

## Immigration and range expansion in Finnish insects

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During the 20th century many insect species have expanded into Finland and established themselves as part of the fauna. Some species of Coleoptera seem to have been carried here originally by man, but nowadays live outdoors. Many other species seem to have reached Finland on their own, and colonized a minor or major part of the country. Most colonists have come from the south, only a few from the east or north-east. This article lists various kinds of newcomers to Finland.

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The Finnish insect fauna has been studied for more than two hundred years, and by now we can recognize several changes. Some species have disappeared from Finland; a list prepared for the Ministry of Environment (Rassi 1992) includes 59 such species, 39 of them in Coleoptera, 10 in Lepidoptera. On the other hand, an average of almost one hundred new insect species have been reported each year (Silfverberg 1991). Of course, rather few of these species are truly new, most have merely not been recognized before. In addition there is a considerable number of species introduced by man, some of them with no chance to survive in Finland, others entirely dependent on greenhouses or similar artificial environments.

There is also a small number of insects that have unintentionally been introduced into Finland by man, but which have managed to establish themselves outdoors, some still limited to human environments (e.g. compost heaps or garbage dumps), but others nowadays even living deep in the forests. A number of such beetles are listed in Table 1. Many of these species were originally described

from East Asia, and some have spread very widely; for instance *Atomaria lewisi* is established in Iceland (Ólafsson 1991), and it has even been recorded from Spitzbergen (Kangas 1967).

Table 1. Exotic colonists that have established themselves outdoors in Finland, with year of first record. Species marked with \* have been reported from old forest areas in Finland (Rutanen 1994, Muona pers. comm.).

<i>Perigona nigriceps</i> (Dejean)	1961
<i>Cercyon laminatus</i> Sharp	1960
<i>Cryptopleurum subtile</i> Sharp	1957
<i>Baeocrara japonica</i> (Matthews)	1974 *
<i>Acrotichis insularis</i> (Mäklin)	1981 *
<i>Philonthus rectangulus</i> Sharp	1936
<i>Philonthus spinipes</i> Sharp	1991
<i>Philonthus parvus</i> Sharp	1964
<i>Lithocharis nigriceps</i> Kraatz	1940
<i>Oxytelus migrator</i> Fauvel	1975
<i>Acrotona pseudotenera</i> (Cameron)	1988
<i>Carpophilus marginellus</i> Motschulsky	1982 *
<i>Atomaria lewisi</i> Reitter	1959 *
<i>Aridius nodifer</i> (Westwood)	1924 *

Table 2. Expanding insect species in Finland, with year of first observation and direction of arrival. References: B84 = Biström 1984, BV85 = Biström & Väisänen 1985, C91 = Clayhills 1991, H68 = Hackman 1968, H83 = Hackman & al. 1983, H90 = Holmberg 1990, J91 = Jansson 1991, J92 = Jalas 1992, K62 = Kaisila 1962, K75 = Koponen 1975 & 1980, K86 = Koponen & Ilvessalo 1986, L50 = Lindberg 1950, L72 = Lindroth 1972, M77 = Mikkola & Jalas 1977, M89 = Mikkola & al. 1989, M90 = Marttila & al. 1990, N69 = Nordström & al. 1969, P81 = Pekkarinen & al. 1981, R90 = Repo 1990, R92 = Rutanen 1992, R94 = Repo 1994, S23 = Saalas 1923, S90 = Silfverberg 1990, V46 = Valle 1946, V64 = Viramo 1964.

