

On *Deraeocoris lutescens* (Schilling) and *Pinalitus atomarius* (Meyer-Dür) in Sweden (Heteroptera: Miridae)

Per Lindskog(†) & Bert Viklund

Lindskog, P. & Viklund, B. 2000: On *Deraeocoris lutescens* (Schilling) and *Pinalitus atomarius* (Meyer-Dür) in Sweden (Heteroptera: Miridae). — Entomol. Fennica 11: 231–238.

Deraeocoris lutescens (Schilling) and *Pinalitus atomarius* (Meyer-Dür) are recently recorded as new to Sweden from the Stockholm area, even though both have previously been mistakenly listed from Sweden in the World catalogue of Miridae by Schuh (1995). The predatory species *D. lutescens*, first caught in 1990, is evidently a newcomer and a southern immigrant to the Swedish fauna, currently occurring commonly on its preferred host trees in city parks and suburban areas of Stockholm. *P. atomarius*, a phytophagous species associated with conifers, was collected, locally in large numbers, on silver fir, *Abies alba*. The latter, recognized here as the primary host-plant of *P. atomarius*, is not native to Sweden or neighbouring countries, but planted for ornamental purposes. Biological and distributional data on the two species are summarized and notes on their taxonomy and current classification are given. Literature records indicate a recent, northward expansion of some more southerly species of Heteroptera, mainly several arboreal Miridae, noted also in other parts of western Europe.

Per Lindskog (†) & Bert Viklund, Department of Entomology, Swedish Museum of Natural History, P.O. Box 50007, SE-104 05 Stockholm, Sweden.

Received 22 February 1999, accepted 15 September 2000

1. Introduction

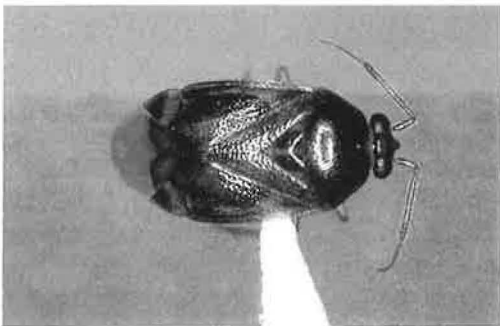
Recently, the two mirid species *Deraeocoris* (*Knightocapsus*) *lutescens* (Schilling) and *Pinalitus atomarius* (Meyer-Dür), have been collected in the Stockholm area in Sweden. These plant bugs have not previously been recorded from Sweden although both are indeed listed from this country in the recent World catalog of Miridae by Schuh (1995), therein referring to the checklist by Coulianos & Ossiannilsson (1976). However, the record is due to a misinterpretation as the listing of these species in the latter paper actually refers to locations from Denmark, not Sweden.

Deraeocoris lutescens, a predator on aphids and other small arthropods, has evidently established itself during recent years as quite a common species on various deciduous trees and shrubs in parks and forested areas in the city of Stockholm and its outskirts. Available data suggest that this species may have recently dispersed into southern Sweden (via Denmark) and expanded northwards at least to the Lake Mälaren valley in Middle Sweden (appr. Lat. 59° 30' N). *Pinalitus atomarius*, a phytophagous species associated with conifers, has been found within the same general area, locally in large numbers, on its apparent principal host-plant, *Abies alba* (silver fir), a tree not growing naturally in Sweden but plant-

ed for ornamental purposes. Distributional and other data on the two species are summarized below, and some illustrations are given to facilitate their identification and to assist in further clarifying their distribution in Sweden and elsewhere in Scandinavia. The authors are interested in being notified of new records of the present two species from Sweden and other northern countries.

Significant parts of the material of *D. lutescens* were collected in a light trap run by our colleague, Mr. Bert Gustafsson, at Naturhistoriska riksmuseet, Stockholm (Swedish Museum of Natural History), starting in 1990. The trap was placed on the roof of the museum building facing parts of the surrounding parklands and rocky outcrops with various deciduous trees (incl. oak, (*Quercus robur*) and Scots pine, (*Pinus sylvestris*)). This area (Norra Djurgården) is included in the recently established National City Park (the "Eco-Park") of Stockholm and the present trap was operated as part of an inventory survey of the insect fauna of the park. Specimens collected by this trap are referred to as "NHRS - light trap" in the list of records below. Abbreviations: Bert Gustafsson - BG, Per Lindskog - PG, Bert Viklund - BV (=collectors); Södermanland - Sö, Uppland - Up (=geographical provinces). The specimens are all deposited in the collection of the Naturhistoriska riksmuseet (NHRS).

