

# Chrysopidae

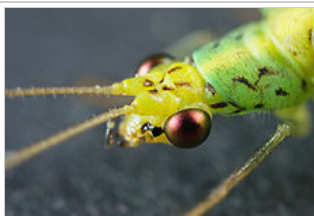
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**Green lacewings** are insects in the large family **Chrysopidae** of the order Neuroptera. There are about 85 genera and (differing between sources) 1,300–2,000 species in this widespread group. Members of the genera *Chrysopa* and *Chrysoperla* are very common in North America and Europe; they are very similar<sup>[1]</sup> and many of their species have been moved from one genus to the other time and again, and in the non-scientific literature assignment to *Chrysopa* and *Chrysoperla* can rarely be relied upon. Since they are the most familiar neuropterids to many people, they are often simply called "**lacewings**". But actually most of the diversity of Neuroptera are properly referred to as some sort of "lacewing", so **common lacewings** is preferable.

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## Description and ecology



Head close-up of *Apertochrysa edwardsi* from Austins Ferry, Tasmania, Australia

Green lacewings are delicate insects with a wingspan of 6 to over 65 mm, though the largest forms are tropical. They are characterized by a wide costal field in their wing venation, which includes the cross-veins. The bodies are usually bright green to greenish-brown, and the compound eyes are conspicuously golden in many species. The wings are usually translucent with a slight iridescence; some have green wing veins or a cloudy brownish wing pattern. The vernacular name "stinkflies", used chiefly for *Chrysopa* species but also for others (e.g. *Cunctochrysa*) refers to their ability to release a vile smell from paired prothoracal glands when handled.

Adults have tympanal organs at the forewings' base, enabling them to hear well. Some *Chrysopa* show evasive behavior when they hear a bat's ultrasound calls: when in flight, they close their wings (making their echolocational signature smaller) and drop down to the ground. Green lacewings also use substrate or body vibrations as a form of communication between themselves, especially during courtship. Species which are nearly identical morphologically may sometimes be separated more easily based on their mating signals. For example the southern European *Chrysoperla mediterranea* looks almost identical to its northern relative *C. carnea* (Common Green Lacewing), but their courtship "songs" are very different; individuals of one species will not react to the other's vibrations<sup>[2]</sup>.

Adults are crepuscular or nocturnal. They feed on pollen, nectar and honeydew supplemented with mites, aphids and other small arthropods, and some, namely *Chrysopa*, are mainly predatory. Others feed almost exclusively on nectar and similar substances, and have symbiotic yeasts in their digestive tract to help break down the food into nutrients<sup>[1]</sup>.

Larvae have either a more slender "humpbacked" shape with a prominent bulge on the thorax, or are plumper, with long bristles jutting out from the sides. These bristles will collect debris and food remains – the empty integuments of aphids, most notably – that provide camouflage from birds.

Eggs are deposited at night, singly or in small groups; one female produces some 100–200 eggs. Eggs are placed on plants, usually where aphids are present nearby in numbers. Each egg is hung on a slender stalk about 1 cm long, usually on the

### Green lacewings



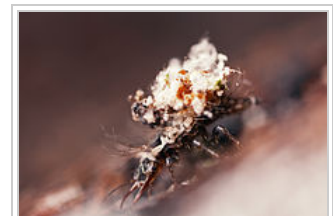
*Chrysopa* sp.

### Scientific classification

Kingdom:	Animalia
Phylum:	Arthropoda
Class:	Insecta
Order:	Neuroptera
Suborder:	Hemerobiiiformia
Superfamily:	Chrysopoidea
Family:	<b>Chrysopidae</b>

### Subfamilies

Apochrysinæ  
 Chrysopinæ  
 Nothochrysinæ  
 and see text



Green Lacewing larva (presumably from Czech Republic) camouflaged against ants



Stalked eggs of unknown species, Mainzer Sand (Rheinland-Pfalz, Deutschland)

underside of a leaf. Immediately after hatching, the larvae moult, then ascend the egg stalk to feed. They are voracious predators, attacking most insects of suitable size, especially soft-bodied ones (aphids, caterpillars and other insect larvae, insect eggs, and at high population densities also each other). Therefore, the larvae are colloquially known as "**aphid lions**" (also spelled "aphid lions") or "**aphid wolves**", similar to the related antlions. Their senses are weakly developed, except that they are very sensitive to touch. Walking around in a haphazard fashion, the larvae sway their heads from one side to the other, and when they strike a potential prey object, the larva grasps it. Their maxillae are hollow, allowing a digestive secretion to be injected in the prey; the organs of an aphid can for example be dissolved by this in 90 seconds. Depending on environmental conditions, larvae need about 1-3 weeks to pupation which takes place in a cocoon; species from temperate regions usually overwinter as a prepupa, though *C. carnea* overwinters as newly-hatched adults.



