

Biological notes and distribution of *Leiopus* Audinet-Serville, 1835 (Coleoptera, Cerambycidae) in Norway

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The distribution of *Leiopus nebulosus* (Linnaeus, 1758) and *L. linnei* Wallin, Nylander & Kvamme, 2009, in Norway is discussed and depicted. Observations of host trees as well as information of substrate qualities and phenology are included.

Key words: Cerambycidae, Lamiinae, Acanthocinini, *Leiopus nebulosus*, *Leiopus linnei*, Norway, distribution, host trees.

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Introduction

Before 2009 *Leiopus nebulosus* (Linnaeus, 1758) was considered to be one species, but has been shown to consist of two sibling species (Wallin *et al.* 2009). *L. nebulosus* was documented from Sweden, Denmark and Finland, while *L. linnei* was shown to be in Sweden and Denmark. Both species were only briefly mentioned from Norway (Wallin *et al.* 2009). In addition, both species have been documented from many other European countries, as far south as the Mediterranean (Wallin *et al.* 2009, Gutowski *et al.* 2010). In this paper, we discuss the distribution in Norway in detail. The host tree preferences, choice of substrate and phenology is also documented and discussed. A third species, *L. punctulatus* (Paykull, 1800) occurs in Sweden and Finland, but has, so far, not been reported from Norway (Ehnström & Holmer 2007, Silfverberg 2010).

Material and methods

All the examined specimens have been determined by the authors according to the description and identification key provided by Wallin *et al.* (2009). Records mentioned in literature have been omitted when no reference specimen(s) have been available for examination. When no date of collection is given, we refer to the year of death of the collector as mentioned in Sømme (2004).

Specimens from the following collections have been examined: The collection of Frode Ødegaard (Trondheim) (CFØD), Oddvar Hanssen (Trondheim) (COHA), Sindre Ligaard (Vestby) (CSLI), The collection of Torstein Kvamme (Ås) (CTKV) and Natural History Museum, Tøyen, University of Oslo (NHMO).

Results

Examination of specimens shows that the species have been recorded from the following localities (summarized on Figures 3 and 4).

Leiopus nebulosus (Linnaeus, 1758) (Figure 1)

Material: Norway (no locality name) before 1884, 2 exx., Leg. Esmark, NHMO; Norway (no locality name) before 1961, 1 ex., Leg. T. H. Schøyen, NHMO (from the collection of Bioforsk); Ø, Moss: Jeløya (EIS 19) 10.VIII.1996, 2 exx., Leg. F. Ødegaard, CFØD; Råde: Tasken (EIS 19) 13.III.1896, 1 ex. Leg. probably Wosleff according to E. Strand, NHMO; Fredrikstad (Onsøy): Rauøy (EIS 19) 19.VIII.1960, 1 ex., [from *Quercus* sp.], Leg. A. Bakke, NHMO; AK, Bærum, Stabæk (=Stabekk) (EIS 28) 21.VII.1852, 1 ex., Leg. Siebke, NHMO; Nesodden (EIS 28) before 1875, 1 ex., Leg. Siebke, NHMO; Kr.nia (=Kristiania = Oslo) before 1884, 1 ex., Leg. probably Siebke or Esmark, NHMO; BØ, Hurum (EIS 28) 18.VI.1893 [month unclearly written on label], 1 ex., Leg. Warloe, NMHO; VE, Tønsberg: Jarlsberg (EIS 19) 9.VI.1992, 1 ex., Leg. F. Ødegaard, CFØD; TEY, Kragerø: Jomfruland (EIS 11) 25.VI.1992, 1 ex., Leg. S.O. Hansen, CFØD; Kragerø: Jomfruland (EIS 11) 14.VI.2004, 1 ex., Leg. F. Ødegaard, CFØD; Kragerø: Knipenheia (EIS 11) 14.VI.2004, 1 ex., Leg. F. Ødegaard, CFØD; Kragerø: Jomfruland (EIS 11) 20.VI.1993, 3 exx., Leg. B. Sagvolden, NHMO; AAY, Birkenes (EIS 6) 8.V.1961, 1 ex. [reared from *Quercus* sp.], Leg. E. Aamlid, NHMO; Birkenes (EIS 6) 10.V.1961, 2 exx. [reared from *Quercus* sp.], Leg. E. Aamlid, NHMO; Birkenes (EIS 6) 15.V.1961, 1 ex. [reared from *Quercus* sp.], Leg. E. Aamlid, CTKV; Birkenes (EIS 6) 19.V.1961, 2 exx. [reared from *Quercus* sp.], Leg. E. Aamlid, NHMO; VAY, Kristiansand: Bråvann (EIS 2) 11.VIII.1997, 1 ex., Leg. Kai Berggren, CTKV; Kristiansand: Nedre Timenes (EIS 2) 7–14.VII.2001, 1 ex., Leg. Kai Berggren, CTKV; Sør-Audnedal (now in Lindesnes Municipality): Vigeland (EIS 1) 26.VI.1962, 1 ex. [from *Quercus* sp.], Leg. Ø. Austarå, NHMO; Lyngdal: Nebbdal (EIS 4) 30.VI.1994, 1 ex., Leg. S. Ligaard, CSLI; Mandal omg. (= surroundings)



