Pollinator Academy

Genus: *Nomada*

Female

Male

Genus: *Nomada* Scopoli, 1770

Clade: Anthophila

Family: Apidae

SubFamily: Nomadinae

Tribe: Nomadini

Number of species of this genus found in Europe: 222

Morphology & diagnosis

The Nomadini range in size from small to large (4-17mm) and have a long tongue. They have three submarginal cells, being the first larger than the combination of the other two. The females of the genus are clearly differentiable from the rest of the bees because their appearance is more wasp-like, as their common names show, with bands of colour in the abdomen: red, orange, yellow and black bands. Even within a species, the tegument can show a strong variability in the colour. The shape of the abdomen is relatively conic and narrow, and the widest segments of the abdomen are the segments 3 and 4. Both sexes show a limited pilosity, with most species being almost glabrous, but still some species show characteristic hair bands at the rear end of the tergites with a coloration ranging from the russet, to brown or white. The sexual dimorphism is clearly differentiable in the field, but it could be difficult for novices: an important trait in the differentiation between sexes is the colour of the eyes (i.e. the males show pale green to azur eyes, while the females have dark reddish eyes). This trait is clearly visible on macrophotographies, and can aid in sex differentiation.

Summary of distinctive traits

- Wasp-like bees, almost hairless
- 3 submarginal cells (most of the time) (a)
- Submarginal cell 1 larger than submarginal cells 2 + 3, submarginal cells 2 and 3 of equivalent size (a)
- Marginal cell pointed toward the apex (b)
- Long mouthpart morphology (c)

(a) *Nomada emarginata* Male

(b) *Nomada emarginata* Male

(c) *Nomada corcyraea* Female

General comments on identification to species level

Identification to species level in this genus involve multiple criteria. For the males, the main character to consider is the genitalia, or sometimes how the setae of the ventral surface of the legs are organized or structured. For the females, the first examen should focus on the labrum and mandibles. Therefore, to prepare the specimens for identification, the labrum should be clearly visible and the mandibles should be open to observe their structure and their tips (is important to observe if they are simple or bifid). Moreover, during the preparation of the specimens the antennae have to be made clearly visible and spread, as long as the sternites and the short spines on the tip of the hind tibias.

Morphologically similar genera, and how to distinguish them

Several bees with 3 submarginal cells have wasp-like appearance and can be confused with Nomada when looked at superficially.

- ***Nomada* - *Epeolus, Triepeolus, Epeoloides, Ammobates, Ammobatoides, Biastes, Chiasmognathus, Parammobatodes, Pasites & Schmiedeknechtia***.
  Nomada species have a marginal cell pointed near the wing margin. The other