Larva of unknown species (from Latvia) camouflaged with sand grains



Larva of Common Green Lacewing (*Chrysoperla carnea*) or perhaps *C. mediterranea* feeding on an aphid

### Use in biological pest control

While depending on species and environmental conditions, some green lacewings will eat only about 150 prey items in their entire life, in other cases 100 aphids will be eaten in a single week. Thus, in several countries, millions of such voracious Chrysopidae are reared for sale as biological control agents of insect and mite pests in agriculture and gardens. They are distributed as eggs, since as noted above they are highly aggressive and cannibalistic in confined quarters; the eggs hatch in the field. Their performance is variable; thus, there is a lot of interest in further research to improve the use of green lacewings as biological pest control. Species that have hitherto attracted wider study and are more or less readily available as captive-bred eggs to deposit out for hatching in pest-infested plant cultures are several members of *Chrysoperla* as well as *Mallada signatus*.<sup>[3]</sup>

Gardeners can attract these lacewings - and therefore ensure a steady supply of larvae - by using certain companion plants and tolerating beneficial weeds. Chrysopidae are attracted mainly by Asteraceae - e.g. calliopsis (*Coreopsis*), cosmos (*Cosmos*), sunflowers (*Helianthus*) and dandelion (*Taraxacum*) - and Apiaceae such as dill (*Anethum*) or angelica (*Angelica*).

### Systematics and taxonomy

For long, green lacewings were considered close relatives of the pleasing lacewings (Dilaridae) and brown lacewings (Hemerobiidae) and placed in the superfamily Hemerobioidea. But this grouping does not appear to be natural and misled most significantly by the supposed hemerobioideans' plesiomorphic larvae. Today, the Hemerobioidea are usually considered monotypic, containing only the brown lacewings; the green lacewings seem to be very closely related to the osmylids (Osmylidae), which have much more advanced larvae superficially resembling those of the spongillaflies (Sisyridae) with which the spongillaflies were thus formerly allied. Thus the superfamily Osmyloidea - also monotypic following the spongillaflies' removal from there - is the closest living relative of green lacewings; some Mesozoic taxa have been placed in families even closer to Chrysopidae (Ascalochrysidae and Mesochrysoptidae) and united with these to superfamily Chrysopoidea.<sup>[4]</sup>

### Selected genera

The living genera of Chrysopidae are divided into one very large and two smaller subfamilies; a few genera are not robustly assigned to either of these yet:

#### Subfamily Apochrysinæ Handlirsch, 1908

- *Apochrysa* (including *Anapochrysa*, *Lauraya*, *Nacaura*, *Oligochrysa*, *Synthochrysa*)<sup>[5]</sup>
- *Domenechus*
- *Joguina* - includes *Lainius*<sup>[5]</sup>
- *Loyola* (including *Claverina*)<sup>[5]</sup>

- *Nobilinus*
- *Nothancyla*
- *Pimachrysa*

### Subfamily Chrysopinae

- Almost 60 genera, see article.

### Subfamily Nothochrysinæ Navas, 1910

- *Asthenochrysa*
- *Dictyochrysa*
- *Hypochrysa*
- *Kimochrysa*
- *Nothochrysa* McLachlan, 1868
- *Pamochrysa*
- *Triplochrysa*

### *Incertae sedis*

- *Cladochrysa*
- *Maculatae*
- *Sinochrysa* Yang, 1992 (Nothochrysinæ?)
- *Tibetochrysa* Yang, 1988 (Chrysopinae?)
- *Tolmeron*
- *Xanthochrysa* Yang & Yang, 1991 (Chrysopinae?)
- *Yunchrysa* Yang & Wang, 1994 (Chrysopinae?)



*Nothancyla verreauxi*  
(Apochrysinæ)



*Nothochrysa fulviceps*  
(Nothochrysinæ)

Compared to other Neuroptera, which have an extensive, sometimes extremely abundant, fossil record, green lacewings are not known from that many fossils, and these are not generally well-studied.<sup>[1]</sup> Their prehistoric relatives mentioned above, however, indicate that at least the basal radiation of the Chrysopoidea must have happened in the Jurassic already, if not earlier.

## Footnotes

- <sup>1</sup> <sup>a</sup> <sup>b</sup> <sup>c</sup> Engel & Grimaldi (2007)
- <sup>^</sup> Henry *et al.* (1999)
- <sup>^</sup> New (2002)
- <sup>^</sup> See references in Haaramo (2008)
- <sup>^</sup> <sup>a</sup> <sup>b</sup> <sup>c</sup> Winterton & Brooks (2002)

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*This article draws heavily on the corresponding article in the German-language Wikipedia.*

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### Further reading

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doi:10.1111/j.1440-6055.1995.tb01306.x (<http://dx.doi.org/10.1111%2Fj.1440-6055.1995.tb01306.x>) (HTML abstract)

## External links

- Green Lacewing: diagnostic photographs and information ([http://www.cirrusimage.com/neuroptera\\_green\\_lacewing.htm](http://www.cirrusimage.com/neuroptera_green_lacewing.htm))
- GMO Safety: Bt maize pollen poses no risk to green lacewings (<http://www.gmo-safety.eu/news/582.maize-pollen-poses-risk-green-lacewings.html>)
- UniProt Taxonomy (<http://www.uniprot.org/taxonomy/7520>)
- Green lacewings of Florida ([http://entnemdept.ufl.edu/creatures/BENEFICIAL/green\\_lacewings.htm](http://entnemdept.ufl.edu/creatures/BENEFICIAL/green_lacewings.htm)), on the UF / IFAS Featured Creatures website.

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Categories: Neuroptera | Biological pest control agents

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