

Biographies of Phasmatologists – 5. Carl Linnaeus.

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Abstract

Carl Linnaeus is best known for his system of grouping and naming plants and animals that, in a modified form, is still in use today. Although he did little work on phasmids, his work is significant because he created the first scientific names of phasmids. His life and phasmid work is outlined.

Keywords

Phasmida, Phasmatologist, Carolus Linnaeus, Carl von Linné, Carl Linnaeus, Biography.

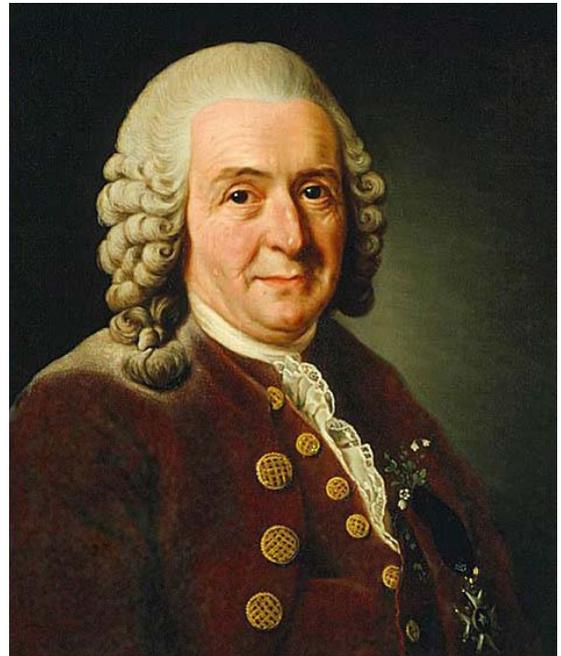
Introduction

Linnaeus was not really a phasmatologist, he described 4 species, and did not recognise them as a distinct group – they were not distinguished from the praying mantids. However, he is viewed as the founder of the system of biological nomenclature – the international system for naming animals and plants. Linnaeus was the first person to describe any phasmids under this system; this means that it could be argued that in 1758 he was the only phasmatologist in the world! Since 2007 is the 300th anniversary of his birth it seemed appropriate to include him in the series *Biographies of Phasmatologists*.

As the founder of our system for naming organisms, it is somewhat ironic that there is often confusion over his name. When he was born, in Sweden, surnames were not in common use, so he was just known as Carl. When he needed a surname at university he adopted the surname Linnaeus; he chose a Latin name because this was the international language of Science at that time. He subsequently Latinised his forename from Carl to Carolus for publishing his work. In later life he was granted nobility and became known as Carl von Linné.

Carl Linnaeus (1707-1778)

Carl was born on May 23rd 1707, at Stenbrohult, in the province of Småland in southern Sweden. His father, Nils Ingemarsson, was both an avid gardener and a Lutheran pastor, and Carl showed a deep love of plants and a fascination with their names from a very early age. Carl showed no desire to follow in his father's footsteps by training for the priesthood, but his family was somewhat consoled when Linnaeus entered the University of Lund in 1727 to study medicine. A year later, he transferred to the prestigious University of Uppsala. However, its medical facilities had been neglected and most of Linnaeus's time at Uppsala was spent collecting and studying plants, his true love. At the time, training in botany was part of the medical curriculum, for every doctor had to prepare and prescribe drugs derived from medicinal plants.



Despite financial difficulties, Linnaeus mounted a botanical and ethnographical expedition to Lapland in 1731, followed by one to central Sweden in 1734.

In 1735 Linnaeus went to the Netherlands to finish his medical degree at the University of Harderwijk; he then enrolled in the University of Leiden for further studies. In the same year he published the first edition of his classification of living things, the *Systema Naturae*. He met or corresponded with many of Europe's leading botanists, and continued to develop

his classification scheme. Linnaeus continually revised his *Systema Naturae*, which grew from a slim pamphlet to a multivolume work, as his concepts were modified and as more and more plant and animal specimens were sent to him from every corner of the globe.