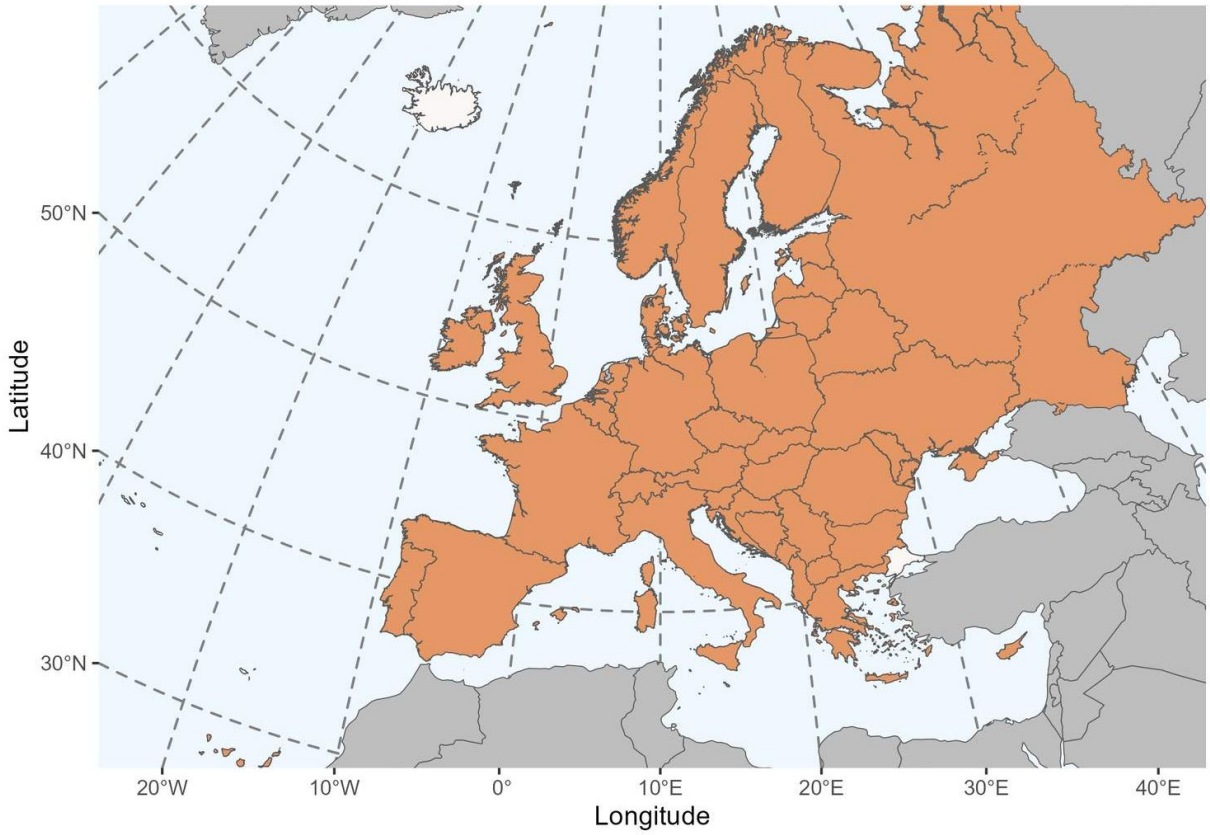
genera have a marginal cell distinctly oval or truncated at the apex.

- ***Nomada - Sphecodes, Ceylalictus, Nomioides and Rophites***
  Nomada species have a straight basal vein. In the field, *Nomada* species can be recognized by their flight behaviour, they fly slowly and low.
  Shecodes, Ceylalictus, Nomioides and *Rophites* species have a distinctly curved basal vein. The females of *Sphecodes* walk more.

- ***Nomada - Andrena, Hylaeus & Colletes***
  Nomada species have a 2nd metasomal segment clearly wider than the first one and 'long tongue' mouthparts.
  Andrena, Hylaeus & Colletes species have a first and second metasomal segment of equivalent width, and 'short tongue' mouthparts

Geographical distribution and global diversity

This genus has an extremely wide distribution. At the global scale they are mostly diversified on the Holartic area, being the Mediterranean one of the most species-rich regions. They have a lower diversity in the Neotropical region. This is the genus of brood parasitic bees with more species in the world (more than 800 species described and validated). The latest study conducted in Europe recorded 208 species (Smit, 2018), and currently there are 214 species found in European territory. There has been done one phylogenetic analysis of the genus at the global scale, made by Alexander (1994), who subdivided the genus *Nomada* into more or less 15 groups of species according to their geographical and morphological affinities; therefore to date no subgenus has formally been recognized.



Presence in Europe

Albania, Andorra, Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom.

Biology

Seasonal life cycle

Most species of the genus are brood parasites associated with hosts normally active in spring: they fly from the end of the winter in the South, all the way to the beginning of

summer. Certain species are nevertheless linked to summer-flying species, thus they can be seen up to the end of summer in certain regions, particularly heather moorland where the species *Nomada rufipes* is a parasite of the ground-dwelling species *Andrena fuscipes*, a solitary bee oligolectic on heather (Ericaceae). Some species are bivoltine, the second generation in most cases being of smaller size than the first.

Reproduction

As in most cases in solitary bees, the copula occurs close to where the individuals emerge, commonly on vegetation or on the ground (Bergmark et al., 1984), and it lasts a few seconds. In certain species of the genus, the males roll the antennae with the antennae of the females during the copula. This behaviour is thought to precede the chemical communication by the interface of the antennae of the two sexes, and thus this could be a potential element in the reproductive isolation between species.