Odonata			
<i>Libellula depressa</i> Linnaeus	1919	SE	V46
Heteroptera			
<i>Acanthosoma haemorrhoidale</i> (Linnaeus)	1921	SW	L50
<i>Troilus luridus</i> (Fabricius)	1935	SW	L50
<i>Palomena prasina</i> (Linnaeus)	1939	SW	L50
Coleoptera			
<i>Amara majuscula</i> (Chaudoir)	1930	S	L72
<i>Amara hyperborea</i> Dejean	1927	NE	B84
<i>Stenolophus mixtus</i> (Herbst)	1935	S	L72
<i>Gabrius astutooides</i> (Strand)	1979	SW	C91
<i>Acrotona parens</i> (Mulsant & Rey)	1983	S	R92
<i>Oryctes nasicornis</i> (Linnaeus)	1920	S	V64
<i>Cantharis lateralis</i> Linnaeus	1942	SE	S90
<i>Ctenicera cuprea</i> (Fabricius)	1899	NE	S23
<i>Hippodamia notata</i> (Laicharting)	1973	E	H90
<i>Metoecus paradoxus</i> (Linnaeus)	1948	S	K86
<i>Agapanthia villosoviridescens</i> (Degeer)	1979	SE	BV85
<i>Gronops inaequalis</i> Boheman	1941	SE	S90
<i>Ips amitinus</i> (Eichhoff)	1950	S	K75
Lepidoptera			
<i>Epiblema grandaevana</i> (Lienig & Zeller)	1956	SE	J92
<i>Catoptria fulgidella</i> (Hübner)	1957	S	J92
<i>Araschnia levana</i> (Linnaeus)	1973	E	M90
<i>Discoloxia blomeri</i> (Curtis)	1966	S	M89
<i>Ourapteryx sambucaria</i> (Linnaeus)	1961	SE	M89
<i>Hypomecis roboraria</i> (Denis & Schiffermüller)	1952	SE	M89
<i>Macdunnoughia confusa</i> (Stephens)	1936	S	K62
<i>Apamea scolopacina</i> (Esper)	1966	S	R90
<i>Luperina testacea</i> (Denis & Schiffermüller)	1942	SW	N69
<i>Staurophora celsia</i> (Linnaeus)	1934	SW	K62
<i>Archanara sparganii</i> (Esper)	1937	S	K62
<i>Orthosia munda</i> (Denis & Schiffermüller)	1990	SW	R94
<i>Cryptocala chardinyi</i> (Boisduval)	1957	SE	M77
<i>Xestia sexstrigata</i> (Haworth)	1932	SW	K62
Diptera			
<i>Rhamphomyia marginata</i> (Fabricius)	1967	S	H68
<i>Urophora cardui</i> (Linnaeus)	1981	S	J91
<i>Lipoptena cervi</i> (Linnaeus)	1960	SE	H83
Hymenoptera			
<i>Bombus sylvarum</i> (Linnaeus)	1944	SE	P81