Returning to Sweden in 1738, he practiced medicine (specializing in the treatment of syphilis) and lectured in Stockholm. In September 1739 he married Sara Elisabeth Morea. They had seven children, Carl, Elisabeth, Sara Magdalena, Lovisa, Sara Christina, Johannes, Sophie; only five survived to adult. In 1741 he was awarded a professorship at Uppsala University. At Uppsala he restored the University's botanical garden, arranging the plants according to his system of classification. He made three more expeditions to various parts of Sweden and appears to have inspired many of his students. Linnaeus arranged for a number of his students to take part in exploration voyages to all parts of the world. Perhaps his most famous student, Daniel Solander, was the naturalist on Captain James Cook's first round-the-world voyage and brought back the first plant collections from Australia and the South Pacific. Another of his students, Carl Peter Thunberg, described eleven phasmids after the death of Linnaeus, one in 1784 and ten in 1815.

Uppsala Astronomical Observatory was founded by Anders Celsius in the same year that Linnaeus became a professor. The year after Celsius died, Linnaeus reversed the numbering of the temperature scale that Celsius had invented, giving us the scale that we use today (The original Celsius scale had water boiling at 0° and freezing at 100°).

Linnaeus was keen to make the Swedish economy more self-sufficient and less dependent on foreign trade, either by acclimatising crops to grow in Sweden, or by finding native substitutes. Sadly, Sweden's cold climate made his attempts to grow cacao, coffee, tea, bananas, rice, and mulberries unsuccessful. His attempts to find native Swedish plants that could be used as tea, coffee, flour, and animal fodder were also not very successful.

Linnaeus continued to practice medicine and eventually became personal physician to the Swedish royal family. In 1758 he bought the manor estate of Hammarby, outside Uppsala, where he built a small museum for his extensive personal collections. In 1761 he was granted nobility, and became Carl von Linné. In 1774 he suffered what was probably a series of mild strokes and remained in poor health until he died on January 10th 1778.

His only surviving son, also called Carl, succeeded his father as a professor at Uppsala University and inherited his personal collections. When he died five years later his father's library, manuscripts, and natural history collections were sold to the English natural historian Sir James Edward Smith. Much of the material that Linnaeus used in his work belonged to the University and this material is still housed in the Uppsala University Museum.

The Linnaeus legacy

The first edition of *Systema Naturae* was printed in the Netherlands in 1735; it was eleven pages long. Linnaeus continued to expand this work and produced several editions over the years; figure 2 (opposite) shows the title page of volume one of the 10th edition in 1758. Linnaeus did not invent the classification system, or binomial nomenclature on his own. However, he developed existing systems and was the first person to use them consistently throughout what became a comprehensive publication. His work became the standard for taxonomy (grouping organisms) and nomenclature (naming species).

Present day taxonomy is still based on his ideas, although, because ideas of how animals should be grouped change as new evidence is found, the Linnaeus system has had to undergo huge changes. To put things in context, there are now more families known than there were species in Linnaeus' time. The system has many more hierarchical levels than Linnaeus used, but the basic principles are the same.

Present day nomenclature has changed very little from Linnaeus' system. It is based on a binomial system: each species is given a generic name and specific name which have to

follow the rules of Latin grammar; the combination of these names is unique to that particular type of animal. The explosion of new species being discovered in the 19th Century resulted in confusion as new names created by different people in different countries. It soon became clear that some form of regulation was essential to deal with problems such as different people giving the same name to different animals. As early as the 1840s a fairly widely accepted code was produced; this was developed over the next 60 years. The 5th International Congress of Zoology set up the International Commission for Zoological Nomenclature (ICZN) to oversee the rules. The ICZN adopted the 10th edition of *Systema Naturae* as the starting point for scientific names.