FIGURE 1. Female of *Leiopus nebulosus* (Linnaeus, 1758). Photo: K. Sund.

(EIS 2) 17.VIII.1923, 1 ex., Leg. Münster, NHMO; Vennesla (EIS 5), before 1923, 1 ex., Leg. probably Røyskeland, Ex. Coll. Ullmann, NHMO; Vennesla (EIS 5) 31.VII.1915, 1 ex., Leg. A. R. (probably Røyskeland), NHMO; ON, Nord-Fron: Stordalsberget (EIS 62) 15.VIII.1996, 1 ex., Leg. F. Ødegaard, [Note: the ex. is incorrectly labelled Hesteskobakken], CFØD; SFI, Sogndal: Fatlaberget (EIS 50) 3.VI–10.VII.1989, 1 ex. [from window trap], Leg. O. Hanssen, COHA; Luster: Ornes (EIS 51) 12.VIII.1989, 1 ex. [hatched from *Tilia* IV.1990], Leg. O. Hanssen, COHA; Leikanger: Grindestrondi (EIS 50) 20.VII.1989, 1 ex., Leg. O. Hanssen, COHA; MRY, Sula: 3.3km east of Sulesund (EIS 76) (UTM 32VLQ568219) 21.VII.2007, 1 ex., Leg. O. Hanssen, COHA; MRI, Nesset: Øvre Vike (EIS 78) 13.VII.1999, 1 ex., Leg. F. Ødegaard, CFØD; Sunndal: Hoelsand (EIS 78) 1.VII.1994, 1 ex., Leg. F. Ødegaard, CFØD; Sunndal:

Oppdølstranda (EIS 85) 22.VI.1985, 3 exx., Leg. O. Hanssen, COHA; Sunndal: Oppdølstranda (EIS 85) 23.VI.1985, 1 ex., Leg. O. Hanssen, COHA; Sunndal: Oppdølstranda (EIS 85) 15.VIII.1987, 1 ex., Leg. O. Hanssen, COHA; Sunndal: Gravem (EIS 79) 12.VII–7.IX.1986, 1 ex. [window trap], Leg. O. Hanssen, COHA; Sunndal: Flåstranda (EIS 85) 1990, 1 ex. [hatched from *Corylus* III.1990], Leg. O. Hanssen, COHA; Sunndal: Ottem (EIS 79) 23.VI.1985, 1 ex., Leg. O. Hanssen, COHA; **STI**, Melhus: Melhus s (EIS 92) (Ø563705 – N7017534) 4.VII.2007, 1 ex., Leg. F. Ødegaard, CFØD; Trondheim (EIS 92) 21.VI.1991, 1 ex. [in a car], Leg. F. Ødegaard, CFØD; Trondheim: Byneset, Almlil (EIS 92) (UTM Ø560898 N7024952) 2.VII.2007, 1 ex., Leg. F. Ødegaard, CFØD.

