the dedicated researcher.]

Internet resources

Nudibranchs and flatworms – a photographic atlas for the Bass Strait Region
http://researchdata.museum.vic.gov.au/marine

ReefWatch Victoria http://reefwatchvic.asn.au/

Marine Flatworms of the World
http://www.rzuser.uni-heidelberg.de/~bu6

InfoZone at Museum Victoria
http://infozone.museum.vic.gov.au/

Online Zoological Collections of Australian Museums (OZCAM) http://www.ozcam.gov.au/
[Searching and mapping selected animals from collections of Australian museums]

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