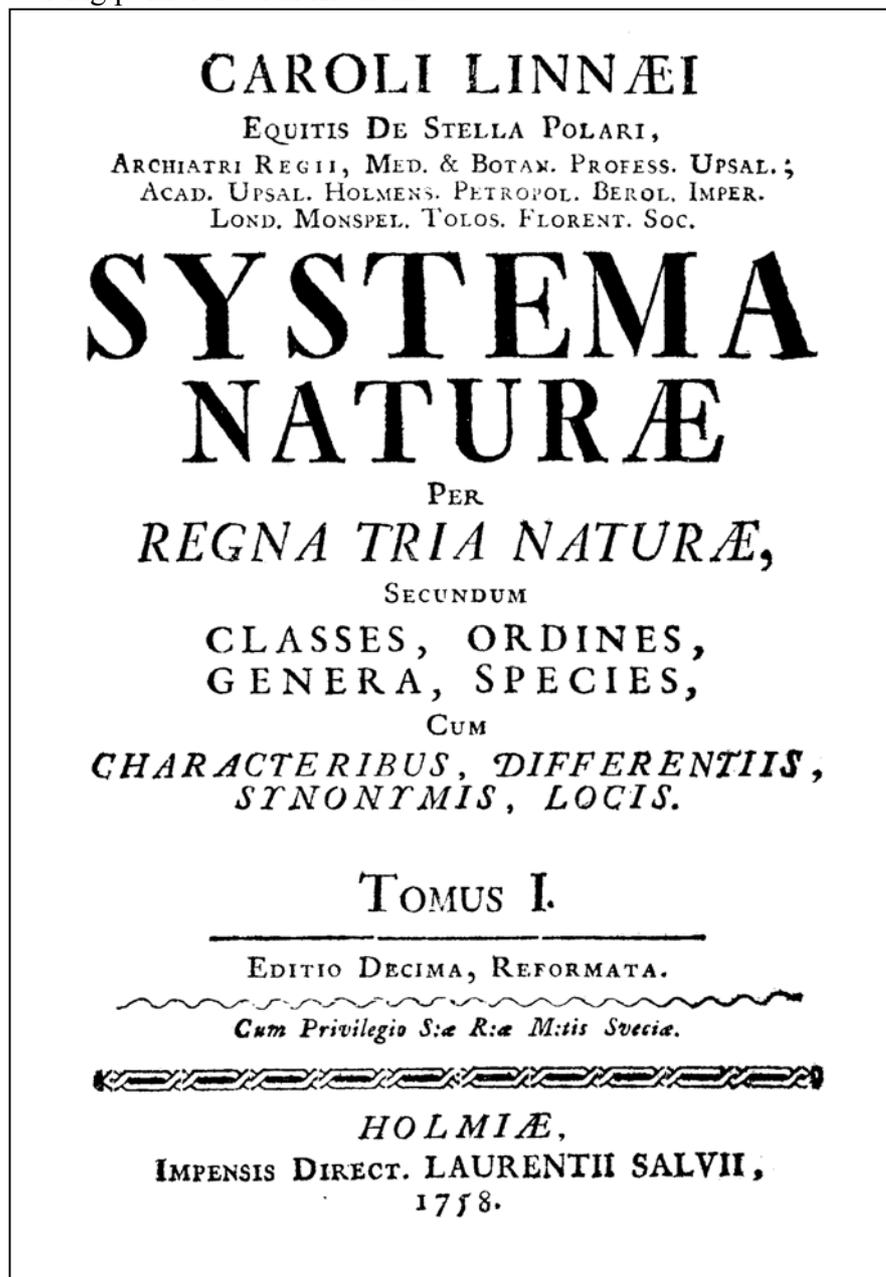