***Leiopus linnei* Wallin, Nylander & Kvamme, 2009** (Figure 2)

Material: Ø, Rygge: Telemarkslnd (=Telemarkslunden) (EIS 19) 17.VI–21.VII.1992, 1 ex., Leg. L.O. Hansen & G. Wahlberg, NHMO; **AK**, Kristiania (=Oslo) (EIS 28), 1 ex., Leg. Esmark, NHMO; Ås: Ås (EIS 28) 23.V.1991, 1 ex., Leg. E. Christiansen, NHMO; Oslo: Bygdøy, Hengsenga (EIS 28) (UTM wgs84, 32V NM 9346 4307) 27.VI–25.VII.2006, 1 ex. [window trap in broadleaved forest patch, from *Tilia*], Leg. S. Olberg & A. Endrestøl [Note: the trap was mounted on a *Tilia*, but this is not necessarily the host tree], NHMO; Oslo: Hovedøya, Store Østre Krutthus (EIS 28) (UTM wgs84, 32V NM 9731 4096) 19.VI–27.VII.2006, 1 ex. [Malaise-trap, slope SW], Leg. S. Olberg & A. Endrestøl, NHMO; Frog: Blylaget (EIS 28) (UTM wgs84, 32V NM 961 265) 02.VII.2006, 1 ex., Leg. Ole Lønnve, NHMO; Ås: Ås (EIS 28) 15.IV.1977, 3 exx. [reared from *Quercus robur*], Leg. T. Kvamme, CTKV; Ås: Ås (EIS 28) 18.IV.1977, 1 ex. [reared from *Quercus robur*], Leg. T. Kvamme, CTKV; Ås: Ås (EIS 28) 22.IV.1977, 3 exx. [reared from *Quercus robur*] [one paratype], Leg. T. Kvamme, CTKV; Oslo: Bygdøy, Hengsenga (EIS 28) 25.II.1989, 1 ex. [ex larva], Leg. S. O. Hansen, CFØD; Oslo: Bygdøy (EIS 28) 28.VI.2006, 1 ex., Leg. F. Ødegaard, CFØD; Oslo: Ekebergskråningen (SE) (EIS 28) (UTM wgs84, 32V NM 9889 4020) 29.V–25.



FIGURE 2. Female of *Leiopus linnei* Wallin, Nylander & Kvamme, 2009. Photo: K. Sund.

VII.2007, 1 ex. [Malaise-trap (progly/eth)], Leg. A. Endrestøl & L. O. Hansen, NHMO; Oppegård (EIS 28) V.1918, 1 ex., Leg. Münster, NHMO; Drøbak (EIS 28) 1.VII.1899, 1 ex., Leg. Warloe, NHMO; Vestby: Son (EIS 19) 6.VII.2000, 1 ex. [window-trap: oak (SW)], Leg. Lars Ove Hansen, NHMO; Vestby: Son, Kolås (EIS 19) VI–VII.2000., 1 ex. [window-traps: Oak (SW)], Leg. L.O. Hansen, NHMO; **VE**, Larvik: Pauler (EIS 17) 29.V.1988 [ex larva IV.1988, imago 29.V.1988], 2 exx. [reared from *Quercus* sp.], Leg. S.O. Hansen, CFØD; Larvik: Løveskogen (EIS 19) 25.V.1988, 1 ex., Leg. S.O. Hansen, CFØD; Stokke: Melsomvik (EIS 19) 15.VI–08.VIII.2005, 1 ex. [Malaise-trap], Leg. A. Sverdrup-Thygeson, CFØD; Hof: Sæteråsen (EIS 28) VIII.1991, 1 ex.,