2. *Deraeocoris* (*Knichtocapsus*) *lutescens* (Schilling, 1837)



Records from Sweden (chronologically). Up: Stockholm, NHRS - light trap, 1 f, 29/8/1990, BG; d:o NHRS, flying through open window at daytime into room, 1 m, 27/5/1991, PL; d:o, NHRS - light trap, 1 f, 21/8/1991, BG; d:o, 1 f, 23/5/1992; d:o, 1 f, 14/6/1992; d:o, 4 m, 1 f, 28/4/1993; Up: Stockholm, Norra Djurgården, Lappkärrret,

indoors, 1 m, 1/5/1993, B. Marttala; d:o nr Laduviken, on *Prunus padus*, 1 f, 4/5/1993, PL; d:o on *Acer platanoides*, 1 f; Up: Solna, Ulriksdal, Ulriksdals slottspark, on *Tilia*, 1 m, 14/9/1993, PL; Up: Ekerö, Drottningholm, Drottningholms slottspark, on *Tilia*, 3 f, 10/6/1996, PL & BV; Up: Stockholm, Kungsholmen, Kristineberg, in window-trap fixed on trunk of oak, 2 m above ground, 28/5 - 13/6/1996, L. Westerberg; Sö: Stockholm, Södermalm, Mosebacke terrass, flying at dusk nr. *Ulmus*, 1 f, 26/6/1996, PL.; Up: Solna, Bergshamra, at SIPRI, on *Tilia*, 1 f, 14/8/1996 PL & BV, Up: Danderyd, Stocksund, Skogshyddan, on *Abies alba*, 2 m, 3 f, 23/9/1996, PL & BV; d:o on *Quercus*, 1 m, 3 f; Up: Stockholm, Norra Djurgården, Lappkärrret, indoors, 1 m, 8/10/1996, BG.

Note: All records given above refer to localities either situated in central Stockholm or its periphery, including city parks and wooded suburban areas. As to the specimens collected (beated) by the authors (PL, BV) from different species of trees, the number of specimens collected, are in no way indicative of the abundance of the species in different instances, only being an arbitrary number of individuals secured as vouchers. In fact, in checking for the presence of the species at any one site, we frequently found numerous specimens immediately when beating on a suitable host plant (mainly *Tilia* and *Quercus*), *D. lutescens* appearing in several cases as the most abundant species of Miridae in the catch. Taken together, the records indicate that *D. lutescens* is currently quite a common species within the Stockholm area.

Additional records. Our friend Carl-Cedric Coulianos (Saltsjö-Boo, Sweden), alerted by the present finds of *D. lutescens*, looked for the species at some localities in south Sweden (south of Stockholm). He kindly informs us that he did find the species in the province of Östergötland as well as having seen a specimen found by another collector in Sweden's southernmost province (Scania). These finds refer to the past few years and will be detailed elsewhere (Coulianos in prep.).

General distribution. *D. lutescens* is widely and commonly distributed in mid- and southern latitudes of the western Palaearctic (Ehanno 1987a; Stichel 1956), including western and eastern Europe generally, the northern Mediterranean countries, Algeria, Morocco, parts of European Russia, the Caucasian countries, Turkey, Iraq, and Iran. Tamanini (1981) refers to *lutescens* as a 'medieuropeo-circummediterranean' species.

The records from Sweden reported here evidently represent the northernmost occurrences of the species confirmed in western Europe. Considering its distribution in the neighbouring countries of Sweden, it has been recorded once in Denmark as a single find from Fyn: Holstenhus, 11 August, 1970 (Andersen & Gaun 1974), but is widely distributed in northern Germany and Poland. No records are known from Norway, Finland, or the Baltic countries.

