

# Gordian Worms

# Fact Sheet



Scanning electron microscope image of a Gordian worm's skin. Image: QM, Mal Bryant.

### Introduction

Requests for identification and information about Gordian worms are common for Queensland Museum staff during spring and summer (September to February). Health authorities, local councils and members of the public have been concerned to find specimens in town water supplies, public and private swimming pools, water tanks, dams and ornamental ponds and even the water bowls of pets! There was a fear they may pose a health risk to either humans, livestock, or pets but by most accounts this is not the case.

Gordian or horse-hair worms belong to the Phylum Nematomorpha (Greek: *nema* = thread; *morphe* = shape) and are parasites (as juveniles) of grasshoppers, mantids, crickets and cockroaches.

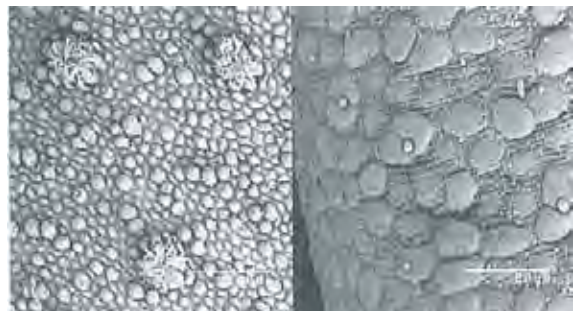
Gordian worms are either male or female and, during mating, they coil around each other forming tangled knots (copulatory tangles). Sometimes a knot may consist of many individuals. The name 'gordian' is derived from the mythological knot of King Gordius. According to legend, whoever could untie this knot, would rule Asia. This was not seen as a problem for Alexander the Great, who simply cut it with his sword!



Gordian worm and host. Image: QM, Rob Adlard and Mal Bryant.

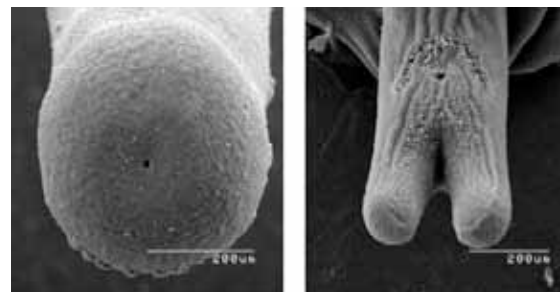
### Biology

Adult worms live in freshwater, do not feed and live only to find a mate. They are relatively long (some can be up to 100 cm), thin (2-3 mm) and rigid rather than limp. The body is circular in cross section and is a tube with an outer layer of cuticle, a thin epidermis, and a relatively thick layer of longitudinal muscle. Inside the tube is a fluid-filled space (pseudocoelom) that surrounds the internal organs. The cuticle is thick and composed of collagen fibres in crossed helical layers. The surface of most species is ornamented with bumps (aeroles) that may have projecting spines or filaments.



Scanning electron microscope image of two Gordian worms' skin showing aeroles. Image: QM, Mal Bryant.

All nematomorph species have characteristic differences in form. The female has a rounded end and a cloaca (common reproductive and intestinal opening) that is always terminal. In contrast, the male cloaca opens just before the end of the body and some have forked posteriors.

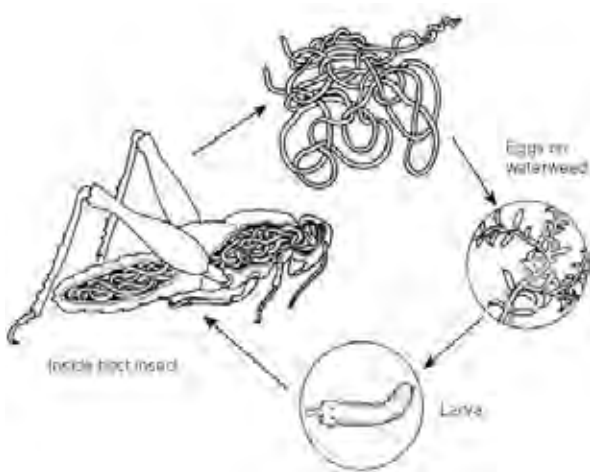


Female Gordian posterior (on left) and male Gordian with forked posterior (on right). Image: QM, Mal Bryant.

Mature Gordian worms seek out mates in freshwater and form copulatory tangles. After copulation the male dies and the female lays eggs in gelatinous strings. One or two weeks later, larvae hatch from the eggs. A land-living insect or other arthropod while feeding or drinking ingests a larva. Once in the gut, the larva uses its spiny proboscis to

penetrate the gut wall and enter the host's blood system (haemocoel). It appears that the developing parasite absorbs nutrients directly through its cuticle since the digestive system is degenerate and non-functional.

After several moults within the host, 'pre-adults' may induce their host to move to water, where they emerge (in the process often killing their host) and seek a mate to complete the lifecycle.



Life cycle of Gordian Worm. Image: QM, Sybil Curtis.

### Identification

Since the late 19th century there has been sporadic reporting and description of the Australian fauna of Gordian worms. To date, only 11 Australian species have been described. It is likely that this relatively low diversity of Australian species is a function of the lack of research effort applied to these fascinating worms, rather than a true representation of the extent of our gordiid fauna.

To distinguish between the genera of Nematomorpha a range of morphological characters are used. These include colour markings; the shape of the anterior and posterior ends; and the types and pattern of cuticular ornamentations (areoles). The colour of the gordiids can vary from a light creamy-brown through to almost black. Some species such as *Chordodes* have a characteristic light and dark mottled appearance, while other species (eg. *Gordius*, *Gordionus* and *Beatogordius*) have a dark anterior collar with a white tip.



Left, Female *Chordodes* posterior. Right, male *Beatogordius* anterior. Image: QM, Mal Bryant.

The areoles on the cuticle are an important characteristic and are best observed using light microscopy or scanning electron microscopy (SEM). They range in appearance from simple rounded structures to those with elaborate crowns of protruding filaments. Associated with, or between areoles, may be found tubercles, spines or bristlefields, which along with the number of types and the patterns of areoles can be

used to distinguish between species.

### Mermithids

Mermithid worms (Phylum Nematoda) are superficially similar in appearance and lifestyle to Gordian worms. They are free-living as adults and the juveniles parasitise a range of terrestrial insects. However, some mermithid species have also been found in spiders from the Greater Brisbane Region.

In contrast to Nematomorphs, Mermithids do not have a terminal cloaca. The male has one or two spicules just before its end. Mermithids have a smooth cuticle, without areoles and are usually pale brown in colour. Their cuticle is much thinner than that of the Gordian worms, so much so that internal structures are visible under microscopic examination.



Mermithid and host. Image: QM, Isda Fellagra.

### Further Information

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