Leg. S. Ligaard, CSLI; Stokke: Brunstad (EIS 19) 18.VI.1989, 1 ex., Leg. B. Sagvolden, NHMO; Nøtterøy: Østre Bolærne (EIS19) (UTM 32V NL 839 640) V.2006, 2 exx. [light-trap ("N")], Leg. Berggren & Voith, NHMO; **TEY** Drangedal: Skultrevassåsen Reservat (EIS 11) 15.VI.1992, 1 ex. [Malaise-trap], Leg. A. Bakke, NHMO; Drangedal: Skultrevassåsen Reservat (EIS 11) 13.VI.1993, 3 exx. [Malaise-trap], Leg. A. Bakke, NHMO; Drangedal: Skultrevassåsen Reservat (EIS 11) 25.VIII.1994, 2 exx. [Malaise-trap], Leg. A. Bakke, NHMO; Drangedal: Skultrevassåsen Reservat (EIS 11) 8.VIII.1995, 1 ex. [Malaise-trap], Leg. A. Bakke, NHMO; Drangedal: Skultrevassåsen Reservat (EIS 11) 23.VII.1996, 1 ex., Leg. A. Bakke, NHMO; Drangedal: Rønnoomsdal (EIS 17) 3.VIII.1999, 1 ex., Leg. A. Bakke, NHMO; Drangedal: Rønnoomsdal (EIS 17) 26.VI–3.VIII.1999, 1 ex., Leg. A. Bakke, NHMO; Kragerø: Grønåsliane (EIS 11) 15.VI.2004, 1 ex., Leg. F. Ødegaard, CFØD; Kragerø (EIS 11) before 1847, 1 ex., Leg. Berg, NHMO; Skien: Ulvskollen (EIS 18) VI–VII.1996, 1 ex., Leg. S. Ligaard, CSLI; **AAV** Arendal: Tromøy, Bjelland (EIS 6) 7.VII.1961, 1 ex., Leg. A. Bakke, NHMO; Arendal: Tromøy, Bjelland (EIS 6) 10.VI.1994, 1 ex. [reared from *Quercus* sp.], Leg. A. Bakke, NHMO; Tvedestrand: Laget (EIS 11) 24.VI.1981, 1 ex. [from *Quercus* sp.], Leg. T. Kvamme, CTKV; Risør: Rangleåsen (EIS 11) 07.III.1989 [ex. larva in branch of *Quercus* sp.], 1 ex., Leg. S.O. Hansen, CFØD; Risør: Rangleåsen (EIS 11) 18.III.1989 [ex. larva in branch of *Quercus* sp.], 1 ex., Leg. S.O. Hansen, CFØD; Risør: Laget (EIS 11) 9.VII.1984, 1 ex., Leg. O. Hanssen, COHA; Froland, Ripåsen (EIS 6) 29.VI.1996, 1 ex., S. Ligaard, CSLI; Gjerstad (EIS 11) VII.1991, 1 ex., Leg. S. Ligaard, CSLI; Gjerstad: Vardeheia (EIS 10) 3.VII–8.VIII.2004, 1 ex. [window trap], Leg. Klepsland & AL.(= A. Laugsand), NHMO; Grimstad, Reddalsvann (EIS 6) 9.VII.1989, 1 ex., Leg. K. Berggren, NHMO; Grimstad, Reddalsvann (EIS 6) 26.VI.1986, 1 ex., Leg. K. Berggren, NHMO; Risør (EIS 11) 08.VII.1917 + 05.VII.1909(?), 2 exx., Leg. Warloe, NHMO; **VAY** Kristiansand: Bråv (=Bråvann) (EIS 2) 1991, 1 ex., Leg. K. Berggren, NHMO; Kristiansand: Bråvann (EIS 2) 22.VIII.1996, 1 ex., Leg. K. Berggren, CTKV;

