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Order Hymenoptera*

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Abstract

An updated classification of the order Hymenoptera is provided with the current numbers of genera and species described so far specified. The order is composed of 2 suborders, 27 superfamilies, 132 families, 8423 extant genera with an additional 685 extinct genera. Considered one of the most species-rich insects orders a total of 153088 extant species have been described, in addition to 2429 extinct species.

Key words: Hymenoptera, wasps, bees, ants, classification, diversity

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Introduction

The present list concerns the current classification and described diversity of the order Hymenoptera which includes all wasps, bees and ants. Classification of extant superfamilies follows Sharkey (2007) and Sharkey *et al*. (2011). The number of described and here included genus-group and species-group taxa are, unless otherwise stated, updated until April 2012, while family-group taxa are updated until August 2013. In the counts for fossil genera and species, only extinct taxa are included, not fossil representatives of extant taxa.

The taxa of Hymenoptera are divided into two suborders (Symphyta and Apocrita), with 27 superfamilies (9 superfamilies in Symphyta and 18 in Apocrita) and 132 families. It is noteworthy that 17 of these families have been described since year 2000 and that 16 of these newly recognized families represent now extinct families only known from fossils. New genera and species are frequently encountered and our most recent estimate total 8423 extant genera with an additional 685 extinct genera. Considered one of the most species-rich insect orders, behind only Coleoptera and Lepidoptera, there is a total of 153088 extant and described species, in addition to 2429 extinct described species.

Diversity estimates based on described species for some of the parasitic wasp families can be misleading. There is a rich literature on the family Cynipidae with much ongoing research, but the classification is currently changing and many new species are being described especially from the northern Neotropical and Oriental regions. At the same time several groups remain without modern revisions, and there is a wealth of synonyms particularly due to separate names of morphologically different generations in the subfamily Cynipinae. Diversity counts for Figitidae and several other large families of parasitic Hymenoptera also bear little relationship to the actual diversity. All major groups of Figitidae (most of the subfamily Eucoilinae, the major genera in Charipinae, plus some genera of Figitinae, Anacharitinae and Aspicerinae) remain without modern revisions, and there are very few current workers in the group. To exemplify this, of the 919 currently formally valid species names in Eucoilinae, current researchers have examined less than 50% of the types and assessed the generic combination—at most 400 species are confirmedly valid and actually recognizable. Even in Europe, the historically best known area, at least 50% of the species present in collections are in fact still undescribed, and for the rest of the world, this ratio is much higher (Forshage, pers. obs.). For real numbers of species of Figitidae, the only figure someone has dared to estimate is an approximately 14,000 (Nordlander, 1984).

Classification

Order **Hymenoptera** Linnaeus, 1758 (2 suborders) (8,423 (and †684) genera, 152,677 (and †2,428) species)

Suborder **Symphyta**[1] (9 superfamilies, 25 families)
- Superfamily **Anaxyeloidea** Martynov, 1925 (1 family)
  - Family **Anaxyelidae** Martynov, 1925 (1 (and †12) genera, 1 (and †32) species)
- Superfamily **Cephoidea** Newman, 1834 (2 families)
  - Family **Cephidae** Newman, 1834 (21 (and †3) genera, 160 (and †6) species)
  - † Family **Sepulcidae** Rasnitsyn, 1968 (†15 genera, †38 species)
- † Superfamily **Karatavitoidea** Rasnitsyn, 1963 (1 family)
  - † Family **Karatavitidae** Rasnitsyn, 1963 (†5 genera, †6 species)
- Superfamily **Orussoidea** Newman, 1834 (2 families)
  - Family **Orussidae** Newman, 1834 (16 (and †2) genera, 82 (and †3) species)
  - † Family **Paroryssidae** Martynov, 1925 (†4 genera, †10 species)
- Superfamily **Pamphilioidea** Cameron, 1890 (3 families)
  - Family **Megalodontesidae** Konow, 1897 (1 (and †1) genera, 42 (and †1) species)