The recency and chronology of the Danish and Swedish finds of *D. lutescens* quoted here lend support to the view that this species have experienced a general northward range expansion during the past few decades. Still, the possibilities of an introduction of the species via imported plant material cannot be entirely excluded: young linden trees (*Tilia*) are sometimes imported from tree nurseries in Germany for planting in some Swedish towns. At any rate, it would seem highly unlikely that a significantly earlier occurrence of *D. lutescens* in the Stockholm area would have escaped the attention of collectors. In fact, this is one of the entomologically more extensively investigated areas of Sweden. The late Professor Frej Ossiannilsson, an eminent hemipterist and efficient collector, published an exhaustive list of the Heteroptera collected by him in the vicinity of the Naturhistoriska riksmuseet and adjacent areas throughout the field seasons of 1939-1941 (Ossiannilsson, 1942), *i.e.* one current focal area of *D. lutescens* in the Stockholm region. In not recording the latter species, his paper provides strong evidence to the absence of the species here some 60 years ago. Notably, that paper also includes a special mentioning of species collected by that author on *Tilia*, a favoured host plant of *D. lutescens*. To be sure, we collected on *Tilia* at one locality specifically mentioned by Ossiannilsson (*op.cit.*: p. 30) as one of his sites for collecting [near the former Institute of Plant Protection, Bergshamra (today SIPRI)]. We immediately encountered *D. lutescens* when beating the branches of one of the linden trees there (above). Moreover, the occurrence of adults of *D. lutescens* throughout a major part of the warmer season together with its high flight activity and ready attraction to light strongly add to the likelihood of encountering this species, further sup-

porting the view that it is a newcomer in the present region as well as in Sweden generally.

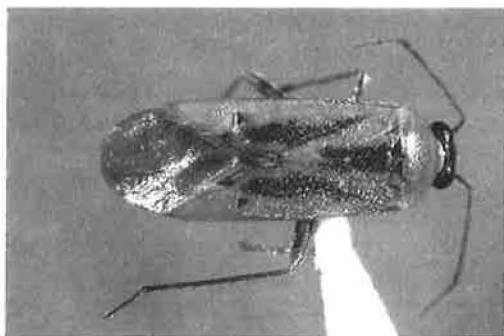
Biology and habitat. *D. lutescens* is a predatory species like its congeners, reportedly feeding mainly upon aphids and some other small arthropod prey like red spider mites living on trees and shrubs. While this species has been collected on a great multitude of deciduous and, more occasionally, coniferous trees, it seems especially partial to *Quercus*, *Tilia*, *Corylus*, *Ulmus*, and *Malus* (*e.g.* Fedorko 1959, Gulde 1921, Masee 1954, Southwood & Leston 1959, Stichel 1956, Wagner & Weber 1964, Göllner-Scheiding, 1992). In France, the species is primarily characterized as being closely associated with various species of *Quercus* (Ehanno 1987b: 824). Records from conifers may at least partly refer to hibernation sites, as the late season record from *Abies* above. In the latter case the species was collected in company with several herb-feeding mirids known to migrate to conifers for hibernation [*Orthops basalis* (A. Costa), *Lygus* spp.]. In attacking some pest species on fruit trees, *etc.*, *D. lutescens* is a reputedly beneficial species in agriculture and forestry. That includes orchards and tree nurseries in a country like the Netherlands, where it ranks as one of the most common mirid species (Berend Aukema, *pers. comm.*). It overwinters as an adult, *e.g.* under bark and frequently also in buildings (Gulde 1921, Stichel 1956), apparently with one single annual generation. The nymphs mainly develop in June-July and reach the adult stage during August and onwards (Ehanno 1987b, Josifov 1978, Putshkov 1961, Southwood & Leston 1959). The present records as well as literature data indicate a high propensity for flight, partly at night.

Taxonomy. *D. lutescens* was formerly contained in the genus *Camptobrochis* Fieber, a genus subsequently put in synonymy with *Deraeocoris* and later treated as a subgenus of the latter (with *C. punctulatus* Fallén as type species) (*cf.* Schuh, 1995). Wagner (1963) erected the new subgenus *Knightocapsus* (with *Phytocoris lutescens* Schilling as type species) to accommodate the Palaearctic *D. lutescens* and *D. putoni* Montandon that he recognized as separate from *D.* (*Camptobrochis*). Among the other Swedish species of *Deraeocoris*, *D. (K.) lutescens* is most

similar regarding body size to *D. (C.) punctulatus* (a species associated with *Artemisia* and other herbs and occurring more rarely in south Sweden), both species being relatively small (length ca 4–4.5 mm) compared with the other, moderately to markedly larger species all belonging to *Deraeocoris s.str.* *D. lutescens* (Fig. 1) is easily separated from *punctulatus* by colour characters and most readily by the entirely smooth scutellum lacking any punctures (with distinct punctures in *punctulatus*). The hemelytra of *lutescens* are yellowish brown with some more or less distinct brownish markings in the male and the entire dorsum is conspicuously shiny. This species is further recognized by a distinct sexual dimorphism in the width of the 2nd antennomere, the latter being noticeably thicker in the male.