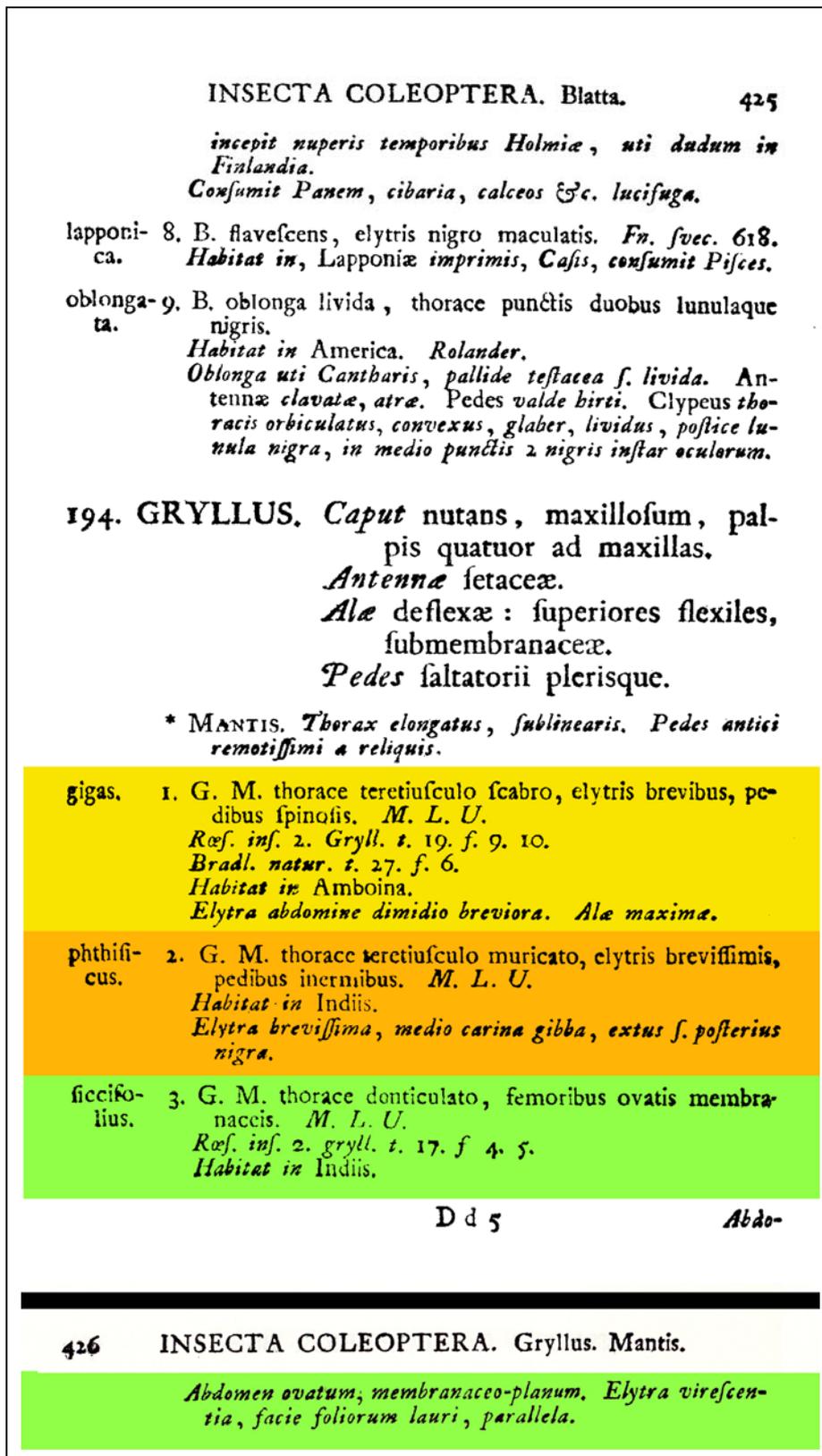