1. Taeger *et al*. 2010; Taeger & Blank 2012.

Family **Pamphiliidae** Cameron, 1890 (10 (and †3) genera, 291 (and †5) species)
† Family **Xyelydidae** Rasnitsyn, 1986 (†8 genera, †20 species)
Superfamily **Siricoidea** Billberg, 1820 (6 families)
† Family **Daohugoidae** Rasnitsyn & Zhang, 2004 (†1 genus, †1 species)
† Family **Praesiricidae** Rasnitsyn, 1968 (†6 genera, †8 species)
† Family **Protosiricidae** Rasnitsyn & Zhang, 2004 (†1 genus, †1 species)
† Family **Pseudosiricidae** Handlirsch, 1908 (†1 genus, †14 species)
† Family **Sinosiricidae** Hong, 1975 (†1 genus, †1 species)
Family **Siricidae** Billberg, 1820 (11 (and †9) genera, 111 (and †13) species)
Superfamily **Tenthredinoidea** Latreille, 1803 (8 families)
Family **Argidae** Konow, 1890 (58 (and †1) genera, 897 (and †7) species)
Family **Blasticotomidae** Thomson, 1871 (2 (and †1) genera, 12 (and †1) species)
Family **Cimbicidae** W. Kirby, 1837 (16 (and †6) genera, 182 (and †19) species)
Family **Diprionidae** Rohwer, 1910 (11 (and †2) genera, 136 (and †2) species)
† Family **Electrotomidae** Rasnitsyn, 1977 (†1 genus, †1 species)
Family **Pergidae** Rohwer, 1911 (60 genera, 442 species)
Family **Tenthredinidae** Latreille, 1803 (400 (and †14) genera, 5500 (and †79) species)
† Family **Xyelotomidae** Rasnitsyn, 1968 (†14 genera, †21 species)
Superfamily **Xiphydrioidea** Leach, 1819 (1 family)
Family **Xiphydriidae** Leach, 1819 (28 genera, 146 species)
Superfamily **Xyeloidea** Newman, 1834 (1 families)
Family **Xyelidae** Newman, 1834 (5 (and †47) genera, 63 (and †93) species)

Suborder **Apocrita** (18 superfamilies, 105 families)
† Superfamily **Ephialtitoidea**[2] Handlirsch, 1906 (1 family)
† Family **Ephialtitidae** Handlirsch, 1906 (†2 genera, †60 species)
Superfamily **Trigonaloidea**[3] Cresson, 1887 (2 families)
† Family **Maimetshidae**[4] Rasnitsyn, 1975 (†9 genera, †11 species)
Family **Trigonalidae**[5] Cresson, 1887 (16 (and †4) genera, 92 (and †5) species)
Superfamily **Megalyroidea** Schletterer, 1889 (1 family)
Family **Megalyridae**[6] Schletterer, 1889 (8 (and †11) genera, 43 (and †40) species)
Superfamily **Stephanoidea** Leach, 1815 (1 family)
Family **Stephanidae**[7] Leach, 1815 (11 (and †4) genera, 342 (and †8) species)
Superfamily **Ceraphronoidea** Haliday, 1833 (4 families)
Family **Ceraphronidae**[8] Haliday, 1833 (15 genera, 304 (and †2) species)
Family **Megaspilidae**[9] Ashmead, 1893 (12 (and †1) genera, 299 (and †12) species)

2. http://www.taxapad.com/taxapadmain.php.
3. This name has been spelled in two ways: Trigonalidae and Trigonalyidae. The family was proposed as Trigonalidae by Cresson (1887) and is based on the genus *Trigonalys* Westwood (1835). Westwood did not provide the derivation of his genus-group name, but it must be assumed that *Trigonalys* is to be treated as a noun in the nominative singular. It is presumably a compound word. If Latin, the first part of the name "trigonium" is a noun meaning triangle but the second part is ambiguous; it might come from the Greek "alys" or it might be an arbitrary combination of letters. Only in the latter case does ICZN Article 29.3.3 apply and the stem adopted by Cresson, who establishes the new family-group taxon, must be accepted as the correct spelling, namely Trigonalidae.
4. Perrichot *et al*. 2011.
5. Lelej 2003a; Poinar 2005.
6. Rasnitsyn 1975; Belokobylskij 1998; Perrichot 2009.
7. Aguiar 2004a, 2004b, 2005, 2006; Aguiar & Jennings 2005, 2010; Aguiar *et al*. 2010; Achterberg & Yang 2004; Achterberg & Quicke 2006; Engel & Grimaldi 2004; Engel 2005b; Hong *et al*. 2010, 2011; Hong & Xu 2011.
8. Johnson & Musetti 2004; Evans *et al*. 2005.
9. Dessart 2001; Martinez 2003; Takada 2009; Peñalver & Engel 2006.