Except for *C. (K.) putoni* of southeastern Europe (Roumania, Greece, Bulgaria, European Turkey) recorded as breeding on *Ulmus* (Josifov 1983a), the few remaining Old World species of the subgenus *Knightocapsus* are all confined to Far East Asia (Russian Far East, Korea, Japan), the subgenus thus lacking representatives in intervening Siberia (cf. Vinokurov & Kanyokova 1995). The Far Eastern species have been collected on *Salix* or *Ulmus* depending on the species (Josifov 1983b, Kerzhner 1988). The disjunct range of the subgenus *Knightocapsus* in the Palaearctic basically conforms to what is more or less loosely referred to as a 'Europeo-Manchurian' range in the zoogeographic literature. This well-known pattern is shared by numerous insect taxa primitively associated with the nemoral forest zones and may refer both to intraspecific disjunctions as well as vicariant sister species.

3. *Pinalitus atomarius* (Meyer-Dür, 1843)



Records from Sweden. Sö: Stockholm, Flaten, Ekudden, 1 f, in yellow pan-trap fixed in an oak tree, ca 3 m above ground, 13/4/- 22/5/1995, BV; Up: Solna, Bergshamra, at SIPRI, on *Abies alba*, 1 m, 4 f, 14/8/1996 PL & BV; Up: Danderyd, Stocksund, Skogshyddan, on *Abies alba*, 18 m, 13 f, 23/9/1996, PL & BV.

Note: The first find of the species recorded here was made by BV at an inventory survey of the insect fauna of a forested area at the southern periphery of Stockholm with primary regard to the wood-living fauna of oaks (*Quercus robur*). Silver fir (*Abies alba*) is usually cited as the principal host plant of *P. atomarius* in the literature. It was noted that some silver firs and other planted *Abies* spp. were indeed growing in rather close proximity to the trap site, therefore appearing as the likely source of the present specimen. However, some of the older trees proved impossible to check for the presence of the species using any ordinary collecting methods, as they were growing in dense stands with their lowest branches positioned high up on the trunks well beyond reach. Beating the branches of some young firs at a visit to this locality in April 1996 did not disclose any *P. atomarius*. Later, when collecting on silver firs of different ages readily accessible to beating at two sites at the northern suburbs of Stockholm, we found *P. atomarius* to be quite common and locally abundant.

General distribution. *P. atomarius* is restricted to the western Palaearctic and may be classified as a European species. Summarizing distributional data as derived from Stichel (1958) (also Josifov 1986, Wagner 1952, 1970), the main centre of this species seems to be mountainous areas of Central and South Europe (incl. Spain, France, Switzerland, Austria, Czech Republic, Slovakia, Poland, Hungary, Ukraine, Italy, Greece, Bulgaria, Romania). For example, in Bulgaria, *P. atomarius* occurs in mountainous regions above the *Quercus* belt (> 800–1000m) (Josifov 1986). In Ukraine, at the eastern border of its Central European range, the species is only recorded from the Carpathian (Zakarpethian) region (Putshkov & Putshkov 1996), occurring rarely within the montane coniferous and mixed forest belts (Roshko 1976).

Clearly, a part of the distribution range of *P. atomarius* is essentially contained within the natural range of the silver fir, *i.e.* the coniferous species that appears to serve as the primary host plant

of this mirid. *A. alba* is endemic to Central and South Europe, mainly growing in mountainous situations where it forms a characteristic element of the coniferous and upper mixed forest tiers. Further, silver fir is locally planted for ornament and timber production in northern and western Europe. Outlying, more or less scattered and isolated records of *P. atomarius* from the latter regions, including Great Britain, the Netherlands, Denmark, and the occurrence in Sweden reported here, are likely due to local introductions of the species via nursery stocks of *A. alba* and other conifers that may possibly serve as auxiliary hosts or hibernation sites (see below). Once established within a certain region, the species may be expected to disperse by flight between geographically more or less isolated stands of its host plant. However, as to the newly discovered occurrence of the species in the Stockholm area of Sweden, it is unclear whether this might be due to some more recent, local introduction, alternatively resulting from any range expansion on a larger scale (*i. e.* as suggested for the preceding species). Thus, unlike the previous species, any earlier occurrences of *P. atomarius* in Sweden may well have escaped attention, as resident entomologists here are evidently less likely to collect on *A. alba*, instead favouring native species as far as conifers are concerned. In any event, future collecting on *A. alba* is encouraged and will most likely confirm the presence of *P. atomarius* in several additional localities in Middle and South Sweden. The species has so far not been reported from Norway, Finland, the Baltic countries, or Russia.