Kristiansand: Stangenes (EIS 2) 17.VII.1980, 5 exx. [Reared from mixed broadleaved wood], Leg. T. Kvamme, CTKV; Kristiansand: St.nes (=Stangenes) (EIS 2) 8.VIII.1982, 1 ex., Leg. S. Svendsen, NHMO; Kristiansand: St.nes (=Stangenes) (EIS 2) 10.VII.1982, 1 ex., Leg. S. Svendsen, NHMO; Kristiansand: Stangenes (EIS 2) 08.VIII.1983, 1 ex., Leg. K. Berggren, NHMO; Kristiansand: Grostøl (EIS 2) 20.VI.1983, 1 ex., Leg. S. Svendsen, CTKV; Kristiansand: Stangenes (EIS 2) 7.VI.1991, 1 ex., Leg. S. Svendsen, NHMO; Kristiansand: Karlsmoen (UTM 32 V MK 449 546) VII.2005, 1 ex. [light-trap], Leg. K. Berggren, NHMO; Farsund: Straumen (EIS 1) 13.VI.1999, 1 ex., Leg. K. Berggren, NHMO.

Discussion

Distribution. *L. linnei* has been found in coastal areas and inland lowland areas from Farsund in the south, towards the north and east, almost to the Swedish border (Figure 3). The pattern of records indicates that the distribution in Norway is limited to coastal and near coastal areas. *L. linnei* can be found in both inland and coastal areas in Sweden and Denmark (Wallin *et al.* 2009). We cannot exclude the possibility that the species may be found in Western Norway. When compared with the distribution in Sweden (Wallin *et al.* 2009) it is also possible that *L. linnei* occurs more to the north. However, new records are necessary to prove this.

L. nebulosus has a wider distribution (Figure 4). The southern part of the range overlaps with the distribution of *L. linnei*. The only true inland record is from Nord-Fron: Stordalsberget. The specimen is wrongly labelled Hesteskobakken. Many specimens from Stordalsberget or Stordalen have incorrectly been labelled Hesteskobakken, a common mistake made by many collectors (Oddvar Hanssen pers. comm., Frode Ødegaard pers. comm.). The specimens from Trondheim represent the northernmost records of the species (cf. Wallin *et al.* 2009).

Host trees. Several authors considered *L. nebulosus* (*sensu lato*) as a polyphagous species on deciduous trees. Conifers such as *Abies alba*,

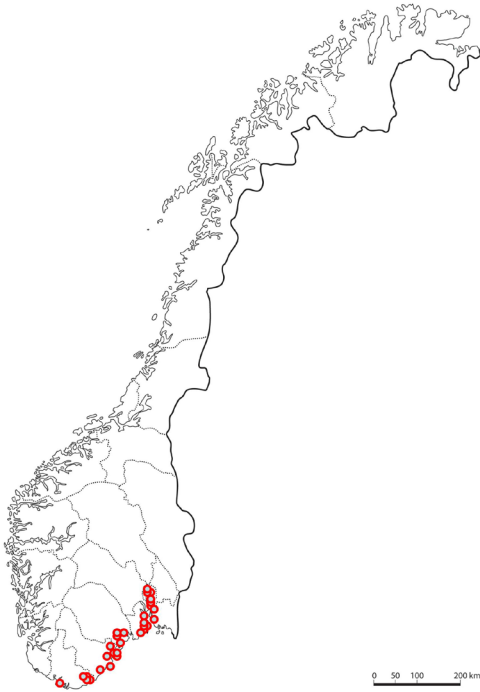


FIGURE 3. The distribution of *Leiopus linnei* Wallin, Nylander & Kvanne, 2009, in Norway. One open circle may represent several localities.

Picea abies and *Pinus* are also registered as host-trees (Freude *et al.* 1966, Bily & Mehl 1989, Cherepanov 1991, Bense 1995, Sama 2002, Böhme 2005, Ehnström & Holmer 2007).

New examinations of the specimens showed that *L. nebulosus* has been reared from *Quercus* and *Tilia* in Sweden, from *Juglans* in France and from *Ficus*, *Alnus*, *Fagus*, *Prunus* and *Corylus* in Italy. *Corylus avellana* appears to be the preferred host tree species in Scandinavia (Wallin *et al.* 2009). Gutowski *et al.* (2010) examined a large number of Polish specimens and list the following host trees: *Alnus glutinosa*, *Corylus avellana*, *Quercus robur*, *Padus avium*, *Tilia cordata* and *Picea abies*. In Norway, specimens have been reared from *Quercus*, but the host tree has not been specified to species. Specimens have also been reared from *Corylus* (= *avellana*) and *Tilia* (= *cordata*). The host tree species have been confirmed by the collector (O. Hanssen pers. com.).