Nesting

The *Nomada* never build their own nest: they exclusively depend on ground-nesting bees and their nests for reproduction. Then, the females are constantly patrolling the area searching nests of their host species. Once the hosts leave their nest to forage, they infiltrate into the host nests where they lay an egg on the reserves of food that the host has prepared for its own descendants. Surprisingly, it looks like the larvae of *Nomada* and/or the adult females can kill any developed larvae from the host species to avoid competition for the stored resources within the nest. As most brood parasitic bees, have a tough cuticle and a strong sting which can potentially use against their hosts if they encounter each other in the nest or in the vicinity. In the case that the hosts are solitary, it is very difficult to find *Nomada* in the environment, they are very difficult to locate. However, in the case that the hosts are gregarious and nest close to each other, it is easy to observe multiple females of *Nomada* in the area for days, sometimes up to weeks.

Host species

The *Nomada* are in most cases associated with solitary ground-dwelling bees of the genus *Andrena* (Andrenidae). Nevertheless, many species of *Nomada* are also associated with the genera *Lasioglossum* (Halictidae), *Panurgus* (Andrenidae), *Melitta* (Melittidae) or *Eucera* (Apidae).

Floral preferences

As brood parasitic bees, the females of *Nomada* do not actively collect pollen to feed their larvae. Males and females are then seen visiting a diversity of flowers from which they collect the nectar and a small quantity of pollen for their own consumption. However, the hosts of certain *Nomada* species are oligolectic. Thus, the involved *Nomada* are therefore also automatically specialized on these plants, as their larvae only consumes the food resources accumulated by their hosts.

Sleeping behaviour

The bees sleep hidden in flowers at night, or they bite to plant parts, such as stems and leaves.

Type species: *Apis ruficornis* Linnaeus, 1758, by designation of Curtis, 1832

Synonyms: *Hypochrotaenia* Holmberg, 1886; *Nomadita* Mocsàry, 1894; *Lamproapis* Cameron, 1902; *Centrias* Robertson, 1903; *Cephen* Robertson, 1903; *Gnathias* Robertson, 1903; *Holonomada* Robertson, 1903; *Xanthidium* Robertson, 1903; *Phor* Robertson, 1903; *Nomadosola* Rohwer, 1911; *Polybiapis* Cockerell, 1916; *Acanthonomada* Schwarz, 1966.

Etymology: from the latin word *Nomades*, plural of *Nomas* meaning itinerant or wandering, with no fixed abode, in reference to the parasitic behaviour of these solitary bees which do not have their own nest but roam around their living environment seeking nests of their host species to exploit

Common names:
FR: les nomades
GER: der Wespenbienen (=wasp bees)

NL: de wespbijen (=wasp bees)
EN: the Nomad bee

List of species found in Europe:

1. *Nomada accentifera* Pérez, 1895
2. *Nomada achaica* Schwarz & Smit, 2020
3. *Nomada acutispina* Schwarz & Smit, 2018
4. *Nomada aeginaica* Schwarz & Smit, 2018
5. *Nomada agrestis* Fabricius, 1787
6. *Nomada alboguttata* Herrich-Schäffer, 1839
7. *Nomada alpigena* Schwarz, Gusenleitner & Mazzucco, 1999
8. *Nomada argentata* Herrich-Schäffer, 1839
9. *Nomada argentea* (Schwarz, 1966)
10. *Nomada ariasi* Dusmet y Alonso, 1913
11. *Nomada armata* Herrich-Schäffer, 1839
12. *Nomada arrogans* Schmiedeknecht, 1882
13. *Nomada atroscutellaris* Strand, 1921
14. *Nomada babiyi* Schwarz & Standfuss, 2007
15. *Nomada baccata* Smith, 1844
16. *Nomada barcelonensis* Cockerell, 1917
17. *Nomada basalis* Herrich-Schäffer, 1839
18. *Nomada beaumonti* Schwarz, 1967
19. *Nomada bifasciata* Olivier, 1811
20. *Nomada bispinosa* Mocsáry, 1883
21. *Nomada blepharipes* Schmiedeknecht, 1882

