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## IF THEY'RE NOT FISH, THEY'RE NOT REALLY SILVER, AND THEY LOOK LIKE ALIENS, WHAT ON EARTH ARE THEY?



### What are silverfish?

Like many nocturnal creatures, silverfish are surrounded by various myths including the widespread misconception that they are actually fish or a prawn-like crustacean, even a type of moth. They are in fact a type of insect belonging to the Lepismatidae family in the Thysanura order and derive their common name from their grey silvery colour and their sinuous fish-like movements when suddenly disturbed. The Thysanura include the eyeless insects but the silverfish have a pair of very small compound eyes which cause the creature to panic and hide when exposed to bright light. The main sensory system is based around two antennae at the front and three hair-like extensions known as cerci at the tail. As wingless insects they belong to the Apterygota.



Physiologically, they have a head, thorax, abdomen (with three pairs of legs and a tail).

Adults are typically between 10 and 20mm long with scaly bodies tapered towards the tail hence the fish-like appearance. Juveniles (nymphs) are normally white in colour and grow exponentially, developing the metallic grey shine after about the third moult.

### Where are they found?

Silverfish are cosmopolitan and can be found in a wide range of climates but never very far away from their food source. They do have various niches beyond the built environment, but when 'inside' they prefer dark and humid places, in particular bathrooms, kitchens and basements. Garages and sheds are also popular habitats and wherever the relative humidity is between 75% and 95%. Because they are nocturnal and somewhat secretive, populations can remain dormant or unnoticed for long periods of time. They are not solitary creatures and finding one individual is likely to be indicative of a much larger hidden population.

### Are they harmful?

The scientific name *Lepisma saccharina* provides a clue to their favourite food sources rich in natural sugars (polysaccharides) such

as starches and carbohydrates. They are particularly fond of paper and are capable of causing extensive damage to books and wallpaper finishes. Dextrin in wallpaper glue and the adhesives associated with bookbinding are particularly attractive to the silverfish along with the cellulose in the paper itself. Dead skin and soap in bathrooms provide another welcome food source. Clothing and textiles made of natural fibres are also prone to damage with silk, cotton and linen especially vulnerable along with woollen and even leather items.

### The life-cycle

The silverfish can have a life-span of between two and eight years. In ideal conditions, sexual maturity can be reached within a few months and reproduction follows a three-phased ritual that can last half an hour. The male and female undertake a face-to-face dance advancing and retreating whilst engaging antennae. This is followed by a chase with the male being pursued by the female before they vibrate side by side, head to tail as the female prepares to take the sperm capsule (spermatophore) into her ovipositor.

Depending on the fertility of the female as many as 50 eggs can be deposited in clusters, ideally into small safe crevices. The eggs are oval and just less than 1mm in length and the tiny white nymphs usually hatch within 6 weeks. The juveniles are physiologically identical to full sized adults and will grow via as many as 50 moults before reaching full size. The exoskeletons (exuvia) are very rarely found as they are often recycled as the first 'snack' as the creature re-emerges.

Silverfish populations are spread by the physical movement of a host material containing eggs and occasionally adults. This host material could be a pile of newspaper or some packaging which has been stored in another humid location.

### Do they contribute a health risk?

Although they can be found in kitchens and can contaminate foodstuff, they do not directly comprise a health risk. Usually they are more interested in the packaging than the contents. Their fine pepper-textured excrement is believed to be entirely innocuous and they do not transmit any diseases.

### Do they have any predators?

Silverfish can escape from some predators owing to their speed, but are not very good at climbing vertically. Mice, centipedes and especially spiders are amongst the most significant 'natural' threats to silverfish populations within buildings. However, being keen to avoid light, they can get cornered as they try and hide.

### What are the best methods of control?

#### 'Organic/natural' treatments

Certain spices such as cinnamon and cloves have been traditionally used as repellents but there is no evidence to suggest that spices have any impact on their eggs or actually kill silverfish. Lemon and/or lavender sprays or essential oils can be used, but again as repellents rather than eradication. The smell of cedar wood shavings is also believed to have a similar effect.

### Traps

Once the area of infestation has been identified, a simple trap can be made by rolling up some moist newspaper held together loosely with elastic bands. The roll needs to be placed horizontally near the population and left for two or three days. The roll holds a threefold attraction; as a food source, a daytime resting place and somewhere to lay eggs. The newspaper can then be replaced at three or four-day intervals until the infestation is either completely disposed of or at least under control. Inspection of the roll is not necessary, but if curiosity proves to be a serious temptation, the paper should be investigated outside as the silverfish would take the opportunity to escape.

Shallow glass dishes with card ramps attached with masking tape can also be used to lure foraging silverfish especially if a small piece of bread is deployed to lure them. However easy it is to capture individual silverfish, these glass traps and the commercial equivalents will not deal with hidden eggs which may stay dormant for a number of weeks.

### Chemical treatments

Sprays are commercially available with most products being based on pyrethrin but, as a highly toxic chemical, this would be entirely unsuitable to be used near food or in areas where children or domestic animals might be present. Products based on boric acid are effective and represent a less dangerous alternative but can cause lung irritation if inhaled. An inert naturally occurring substance known as diatomaceous earth can be sprinkled around infected areas with the microscopically sharp particles causing irreparable damage to the exoskeletons of the silverfish. These treatments will have a limited impact especially as the eggs are hidden away in tiny crevices etc.

### Humidity levels

An alternative approach is to try and reduce the humidity of the areas of silverfish infestation. Ideally, a humidity level of below 75% should be aimed for. Efficient mechanical ventilation and dehumidification systems could be considered or perhaps a regime of regularly opening windows in kitchens and bathrooms might be appropriate.

### Physical barriers and life-style changes

A combination of practical physical measures and changes in habit probably provide the most straightforward solution to silverfish

infestation. All nooks and crannies that may provide ideal locations for eggs should be dealt with to break the life-cycle with caulk, mastics and fillers being deployed. Organic starchy materials that provide potential food for the silverfish should be kept higher up and away from damp dark corners and cupboards. Rigorous cleaning regimes including regular vacuuming are recommended especially if the eggs are to be removed and the storage of foods in plastic containers is good practice if the silverfish are in the kitchen. Vacuuming after sprinkling bicarbonate of soda is recommended for certain locations as it will have an additional drying effect.



### Bibliography/ further reading

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### About the author

Charles is a Senior Lecturer in Building Conservation and the Course Leader for Architectural Technology in the Department of Architecture and 3D Design, Huddersfield University. Currently his scholarly activity includes the exploration of the complex relationship between buildings and ecology based on the premise that architecture forms part of a much wider ecosystem. His other research interests include sustainable approaches to the refurbishment of historic buildings and typologies for traditional buildings.

He is a member of the Institute of Historic Building Conservation, the Chartered Institute of Architectural Technologists and is a Fellow of the Chartered Association of Building Engineers.