In Poland, a long list of deciduous and also

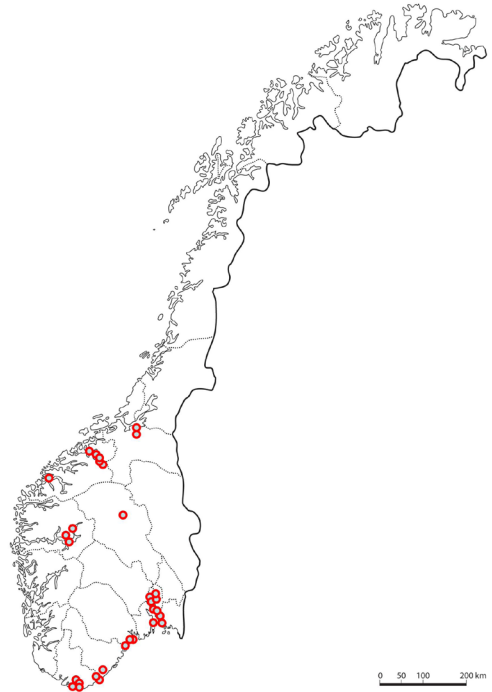


FIGURE 4. The distribution of *Leiopus nebulosus* (Linnaeus, 1758) in Norway. One open circle may represent several localities.

some conifers are listed as host trees for *L. linnei* (Gutowski *et al.* 2010): *Acer negundo*, *A. platanoides*, *A. pseudoplatanus*, *Aesculus hippocastanum*, *Alnus glutinosa*, *Carpinus betulus*, *Corylus avellana*, *Fagus sylvatica*, *Juglans regia*, *Malus domestica*, *Padus avium*, *Populus tremula*, *Quercus petraea*, *Q. robur*, *Q. rubra*, *Rhus typhina*, *Salix caprea*, *Sorbus aucuparia*, *Ulmus laevis* plus *Picea abies* and *Pinus sylvestris*. *L. linnei* is known to utilize *Quercus* spp. and *Acer* spp. in Sweden (Wallin *et al.* 2009). According to Bengt Andersson (pers. comm.), *L. linnei* has been reared from *Salix* spp. in Sweden. The majority of *L. linnei* specimens from specified host trees in Norway come from *Quercus* spp. *Quercus robur* is sometimes specified as host tree. One specimen has been sampled from *Tilia* with a window trap.

Few of the Norwegian specimens examined have information on host tree species. Many of the specimens have been collected in window traps and some of these specimens are labelled with a tree name. This may indicate that the trap has

been attached to, or mounted close to the specific tree species, and is not automatically information on a documented host tree (Arne Endrestøl pers. comm.). Imagines have often been sampled by chance and consequently no host tree information is mentioned. Although not documented in Norway, we assume it very likely that *Q. petraea* may be a host-tree like *Q. robur* since they have an overlapping distribution (Hultén 1971, Frivold 1994, Lid & Lid 2005) and since it is reared from *Q. petraea* in Poland (Gutowski *et al.* 2010).

The host tree preference is overlapping for *L. linnei* and *L. nebulosus*. We assume that the properties of the substrate are more important for differences in choice of habitat rather than the tree species. Studies of possible development of *Leiopus* in *Salix* spp., *Alnus* spp., *Populus tremula* and *Sorbus aucuparia* is of particular interest regarding the distribution of the beetles in the Scandinavian countries.

Substrate preferences and biology. *L. nebulosus* (sensu lato) develops in bark and wood of smaller dimensions, mainly twigs and branches, both standing and fallen trees (Ehnström & Axelsson 2002). Ehnström & Holmer (2007)

write that the preferred dimensions are smaller than 5cm in diameter.