† Family **Radiophronidae**[10] Ortega-Blanco, Rasnitsyn & Declòs, 2010 (†2 genera, †2 species)
† Family **Stigmaphronidae**[11] Kozlov, 1975 (†8 genera, †25 species)
Superfamily **Evanioidea** Latreille, 1802 (5 families)
† Family **Andreneliidae**[12] Rasnitsyn & Martínez-Declòs, 2000 (†1 genus, †1 species)
Family **Aulacidae**[13] Shuckard, 1841 (2 (and †10) genera, 185 (and †18) species)
Family **Evaniidae**[14] Latreille, 1802 (21 (and †9) genera, 449 (and †19) species)
Family **Gasteruptiidae**[15] Ashmead, 1900 (6 genera, 496 species)
† Family **Praeaulacidae**[16] Rasnitsyn, 1972 (†10 genera, †39 species)
Superfamily **Mymarommatoidea** Debauche, 1948 (3 families)
† Family **Alavarommatidae**[17] Ortega-Blanco, Peñalver, Delclòs & Engel, 2011 (†1 genus, †1 species)
† Family **Gallorommatidae**[18] Gibson, Read & Huber, 2007 (†1 genus, †3 species)
Family **Mymarommatidae**[19] Debauche, 1948 (3 (and †2) genera, 10 (and †10) species)
Superfamily **Proctotrupoidea** Latreille, 1802 (11 families)
Family **Austroniidae**[20] Kozlov, 1975 (1 (and †1) genera, 3 (and †1) species)
Family **Heloridae** Förster, 1856 (1 (and †9) genera, 12 (and †13) species)
† Family **Iscopinidae** Rasnitsyn, 1980 (†10 genera, †39 species)
† Family **Jurapriidae** Rasnitsyn, 1983 (†1 genus, †1 species)
† Family **Mesoserphidae**[21] Kozlov, 1970 (†16 genera, †33 species)
Family **Pelecinidae**[22] Haliday, 1839 (1 (and †5) genera, 3 (and †8) species)
Family **Peradeniidae**[23] Naumann & Masner, 1985 (1 genus, 2 (and †1) species)
Family **Proctorenyxidae**[24] Lelej & Kozlov, 1999 (2 genera, 2 species)
Family **Proctotrupidae** Latreille, 1802 (28 (and †15) genera, 403 (and †26) species)
Family **Roproniidae** Bradley, 1905 (2 (and †4) genera, 20 (and †5) species)
Family **Vanhorniidae** Crawford, 1909 (3 genera, 5 species)
† Genera unplaced to family (†2 genera, †3 species)
Superfamily **Diaprioidea** Haliday, 1833 (5 families)
Family **Diapriidae**[25] Haliday, 1833 (190 (and †7) genera, 2048 (and †22) species)
Family **Ismaridae**[26] Thomson, 1858 (1 genus, 29 species)
Family **Maamingidae**[27] Early, Masner, Naumann & Austin, 2001 (1 genus, 2 species)
Family **Monomachidae**[28] Ashmead, 1902 (2 genera, 30 species)

10. Ortega-Blanco *et al*. 2010.
11. McKellar & Engel 2011.
12. Rasnitsyn & Martínez-Declòs 2000.
13. Turrisi *et al*. 2009; Jennings & Krogmann 2009.
14. Deans 2005; Kawada & Azevedo 2007; Deans & Kawada 2008; Rasnitsyn & Brothers 2007; Zhang & Rasnitsyn 2008; Peñalver *et al*. 2010; Deans *et al*. 2012.
15. Jennings & Austin 2002; Macedo 2009.
16. Zhang & Rasnitsyn 2008.
17. Ortega-Blanco *et al*. 2011a.
18. Engel & Grimaldi 2007a.
19. Gibson *et al*. 2007; Huber *et al*. 2008.
20. Kozlov in Rasnitsyn 1975.
21. http://osuc.biosci.ohio-state.edu.
22. Engel & Grimaldi 2006a.
23. Johnson *et al*. 2001.
24. Lelej & Kozlov 1999; He *et al*. 2002.
25. Perrichot & Nel 2008.
26. http://osuc.biosci.ohio-state.edu.
27. Early *et al*. 2001.
28. Johnson & Musetti 2012.