Biology and habitat. *P. atomarius* is a phytophagous species exclusively associated with coniferous trees. No conclusive data on any preferences of this species for some particular conifer species are available in the literature. Generally, published notes on the habits of *P. atomarius* are scarce and it seems to have been only more sporadically collected. Reuter (1908), in his comprehensive treatise of the Hemipterous fauna of Palaearctic conifers, summarizes the earlier literature containing notes on host plants of *P. atomarius* (op.cit. :80), *i. e.* the tree species on which the species has been collected. References indicating silver fir, as well as Norway spruce, *Picea abies* (= *excelsa*), and in a few cases *Pinus*, as host-plants are cited. Checking some of the orig-

inal references quoted by Reuter (op.cit.), it appears that whether a given collecting record of *P. atomarius* actually is referring to a find on a species of true fir (*Abies*), alternatively spruce (*Picea*), remains doubtful in several instances. For example, Reuter (op.cit.) refers to a find on "*Picea excelsa*" quoting Edwards (1880). In fact, the latter author writes that he secured a few specimens of *atomarius* from a "spruce-fir" (sic) in England, *i. e.* what in our understanding might rather suggest a species of *Abies*. Still, in the case of several more recently published records of *P. atomarius* with apparently reliable collecting data, the species is noted as having been collected on *Abies alba* as well as on *Picea abies* and *Pinus* sp. That includes data from areas situated within what may be identified as the primary or indigenous range of this species in Europe (above), as Italy or Poland (Smreczynski 1954, Tamanini 1981). In general faunistic works, the host plants of *P. atomarius* are then summarized to comprise these conifers without indications of any particular preferences (Stichel 1958, Wagner, 1971, Gaun 1974). Southwood & Leston (1959) adding finds on Douglas fir (*Pseudotsuga menziesii*), a north American species introduced to Europe.

In our view, available evidence suggests *A. alba* as a primary or original host plant of *P. atomarius*. First, the close correspondence observed between the zonal-geographic ranges of *P. atomarius* and *A. alba* in Central and South Europe, both endemic to the region, supports this view. Assuming that Norway spruce (*Picea abies*) and/or Scots pine (*Pinus sylvestris*) would serve as regular host plants for *P. atomarius* we would reasonably expect a different pattern of distribution in *P. atomarius*, notably the possession of a much wider range, considering the present distribution and the Quaternary and Holocene migrational histories of the latter tree species. One might compare the situation with *Pinalitus rubricatus* (Fallén), a close and better studied relative of *atomarius* that feeds on different species of spruce, fir and pine, as well as *Larix*, though clearly preferring Norway spruce, at least in Europe (*e.g.* Kulenberg 1944, Southwood & Leston 1959). The distribution of this species is quite wide, transcontinental, extending over major parts of the coniferous and mixed forest zones of the Palae-

arctic (incl. the boreal taiga and corresponding mid-latitude mountain belts). The biogeographical patterns recognized here provide of course only a sort of indirect evidence for the role of *A. alba* as the primary or effectively sole host-plant of *P. atomarius*. Nevertheless, our own, admittedly quite cursory, field observations in Sweden, support a strong and seemingly exclusive association of *P. atomarius* with *A. alba*. One of our collecting sites for *atomarius* (cf. Danderyd, Skogshyddan, above) consists of an older, derelict arboretum with various introduced trees intermixed with native trees. *A. alba*, as well as *A. nordmanniana* have been planted there and subsequently propagated freely within the area, in several cases growing densely interspersed with native Norway spruce. *P. atomarius* was found on virtually every *A. alba* investigated, whereas no specimens were recorded by beating adjacent or contiguous branches of *Picea abies*. The species was also not found on the few individuals of *A. nordmanniana* investigated. If attributing *A. alba* the role as a more or less exclusive host-plant of *P. atomarius*, literature records from *Picea abies* and other conifers would suggest accidental occurrences or pointing at hibernation sites, alternatively expressing a regional broadening of the host-plant range. [Indeed, an increase in width of host-plant range (as well as shifts in host plant preferences) was recognized by Reuter (1908) when comparing more southern and northern populations of some conifer-inhabiting species of Hemiptera in Europe.]