Our experiences so far show that *L. linnei* lives in wood with thicker bark while *L. nebulosus* prefers thinner bark. This also indicates that *L. linnei* inhabits relatively thicker branches and stems compared to *L. nebulosus*. Also Gutowski *et al.* (2010) indicate smaller dimensions since both species most often has been reared from branches and twigs, but no clear differences are documented. Further, *L. linnei* utilizes wood with relatively higher moisture content than *L. nebulosus* (cf. Wallin *et al.* 2009). It is uncertain if this influences the choice of fallen or standing wood, but Gutowski *et al.* (2010) mention only *L. linnei* from fallen branches. This is in agreement with the assumption that *L. nebulosus* prefers warmer and drier conditions than *L. linnei*.

The extent of larval galleries furrow the sapwood depending on the thickness of the bark. The pupal chamber is in the bark, the sapwood or a combination of these, also depending on the thickness of the bark (Wallin *et al.* 2009).

The development of *L. nebulosus* (sensu lato) takes one to two years (Bily & Mehl 1989, Bense

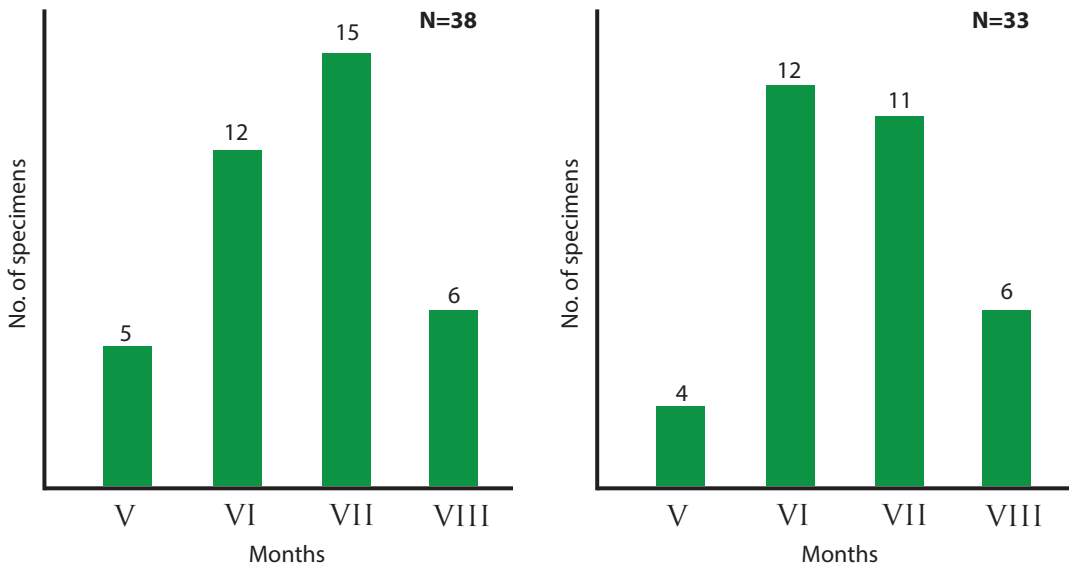


FIGURE 5. The activity period of adults of *Leiopus linnei* (Wallin, Nylander & Kvamme, 2009) (left) and *L. nebulosus* (Linnaeus, 1758) (right). The adults included have been observed or hatched under natural circumstances. When the month is not stated as one month, or the date of rearing of adult beetles has been done under artificial conditions, the records have been omitted.

1995, Ehnström & Axelsson 2002, Lindhe *et al.* 2010), but Ehnström & Holmer (2007) state that the development usually takes one year.

Phenology. The data shows that the highest numbers of adults of both species have been sampled in June and July (Figure 5). However, the data are strongly influenced by sampling methods and activity period of the entomologists, and are not statistically significant. The data only shows that both species should probably be regarded as high summer species. We have no indication of differences in activity periods.

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