† Family **Spathiopterygidae**[29] Engel & Ortega-Blanco, 2013 (†3 genera and †3 species)

Superfamily **Platygastroidea** Haliday, 1833 (1 family)

Family **Platygastridae** Haliday, 1833 (236 (and †20) genera, 5385 (and †45) species)

† Superfamily **Serphitoidea** Brues, 1937 (1 family)

† Family **Serphitidae**[30] Brues, 1937 (†3 genera, †9 species)

Superfamily **Cynipoidea** Latreille, 1802 (8 families)

Family **Austrocynipidae**[31] Riek, 1971 (1 genus, 1 species)

Family **Cynipidae**[32] Latreille, 1802 (74 (and †3) genera, 1412 (and †11) species)

Family **Figitidae** Hartig, 1840 (148 (and †10) genera, 1571 (and †11) species)

† Family **Gerocynipidae**[33] Liu & Engel, 2007 (†3 genera, †5 species)

Family **Ibaliidae**[34] Thomson, 1862 (3 (and †1) genera, 20 (and †2) species)

Family **Liopteridae** Ashmead, 1895 (10 (and †2) genera, 153 (and †2) species)

† Family **Protimaspidae**[35] Liu & Engel, 2007 (†1 genus, †1 species)

† Family **Stolamissidae**[36] Liu & Engel, 2007 (†1 genus, †1 species)

Superfamily **Chalcidoidea**[37] Latreille, 1817 (23 families)

Family **Agaonidae**[38] Walker, 1846 (20 (and †2) genera, 762 (and †4) species)

Family **Aphelinidae** Thomson, 1876 (29 (and †1) genera, 1078 (and †1) species)

Family **Azotidae**[39] Nikol'skaya & Yasnosh, 1966 (1 genus, 92 species)

Family **Chalcididae** Latreille, 1817 (90 (and †3) genera, 1469 (and †5) species)

Family **Cynipencyrtidae**[40] Trjapitzin, 1973 (1 genus, 1 species)

Family **Encyrtidae** Walker, 1837 (493 (and †2) genera, 4058 (and †3) species)

Family **Eriaporidae**[41] Ghesquière, 1955 (5 genera, 22 species)

Family **Eucharitidae** Walker, 1846 (57 (and †1) genera, 427 (and †1) species)

Family **Eulophidae** Westwood, 1829 (334 (and †2) genera, 4969 (and †3) species)

Family **Eupelmidae** Walker, 1833 (51 (and †4) genera, 931 (and †5) species)

Family **Eurytomidae** Walker, 1832 (97 (and †1) genera, 1453 (and †3) species)

† Family **Khutelchalcididae** Rasnitsyn, Basibuyuk & Quicke, 2004 (†1 genus, †1 species)

Family **Leucospidae**[42] Walker, 1834 (4 (and †1) genera, 134 (and †1) species)

Family **Mymaridae** Haliday, 1833 (96 (and †13) genera, 1437 (and †20) species)

Family **Ormyridae** Förster, 1856 (3 genera, 125 species)

Family **Perilampidae** Förster, 1856 (17 (and †1) genera, 284 (and †1) species)

Family **Pteromalidae** Dalman, 1820 (619 (and †6) genera, 3544 (and †20) species)

Family **Rotoitidae**[43] Bouček & Noyes, 1987 (2 genera, 2 species)

Family **Signiphoridae** Howard, 1894 (4 genera, 78 species)

Family **Tanaostigmatidae** Ashmead, 1904 (9 (and †1) genera, 93 (and †1) species)

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29. Engel *et al*. 2013.
30. Ortega-Blanco *et al*. 2011b.
31. Ronquist 1999.
32. Liljeblad 2002.
33. Liu *et al*. 2007a.
34. Liu & Nordlander 1994; Liu *et al*. 2007; Liu & Engel 2010.
35. Liu *et al*. 2007a.
36. Liu *et al*. 2007a.
37. Noyes 2012.
38. Peñalver *et al*. 2006.
39. Heraty *et al*. (2013) revised the status of this family. The included taxa were previously found in Aphelinidae.
40. Heraty *et al*. (2013) revised the status of this family. The included taxa were previously found in Tanaostigmatidae.
41. Heraty *et al*. (2013) revised the status of this family. The included taxa were previously found in Aphelinidae.
42. Engel 2002.
43. Gibson & Huber 2000.