Pinalitus atomarius overwinters in the imaginal stage and adults of the new and apparently single generation of the year are appearing in August - September (Wagner & Weber 1964, Southwood & Leston 1959).

Taxonomy. Until recently, *P. atomarius* was contained in the genus *Orthops* Fieber (type species: *Cimex kalmii* Linnaeus) among the "Lygus complex" of genera. This complex has lately been subject to many taxonomic changes, including subdivisions into several new genera and a reshuffling of species among genera according to shifting generic concepts of various workers. Currently, the taxonomy of several of the included groups appears to be in a state of flux. The genus *Pinalitus* Kelton (type species: *Deraeocoris approximatus* Stål) was originally erected

to accommodate one North American species of the *Lygus* complex (Kelton, 1955). Additional North American species were subsequently transferred to or described in *Pinalitus* and the genus was first being recognized as Holarctic with the inclusion of the Old World *Orthops rubricatus* (Fallén) (cf. Kelton 1977). All these species are associated with conifers. Kerzhner (1988) transferred all Palaearctic species of *Orthops* (incl. *atomarius*) associated with trees, coniferous as well as broad-leaved, to *Pinalitus* mainly on the basis of characters of the female genitalia. As a result *Orthops* became restricted to the herb-feeding species of the genus [mainly including the familiar *kalmii* group (feeding on Apiaceae) and the *montanus* group (feeding on Polygonaceae)]. Subsequently, Yasunaga (1992) erected two new genera to hold some of the Far East Asian species and recognized a strict association of the genus *Pinalitus* to conifers. Schwartz (1994), undertaking the first cladistic investigation of these and related genera of the *Lygus* complex, arrived at results conflicting with the concepts above. That author provides some evidence suggesting that *Pinalitus* sensu Kerzhner is a paraphyletic taxon and that the Palaearctic respectively Nearctic species attributed to that genus and living on conifers are not forming a monophyletic group. Accordingly, *P. atomarius* and *P. rubricatus* together with a few related Palaearctic species inhabiting conifers and recognized as the *Pinalitus rubricatus* group would require separate generic recognition in due course. The same conclusion is advanced for *P. cervinus* (Herrich-Schaeffer) and its relatives living on deciduous trees (*P. cervinus* group).

In current standard identification keys to the European species of the *Lygus* complex, the traditional, more inclusive concept of *Orthops* is followed (e. g. Stichel 1958, Wagner 1952). *P. atomarius* is recognized by the relatively slender, elongate body stature, most pronounced in the male sex, and light brown to reddish brown colour with more or less developed dark markings on the dorsum (head, scutellum, and hemelytra) (Fig. 2). *P. atomarius* is most similar to *P. rubricatus* considering the species of the traditional *Orthops* complex occurring within extra-Mediterranean Europe. It is readily separated from the latter by the following key characters [corre-

sponding states in *rubricatus* given within brackets]: (1) Spines of hind tibiae blackish, stout, prominent, their length somewhat exceeding width of tibia [spines pale, less prominent, shorter]; (2) cuneus without apical, dark marking [distal corner of cuneus narrowly dark]; (3) membrane with numerous small, irregular dark dots [membrane uniformly greyish, not patterned with dots]. The wording in some commonly used identification keys to these and other species of traditional *Orthops* may partly raise confusion. Accordingly, in the key by Wagner (1952) [and essentially reiterated in Gaun (1974) and other well-known works], *atomarius* is separated from *rubricatus* (and most other species of traditional *Orthops*) in having all tibiae endowed with long blackish spines, as opposed to at least the fore tibiae with light spines in the latter. Now, this may raise some confusion as the fore tibiae of *atomarius* are in fact devoid of spines according to our observations (three inconspicuous, light spines on the ventral side of fore tibiae observed in *rubricatus*).

Pinalitus atomarius is evidently most closely related to and forms the sister-species of *Pinalitus brachycnemis* (Reuter), (Algeria, Morocco, Lebanon, Syria) collected on *Cedrus*.

Externally, *P. brachycnemis* looks essentially like a smaller edition of *atomarius* and the two species share a characteristically angulate shape of the sensory process of the left male paramere (cf. Wagner 1971).