22. *Nomada bluethgeni* Stöckhert, 1944

23. *Nomada bolivari* Dusmet y Alonso, 1913

24. *Nomada bouceki* Kocourek, 1985

25. *Nomada braunsiana* Schmiedeknecht, 1882

26. *Nomada breviceps* Schwarz, Smit & Ockermüller, 2019

27. *Nomada breviscapa* Schwarz & Smit, 2018

28. *Nomada cadiza* Schwarz & Gusenleitner, 2013

29. *Nomada calimorpha* Schmiedeknecht, 1882

30. *Nomada carnifex* Mocsáry, 1883

31. *Nomada caspia* Morawitz, 1895

32. *Nomada castellana* Dusmet y Alonso, 1913

33. *Nomada cherkesiana* Mavromoustakis, 1955

34. *Nomada collarae* Schwarz, 1964

35. *Nomada concolor* Schmiedeknecht, 1882

36. *Nomada confinis* Schmiedeknecht, 1882

37. *Nomada conjungens* Herrich-Schäffer, 1839

38. *Nomada connectens* Pérez, 1884

39. *Nomada corcyraea* Schmiedeknecht, 1882

40. *Nomada coronata* Pérez, 1895

41. *Nomada coxalis* Morawitz, 1877

42. *Nomada crenulata* Schwarz and Smit, 2018

43. *Nomada cretensis* Schulz, 1906

44. *Nomada cristata* Pérez, 1895

45. *Nomada cruenta* Schmiedeknecht, 1882
46. *Nomada cypria* Mavromoustakis, 1952
47. *Nomada cypricola* Mavromoustakis, 1955
48. *Nomada diacantha* Schwarz, 1981
49. *Nomada dira* Schmiedeknecht, 1882
50. *Nomada discedens* Pérez, 1884
51. *Nomada discrepans* Schmiedeknecht, 1882
52. *Nomada distinguenda* Morawitz, 1874
53. *Nomada dolosa* Mocsáry, 1883
54. *Nomada dubia* Eversmann, 1852
55. *Nomada duplex* Smith, 1854
56. *Nomada ebmeri* Schwarz & Smit, 2018
57. *Nomada ecarinata* Morawitz, 1888
58. *Nomada elsei* Schwarz & Smit, 2018
59. *Nomada emarginata* Morawitz, 1877
60. *Nomada eos* Schmiedeknecht, 1882
61. *Nomada errans* Lepeletier, 1841
62. *Nomada erythrocephala* Morawitz, 1871
63. *Nomada fabriciana* (Linnaeus, 1767)
64. *Nomada facilis* Schwarz, 1967
65. *Nomada fallax* Pérez, 1913
66. *Nomada femoralis* Morawitz, 1869
67. *Nomada fenestrata* Lepeletier, 1841

68. *Nomada ferruginata* (Linnaeus, 1767)

69. *Nomada filicornis* Schwarz & Smit, 2018

70. *Nomada flava* Panzer, 1798

71. *Nomada flavigenis* Schwarz & Standfuss, 2007

72. *Nomada flavilabris* Morawitz, 1875

73. *Nomada flavinervis* Brullé, 1832

74. *Nomada flavoguttata* (Kirby, 1802)

75. *Nomada flavopicta* (Kirby, 1802)

76. *Nomada fucata* Panzer, 1798

77. *Nomada fulvicornis* Fabricius, 1793

78. *Nomada furva* Panzer, 1798

79. *Nomada furvoides* Stöckhert, 1943

80. *Nomada fusca* Schwarz, 1986

81. *Nomada fuscicornis* Nylander, 1848

82. *Nomada gageae* Schwarz & Smit, 2018

83. *Nomada glaberrima* Schmiedeknecht, 1882

84. *Nomada glaucopis* Pérez, 1890

85. *Nomada goodeniana* (Kirby, 1802)