Figure 2.
Title page of
volume 1 of the
10th Edition.

The 10th edition of *Systema Naturae*, published by Linnaeus 1758, classified and described 4,400 species of animals and 7,700 species of plants. Volume 1 of the 1758 edition deals with the animals; classification of plants is based on a different edition and is overseen by a separate organisation. Since 1758, the number of known species of animals has risen from 4,400 to about one million; the number of stick insect names has risen from three to over 3,000.

Systema Naturae was written in Latin, the usual language for scientific work at that time. Figure 3 (below) shows page 425 and the top few lines of page 226; I have highlighted the three phasmids in different colours.

Figure 3.
Page 425 & top of page 426 of the 10th edition of *Systema Naturae*, with phasmids highlighted in colour.



The Linnean Society and the Linnaean collection

James Smith was one of the founders, and the first President, of the Linnean Society of London in 1788. The society was set up to further the knowledge of natural history, and is now the oldest extant biological society in the world. Other Linnean Societies, with similar aims, were later formed in other countries throughout the world. The Linnean Society of London bought Smith's collection (including Linnaeus' material) after his death in 1828. The Linnaean manuscripts and collections are preserved at the Linnean Society, Burlington House, in London.

Smith's own collection was mixed in with those he bought from the Linnaeus family so it is not always clear which specimens belonged to Linnaeus. The collection includes about 14,000 plant and 5,000 animal specimens that are believed to have come from Linnaeus; of these 3,198 are insects (Fitton & Harman, 2007), and two are phasmids (Marshall, 1983).

Specimens in Uppsala University Museum

Brock (2002) gave details and photographs of the specimens described by Linnaeus that are in the museum at Uppsala. There are a total of four specimens, three of *Phasma gigas* (Linnaeus, 1758) and one of *Phyllium siccifolium* (Linnaeus, 1758).

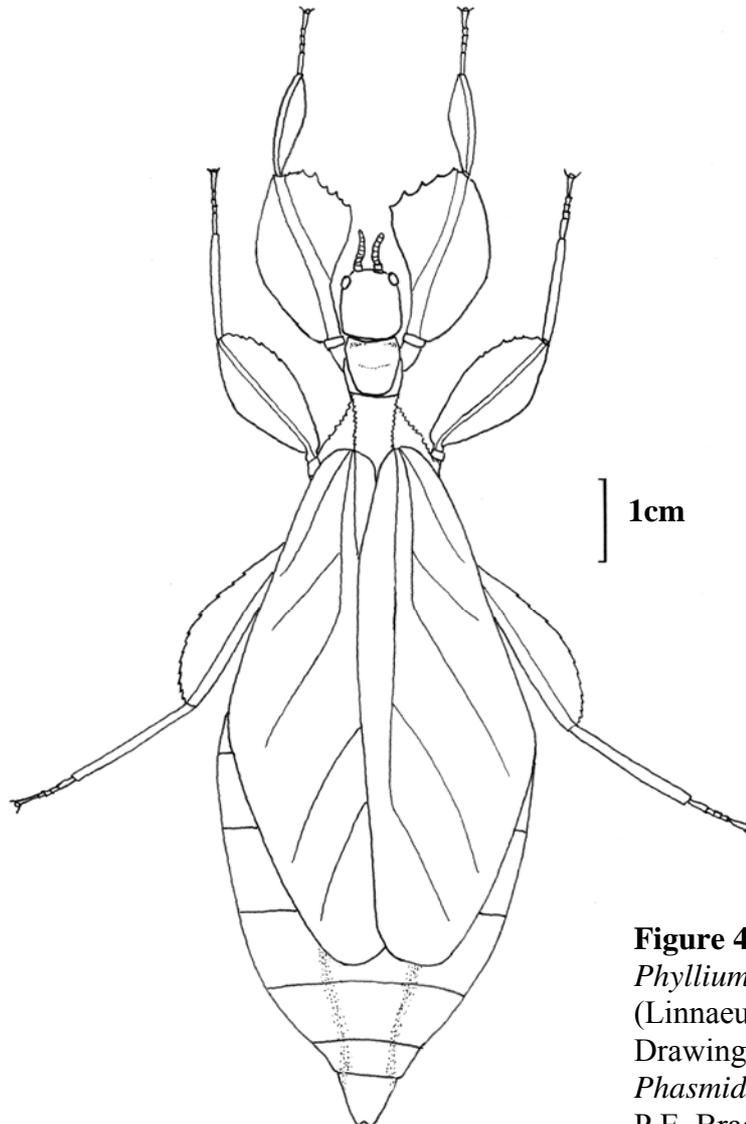


Figure 4.
Phyllium siccifolium
(Linnaeus, 1758) ♀.
Drawing taken from
Phasmids of Borneo by
P.E. Bragg (2001).