4. Concluding remarks

At least in the case of *Deraeocoris lutescens*, there is some support for a recent active immigration of the species into south Sweden followed by a considerable range expansion northwards and an establishment of some quite abundant, local populations. Conceivably, these events might be related to some recent variations and changes in climatic conditions of northwestern Europe fostering a northward expansion of more southern insects within this region. Thus, it is noteworthy that a significant number of generally southern and essentially Mediterranean species of Heter-

optera, mainly several arboreal Miridae like the present two species, were recorded for the first time in the Netherlands during 1985–1992. Some of these species have likely been passively introduced into that country by imported plant material, in other cases the possibility of range expansions related to a recent warming of the climate has been noted (Aukema 1990, 1993). Two of these species [the arboreal mirids *Brachynotocoris puncticornis* Reuter and *Deraeocoris flavilinea* (Costa)] have likewise been recorded as new to northeastern Germany at about the same time period (Göllner-Scheiding 1992), supporting the assumption of an active range expansion here. May it suffice here to observe that these expansive tendencies of various southern species of Heteroptera observed in parts of western Europe closely coincide in time with first records of *D. lutescens* (and *Pinalitus atomarius*) in Sweden and may hint at some common climatic causes.

Acknowledgements. We express our best thanks to Berend Aukema (Wageningen, the Netherlands), Carl-Cedric Coulianos (Saltsjö-Boo, Sweden), Bert Gustafsson (Stockholm, Sweden), Håkan Hultén (Garpenberg, Sweden) and Rolf G. Eriksson (Solna, Sweden) for various assistance with material and literature and for providing useful information, and to Walter Niederer (Innsbruck, Austria), whose comments improved the manuscript.

References

- Andersen, N. M. & Gaun, S. 1974: Fortegnelse over Danmarks tæger (Hemiptera-Heteroptera). — Entomologiske Meddelelser 42: 113–134.
- Aukema, B. 1990: *Brachynotocoris puncticornis* nieuw voor de Nederlandse fauna (Heteroptera: Miridae, Orthotylinae). — Entomologische Berichten, Amsterdam 50: 15–16.
- Aukema, B. 1993: *Rhopalus tigrinus* (Rhopalidae) and *Eurydema ornatum* (Pentatomidae) nieuw voor der Nederlandse fauna (Heteroptera). — Entomologische Berichten, Amsterdam 53:19–22.
- Coulianos, C.-C. & Ossiannilsson, F. 1976: Catalogus Insectorum Sueciae. VII. Hemiptera Heteroptera. - 2nd Ed. — Entomologisk Tidskrift 97: 135–173.
- Edwards, J. 1880: An additional species of British Hemiptera. — Entomologist's Monthly Magazine 17: 150.
- Ehanno, B. 1987a: Les Hétero-ptères Mirides de France. Tome II-A: Inventaire et syntheses ecologiques. — Inventaires de Faune et de Flore 40: 97–647.
- Ehanno, B. 1987b: Les Hétero-ptères Mirides de France. Tome II-B: Inventaire biogeographique at atlas. — Inventaires de Faune et de Flore 42: 649–1075.