86. *Nomada gransassoi* Schwarz, 1986

87. *Nomada gredosiana* Schwarz & Gusenleitner, 2013

88. *Nomada gribodoi* Schmiedeknecht, 1882

89. *Nomada gruenwaldti* Schwarz, 1979

90. *Nomada guichardi* Schwarz, 1981

91. *Nomada guttulata* Schenck, 1861
92. *Nomada halophila* Wood, 2022
93. *Nomada hera* Schwarz, 1965
94. *Nomada hirtipes* Pérez, 1884
95. *Nomada hispanica* Dusmet y Alonso, 1913
96. *Nomada hungarica* Dalla Torre & Friese, 1894
97. *Nomada illustris* Schmiedeknecht, 1882
98. *Nomada immaculata* Morawitz, 1874
99. *Nomada imperialis* Schmiedeknecht, 1882
100. *Nomada incisa* Schmiedeknecht, 1882
101. *Nomada insignipes* Schmiedeknecht, 1882
102. *Nomada integra* Brullé, 1832
103. *Nomada italica* Dalla Torre & Friese, 1894
104. *Nomada jaramensis* Dusmet y Alonso, 1913
105. *Nomada kervilleana* Pérez, 1913
106. *Nomada kohli* Schmiedeknecht, 1882
107. *Nomada kornosica* Mavromoustakis, 1958
108. *Nomada kriesteni* Schwarz & Gusenleitner, 2013
109. *Nomada lamellata* Schwarz, 1977
110. *Nomada lapillula* Schwarz & Smit, 2018
111. *Nomada lateritia* Mocsáry, 1883
112. *Nomada lathburiana* (Kirby, 1802)
113. *Nomada laticrus* Mocsáry, 1883

114. *Nomada legoffi* Dufrêne, 2021

115. *Nomada leucophthalma* (Kirby, 1802)

116. *Nomada limassolica* Mavromoustakis, 1955

117. *Nomada linsenmaieri* Schwarz, 1974

118. *Nomada litigiosa* Gribodo, 1893

119. *Nomada lucidula* Schwarz, 1967

120. *Nomada lutea* Eversmann, 1852

121. *Nomada luteipes* Schwarz & Smit, 2018

122. *Nomada maculicornis* Pérez, 1884

123. *Nomada mandibularis* Schwarz & Gusenleitner, 2013

124. *Nomada marshamella* (Kirby, 1802)