The phasmids of Linnaeus

Linnaeus divided the Insects into seven main groups; these were then split into smaller groups. These smaller groups are now referred to as genera and further divisions of these genera as subgenera. All the phasmids that Linnaeus described were placed in the genus *Gryllus*, and subgenus *Mantis*. Linnaeus elevated *Mantis* to a full genus in the 12th edition of *Systema Naturae* in 1767. In 1758 the genus *Gryllus* included phasmids, mantids, crickets, bush crickets, grasshoppers, and locusts; it is now restricted to some crickets. The subgenus *Mantis* contained all the phasmids (3) and praying mantids (7); the genus *Mantis* is now restricted to six species of praying mantids.

Linnaeus produced three publications naming new of phasmids species, *Systema Naturae* in 1758, and two separate publications in 1763. None of his phasmids were illustrated. *Systema Naturae* named three species. In 1763 Linnaeus described his fourth species of phasmid in two different publications. However, he used different names in the two publications, so he actually produced five species names. Linnaeus intended the name *necydaloides* to replace *brachypterus*, however, this was an unnecessary change and under the ICZN rules the earliest name, *brachypterus*, takes priority and is the valid name; the later name, *necydaloides*, is a junior synonym and should not be used.

The table below gives the original name of his phasmids, followed by the year and page number of the publication, and the current name.

Original name	Current name
<i>Gryllus Mantis gigas</i> 1758: 425.	<i>Phasma gigas</i> (Linnaeus, 1758)
<i>Grllus Mantis phthisicus</i> 1758: 425	<i>Pseudophasma phthisicum</i> (Linnaeus, 1758)
<i>Gryllus Mantis siccifolius</i> 1758: 425.	<i>Phyllium siccifolium</i> (Linnaeus, 1758)
<i>Gryllus Mantis brachypterus</i> 1763a: 14.	<i>Pseudophasma brachypterus</i> (Linnaeus, 1763)
<i>Gryllus Mantis necydaloides</i> 1763b: 397.	<i>Pseudophasma brachypterus</i> (Linnaeus, 1763)

The number of phasmids that Linnaeus originally had is unknown. Only six specimens survive; there are no known specimens of those currently placed in *Pseudophasma*. Uppsala contains one adult female *Phyllium siccifolium*, and one male, one adult female and one female nymph of *Phasma gigas*. The two specimens (one male and one female) in the Linnean Society, that were treated as *gigas* by Linnaeus, were later described as *Diaperodes scabricollis* by Gray, in 1835, because he decided they were different from other specimens of *gigas*.

References

- Brock, P.D.** (2002) Linnaean stick and leaf insect type material (Insecta: Phasmida). *Le Bulletin de Phyllie*, **1**(11): 3-14.
- Fitton M. & Harman, K.** (2007) The "Linnaean" insect collection. *Linnean*, Special Issue **7**: 47-58.
- Gray, G.R.** (1835) *Synopsis of the species of insects belonging to the family of Phasmidae*. Longmans, London.
- Linnaeus, C.** (1758) *Systema Naturae*, **10th Edition**. Holmiae.
- Linnaeus, C.** (1763a) *Centuria Insectorum Rariorum*. Upsaliae.
- Linnaeus, C.** (1763b) CXXI. *Centuria Insectorum. Amoenitates Academicae*, **6**: 384-415.
- Linnaeus, C.** (1767) *Systema Naturae*, **12th Edition**. Holmiae.
- Marshall, J.A.** (1983) The Orthopteroid insects described by Linnaeus, with notes on the Linnaean collection. *Zoological Journal of the Linnean Society*, **78**(4): 375-396.
- Thunberg, C.P.** (1784) *Dissertatio Entomologica, Novas Insectorum Species. Sistens. Cujus partem tertiam*. Upsaliae.
- Thunberg, C.P.** (1815) Hemipterorum maxillosorum genera illustrata. *Mémoires de l'Académie Impériale des Sciences de St.-Petersbourg*, **Volume 5**.