- Fedorok, J. 1959: [An attempt to find the relationship between the occurrence of Heteroptera and forest habitats.] — *Annales Universitatis Mariae Curie-Skłodowska, Lublin* 14: 93–114. (In Polish)
- Gaun, S. 1974: Blomstertæger. — *Danmarks Fauna* 81: 1–279.
- Gulde, J. 1921: Die Wanzen (Hemiptera-Heteroptera) der Umgebung von Frankfurt a. M. und der Mainzer Becken. — *Abhandlungen herausgegeben v. d. Senckenbergischen Naturforschender Gesellschaft Frankfurt a. M.* 37: 329–503.
- Göllner-Scheidung, U. 1992: Einheimische Bäume als Lebensraum von Heteroptera (Insecta). — *Faunistische Abhandlungen Staatliches Museum für Tierkunde in Dresden* 18: 103–129.
- Josifov, M. 1978: Dendrobionte und dendrophile Halbflügler (Heteroptera) an der Eiche in Bulgarien. — *Acta Zoologica Bulgarica* 9: 3–14.
- Josifov, M. 1983a: Beitrag zur Taxonomie der ostpaläarktischen *Deraeocoris*-Arten. — *Reichenbachia* 21: 75–86.
- Josifov, M. 1983b: Über die Verbreitung mancher Heteropterenarten auf der Balkanhalbinsel. II. — *Acta Zoologica Bulgarica* 22: 3–8.
- Josifov, M. V. 1986: Verzeichnis der von der Balkanhalbinsel bekannten Heteropterenarten (Insecta, Heteroptera). — *Faunistische Abhandlungen Staatliches Museum für Tierkunde in Dresden* 14: 61–93.
- Kelton, L. A. 1955: Genera and subgenera of the *Lygus* complex (Hemiptera: Miridae). — *Canadian Entomologist* 87: 277–301.
- Kelton, L. A. 1977: Species of the genus *Pinalitus* Kelton found in North America (Heteroptera, Miridae). — *Canadian Entomologist* 109: 1549–1554.
- Kerzhner, I. M. 1988: New and little known Heteroptera from the Far East of the USSR. Vladivostok (Nauka). (In Russian) [1987]
- Kullenberg, B. 1944: Studien über die Biologie der Capsiden. — *Zoologiska Bidrag från Uppsala* 23: 1–522.
- Massee, A. M. 1954: The Hemiptera-Heteroptera of Kent. — *Transactions of the Society for British Entomology* 11: 245–280.
- Ossiannilsson, F. 1942: Hemipterfynd i Stockholmstrakten. — *Opuscula Entomologica* 7: 28–37.
- Putshkov, V. G. 1961: Plant bugs (Heteroptera, Miridae) from Poltavsk Region. — *Pratsi Institutu Zoologii, Kiev* 17: 71–85. (In Ukrainian)
- Putshkov, V. G. & Putshkov, P. V. 1996: Heteroptera of the Ukraine: check-list and distribution. St. Petersburg. Ukrainian Academy of Sciences, Institute of Zoology & Russian Academy of Sciences, Zoological Institute.
- Reuter, O. M. 1908: Charakteristik und Entwicklungsgeschichte der Hemipterenfauna (Heteroptera, Auchenorrhyncha und Psyllidae) der Palaearktischen Coniferen. — *Acta Societatis Scientiarum Fennicae* 36 (1), 1909: 1–120.
- Roshko, G. M. 1976: [Miridae (Heteroptera) of the Ukrainian Carpathians, Transcarpathia and Ciscarpathians.] — *Entomologicheskoe Obozrenie* 55: 814–819. (In Russian)
- Schuh, R. T. 1995: Plant bugs of the world (Insecta: Heteroptera: Miridae). The New York Entomological Society.
- Schwartz, M. D. 1994: Review of the genus *Salignus* Kelton and a character discussion of related genera (Heteroptera: Miridae: Mirinae). — *Canadian Entomologist* 126: 971–993.
- Smreczynski, S. 1954: Materialy do fauny pluskwiaków (Hemiptera) Polski. — *Fragmenta Faunistica* 7: 1–156.
- Southwood, T. R.E. & Leston, D. 1959: Land and water bugs of the British Isles. London (Warne).
- Stichel, W. 1956–1958: Illustrierte Bestimmungstabellen der Wanzen. II. Europa. (Hemiptera-Heteroptera Europaea). 2. Berlin-Hermsdorf (Stichel).
- Tamanini, L. 1981: Gli eterotteri della Basilicata e della Calabria (Italia meridionale) (Hemiptera Heteroptera). — *Memorie del Museo Civico di Storia Naturale di Verona* (2) A (3): 1–164.
- Vinokurov, N. N. & Kanyokova, E. V. 1995: Heteroptera of Siberia. Novosibirsk (Nauka).
- Wagner, E. 1952: Blindwanzen oder Miriden. — *Die Tierwelt Deutschlands* 41:i-iv,1–218.
- Wagner, E. 1963: Zur Systematik der Deraeocorini Dgl. et Sc. (Hem. Het. Miridae). — *Deutsche Entomologische Zeitschrift* 10: 17–25.
- Wagner, E. 1970: Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera: Heteroptera). 1–3. — *Entomologische Abhandlungen und Berichte herausgegeben vom Staatlichen Museum für Tierkunde in Dresden* 37, Suppl. (1970–1971): 1–484.
- Wagner, E. & Weber, H. H. 1964: Hétéroptères Miridae. — *Faune de France* 67: 1–591.
- Yasunaga, T. 1992: *Pinalitus* Kelton (Heteroptera, Miridae) and its allied genera of Japan. — *Japanese Journal of Entomology* 62: 115–131.