Family **Tetracampidae** Förster, 1856 (15 (and †5 (+†1 from Mymaridae, unpubl.) genera, 44 (and †8 (+†1 from Mymaridae, unpublished) species)
Family **Torymidae** Walker, 1833 (82 (and †5) genera, 900 (and †13) species)
Family **Trichogrammatidae** Haliday, 1851 (97 (and †3) genera, 881 (and †3) species)
Superfamily **Ichneumonoidea** Latreille, 1802 (3 families)
Family **Braconidae** Nees, 1811 (1057 (and †5) genera, 19205 (and †206) species)
Family **Ichneumonidae**[44] Latreille, 1802 (1575 genera, 24025 (and †216) species)
† Family **Praeichneumonidae**[45] Rasnitsyn, 1983 (†1 genus, †5 species)
† Superfamily **Bethylonymoidea** Rasnitsyn, 1975 (1 family)
† Family **Bethylonymidae**[46] Rasnitsyn, 1975 (†2 genera, †17 species)
Superfamily **Chrysidoidea** Latreille, 1802 (9 families)
Family **Bethylidae**[47] Haliday, 1839 (84 (and †11) genera, 2340 (and †13) species)
Family **Chrysididae**[48] Latreille, 1802 (81 (and †6) genera, 2500 (and †9) species)
Family **Dryinidae**[49] Haliday, 1833 (41 (and †2) genera, 1605 (and †19) species)
Family **Embolemidae**[50] Förster, 1856 (2 (and †1) genera, 39 (and †9) species)
† Family **Falsiformicidae**[51] Rasnitsyn, 1975 (†1 genus, †1 species)
† Family **Plumalexiidae**[52] Brothers, 2011 (†1 genus, †1 species)
Family **Plumariidae**[53] Bischoff, 1914 (7 genera, 22 species)
Family **Sclerogibbidae**[54] Ashmead, 1902 (3 (and †1) genera, 20 (and †2) species)
Family **Scolebythidae**[55] Evans, 1963 (4 (and †5) genera, 6 (and †7) species)
Superfamily **Vespoidea**[56] Latreille, 1802 (10 families)
Family **Bradynobaenidae**[57] de Saussure, 1892 (10 genera, 188 species)
Family **Formicidae**[58] Latreille, 1802 (299 (and †132) genera, 12199 (and †620) species)
Family **Mutillidae**[59] Latreille, 1802 (210 (and †1) genera, 4302 (and †12) species)
Family **Pompilidae**[60] Latreille, 1804 (125 (and †2) genera, 4855 (and †16) species)
Family **Rhopalosomatidae**[61] Ashmead, 1896 (4 (and †4) genera, 72 (and †4) species)
Family **Sapygidae**[62] Latreille, 1810 (12 (and †1) genera, 66 (and †1) species)
Family **Scoliidae**[63] [64] Latreille, 1802 (143 (and †5) genera, 560 (and †17) species)
Family **Sierolomorphidae**[65] Krombein, 1951 (2 genera, 11 (and †1) species)
Family **Tiphiidae**[66] Leach, 1815 (120 (and †5) genera, 2000 (and †17) species)
Family **Vespidae**[67] Latreille, 1802 (268 (and †3) genera, 4932 (and †11) species)