125. *Nomada mauritanica* Lepeletier, 1841

126. *Nomada mavromoustakisi* Schwarz & Standfuss, 2007

127. *Nomada maxschwarzi* Smit, 2018

128. *Nomada melanopyga* Schmiedeknecht, 1882

129. *Nomada melathoracica* Imhoff, 1834

130. *Nomada merceti* Alfken, 1909

131. *Nomada minuscula* Noskiewicz, 1930

132. *Nomada mitaii* Proshchalykin, 2010

133. *Nomada mocsaryi* Schmiedeknecht, 1882

134. *Nomada moeschleri* Alfken, 1913

135. *Nomada montarco* Álvarez Fidalgo, 2023

136. *Nomada moravitzii* Radoszkowski, 1876

137. *Nomada mutabilis* Morawitz, 1870

138. *Nomada mutica* Morawitz, 1872

139. *Nomada nausicaa* Schmiedeknecht, 1882

140. *Nomada nesiotica* Mavromoustakis, 1958

141. *Nomada nigrifrons* Schwarz & Smit, 2018

142. *Nomada nigrilabris* Schwarz & Smit, 2018

143. *Nomada nigrospina* Schwarz & Smit, 2018

144. *Nomada nigrovaria* Pérez, 1895

145. *Nomada nobilis* Herrich-Schäffer, 1839

146. *Nomada noskiewiczi* Schwarz, 1966

147. *Nomada numida* Lepeletier, 1841

148. *Nomada obscura* Zetterstedt, 1838

149. *Nomada obtusifrons* Nylander, 1848

150. *Nomada oculata* Friese, 1921

151. *Nomada opaca* Alfken, 1913

152. *Nomada opaciformis* Schwarz & Smit, 2018

153. *Nomada oralis* Schwarz, 1981

154. *Nomada orbitalis* Pérez, 1913

155. *Nomada ottomanensis* Schwarz & Smit, 2018

156. *Nomada pallispinosa* Schwarz, 1967

157. *Nomada panurgina* Morawitz, 1869

158. *Nomada panzeri* Lepeletier, 1841

159. *Nomada pastoralis* Eversmann, 1852

160. *Nomada pectoralis* Morawitz, 1877

161. *Nomada piccioliana* Magretti, 1883

162. *Nomada piliventris* Morawitz, 1877

163. *Nomada pilosa* Schwarz & Gusenleitner, 2017

164. *Nomada platythorax* Schwarz, 1981

165. *Nomada pleurosticta* Herrich-Schäffer, 1839

166. *Nomada polemediana* Mavromoustakis, 1957

167. *Nomada posthuma* Blüthgen, 1949

168. *Nomada priesneri* Schwarz, 1965

169. *Nomada propinqua* Schmiedeknecht, 1882

170. *Nomada pruinosa* Pérez, 1895

171. *Nomada pulchra* Arnold, 1888

172. *Nomada pygidialis* Schwarz, 1981

173. *Nomada pyrgosica* Schwarz & Smit, 2018

174. *Nomada radoszkowskii* Łoziński, 1922

175. *Nomada rhenana* Morawitz, 1872

176. *Nomada roberjeotiana* Panzer, 1799

177. *Nomada rostrata* Herrich-Schäffer, 1839

178. *Nomada rubiginosa* Pérez, 1884

179. *Nomada rubricollis* Schwarz, 1967

180. *Nomada rubricosa* Eversmann, 1852

181. *Nomada rubricoxa* Schwarz, 1977

182. *Nomada rubriventris* Schwarz, 1981

183. *Nomada ruficornis* (Linnaeus, 1758)

184. *Nomada rufipes* Fabricius, 1793

185. *Nomada rufoabdominalis* Schwarz, 1963

186. *Nomada sabulosa* Radoszkowski, 1876

187. *Nomada sanguinea* Smith, 1854

188. *Nomada scheuchli* Schwarz & Standfuss, 2007

189. *Nomada serricornis* Pérez, 1884

190. *Nomada sexfasciata* (Panzer, 1799)

191. *Nomada sheppardana* (Kirby, 1802)

192. *Nomada sicula* Schwarz, 1974

193. *Nomada signata* Jurine, 1807

194. *Nomada similis* Morawitz, 1872

195. *Nomada simulatrix* Schwarz & Smit, 2018

196. *Nomada smiti* Schwarz, 2018

197. *Nomada standfussi* Schwarz, 2007

198. *Nomada stigma* Fabricius, 1804

199. *Nomada stoeckherti* Pittioni, 1951

200. *Nomada striata* Fabricius, 1793

201. *Nomada subcornuta* (Kirby, 1802)

202. *Nomada succincta* Panzer, 1798

203. *Nomada sybarita* Schmiedeknecht, 1882

204. *Nomada symphyti* Stöckhert, 1930

205. *Nomada tarsalis* Schwarz & Smit, 2018

206. *Nomada tenella* Mocsáry, 1883

207. *Nomada teunisseni* Schwarz & Smit, 2018

208. *Nomada thersites* Schmiedeknecht, 1882

209. *Nomada tormentillae* Alfken, 1901

210. *Nomada trapeziformis* Schmiedeknecht, 1882

211. *Nomada tridentirostris* Dours, 1873

212. *Nomada trispinosa* Schmiedeknecht, 1882

213. *Nomada tuberculifera* Schwarz & Smit, 2018

214. *Nomada umbrosa* Schmiedeknecht, 1882

215. *Nomada unica* Schwarz & Smit, 2018

216. *Nomada unispinosa* Schwarz, 1981

217. *Nomada verna* Schmiedeknecht, 1882

218. *Nomada villosa* Thomson, 1870

219. *Nomada warnckei* Schwarz & Smit, 2018

220. *Nomada yarrowi* Schwarz, 1981

221. *Nomada yermasoyiae* Schwarz, Smit & Gusenleitner, 2018

222. *Nomada zonata* Panzer, 1798

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Attributions

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