44. Wahl 1999; Yu *et al*. 2005.
45. Kopylov 2012.
46. Rasnitsyn 1975; Rasnitsyn & Zhang 2010.
47. Vargas-Rojas & Terayama 2006; Huber 2009; Carpenter 1992; Ploëg & Nel 2004.
48. Kimsey & Bohart 1990; Engel 2006.
49. Olmi & Virla 2006; Engel 2005a; Olmi *et al*. 2011a.
50. Olmi 2006a; Olmi *et al*. 2011b; Perrichot & Engel 2011; Ortega-Blanco *et al*. 2011c.
51. Rasnitsyn 1975.
52. Brothers 2011.
53. Huber 2009; Brothers 2011.
54. Olmi 2006b; Engel & Grimaldi 2006b.
55. Brothers 2006; Engel & Grimaldi 2007b.
56. This equals Scolioidea Latreille, 1802 + Pompiloidea Latreille, 1804 + Vespoidea Latreille, 1802 + Formicoidea Latreille, 1802 *sensu* Rasnitsyn 1988.
57. Lelej 2003b.
58. http://antcat.org (accessed March 2012).
59. Brothers 2003; Lelej 2005.
60. Engel & Grimaldi 2006c.
61. http://rhopalosomatidae.hymis.eu (accessed August 2013).
62. Kurzenko 2009; Bennett & Engel 2005.

Superfamily **Apoidea** Latreille, 1802 (13 families)

Family **Ampulicidae**[68] Shuckard, 1840 (6 (and †7) genera, 200 (and †8) species)

Family **Andrenidae**[69] Latreille, 1802 (77 (and †3) genera, 2917 (and †11) species)

† Family **Angarosphecidae**[70] Rasnitsyn, 1975 (†13 genera, †44 species)

Family **Apidae**[71] Latreille, 1802 (209 (and †22) genera, 5749 (and †87) species)

Family **Colletidae**[72] Lepeletier de Saint Fargeau, 1841 (86 genera, 2547 (and †2) species)

Family **Crabronidae**[73] Latreille, 1802 (242 (and †24) genera, 8773[74] (and †29) species)

Family **Halictidae**[75] Thomson, 1869 (79 (and †7) genera, 4327 (and †22) species)

Family **Megachilidae**[76] Latreille, 1802 (76 (and †6) genera, 4096 (and †34) species)

Family **Melittidae**[77] Schenck, 1860 (15 (and †2) genera, 187 (and †4) species)

† Family **Mellitosphecidae**[78] Poinar & Danforth, 2006 (†1 genus, †1 species)

† Family **Paleomelittidae**[79] Engel, 2001 (†1 genus, †1 species)

Family **Sphecidae**[80] Latreille, 1802 (19 (and †1) genera, 724[81] (and †1) species)

Family **Stenotritidae**[82] Cockerell, 1934 (2 genera, 21 species)

Apocrita incertae sedis (3 families)

† Family **Archaeocynipidae**[83] Rasnitsyn & Kovalev, 1988 (†2 genera, †3 species)

† Family **Eostephanitidae** Hong, 2002 (†1 genus, †1 species)

† Family **Kuafuidae**[84] Rasnitsyn & Zhang, 2010 (†3 genera, †3 species)

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63. Osten (2005) ignored Argaman's classification and lists only 43 valid genera for Scoliidae. While Argaman's division of the family into 143 genera is not supported by phylogenetic analysis or proper diagnosis, the family obviously is very diverse and in need of a generic revision based on a phylogeny.
64. Argaman 1996; Osten 2005; Zhang 2006.
65. Gorbatovskij & Lelej 1998; Rasnitsyn 2000.
66. Kimsey 1991; Kimsey 2006; Engel *et al*. 2009.
67. Carpenter & Rasnitsyn 1990; Sarmiento & Carpenter 2006; Brothers & Rasnitsyn 2008.
68. http://research.calacademy.org/ent/catalog_sphecidae.
69. Michener 2007; Michez *et al*. 2012; Ascher & Pickering 2012.
70. http://research.calacademy.org/ent/catalog_sphecidae.
71. Michener 2007; Michez *et al*. 2012; Ascher & Pickering 2012.
72. Michener 2007; Michez *et al*. 2012; Ascher & Pickering 2012.
73. http://research.calacademy.org/ent/catalog_sphecidae.
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76. Michener 2007; Michez *et al*. 2012; Ascher & Pickering 2012.
77. Michener 2007; Michez *et al*. 2012; Ascher & Pickering 2012.
78. Michez *et al*. 2012.
79. Michener 2007; Michez *et al*. 2012; Ascher & Pickering 2012.
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