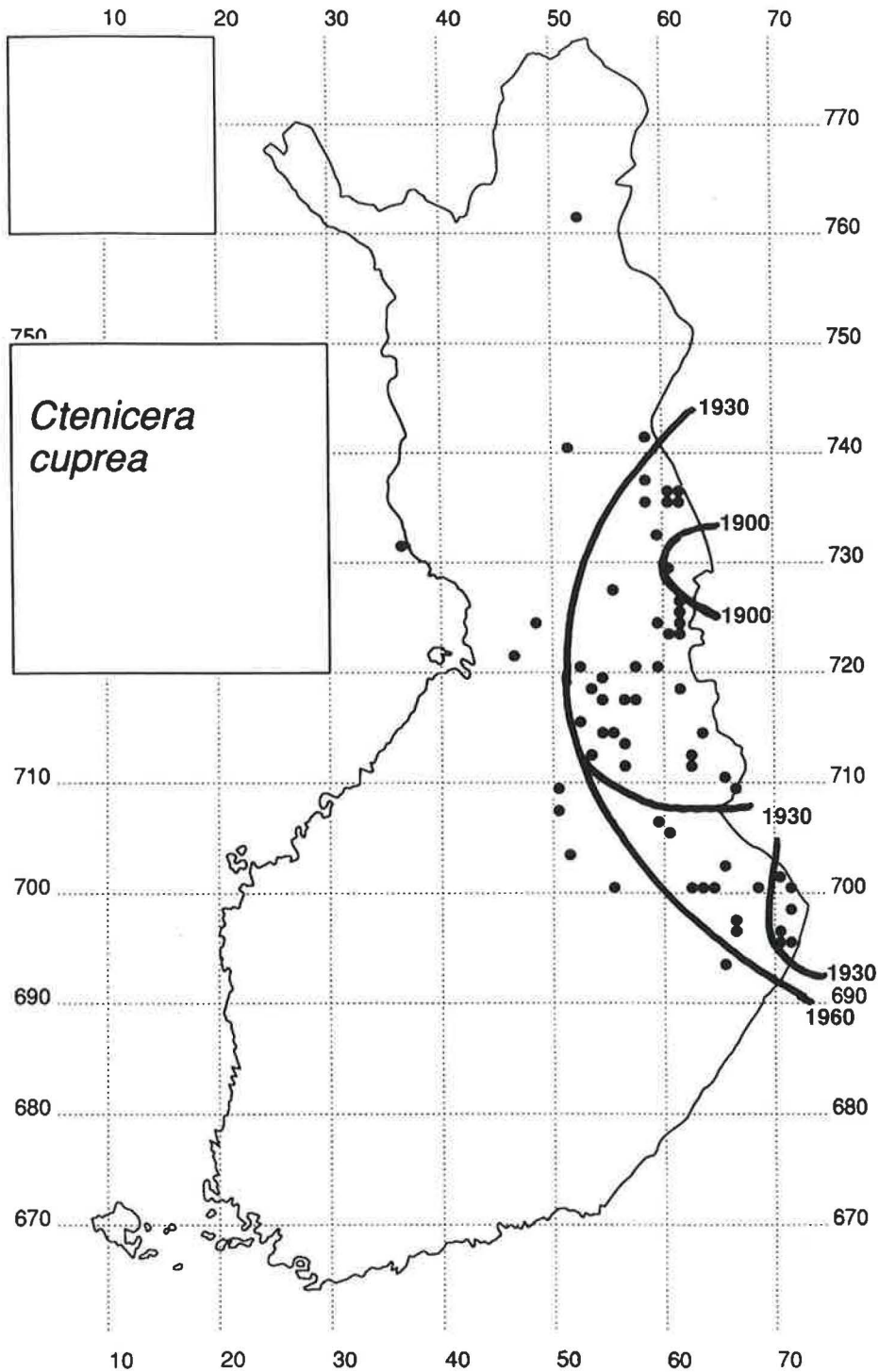


Fig. 1. The present distribution of *Ctenicera cuprea* in Finland, and the limits reached by 1900, 1930 and 1960.

Yet there are cases where we have sufficient information to conclude that a spontaneous range expansion has occurred.

The best observations have been made on Lepidoptera; the numerous amateur lepidopterists have proven to be an invaluable asset for scientists analyzing the dispersal. Kaisila (1962) studied the records for a large number of Lepidopteran species, and could present a picture of how they have spread, and occasionally again retreated. In Table 2 a few of these species are listed, and also some later arrivals.

In other orders documentation is generally poorer, and detailed information on dispersal can mainly be found for conspicuous or economically important species. Some prominent species are listed in Table 2. A particularly rapid spread has been documented for *Ips amitinus*; about 500 km in 40 years. A rapid spread has also been observed for *Lipoptena cervi*, but here the flies may have been carried by their hosts, the elks. Jansson (1991) reported a dispersal of some 10 km/year for *Urophora cardui* in southern Finland, which is about four times that reported by Eber & Brandl (1994) from Central Europe, but as the latter spread is supposed to be a fluctuation, the situations may not be equivalent.

Most of the new species have entered Finland in the south. One prominent exception is the click-beetle *Ctenicera cuprea*. It was widely distributed in northern Russia, including Russian Karelia, and was first discovered in Finland in Kuusamo. During this century it has spread south and west from there (Fig. 1), lately even reaching Sweden (Lundberg 1991).

The most attention is given to those range extensions that include new country records. Most borders are, however, man-made, and reflect rarely fundamental biological differences. Many species have expanded or diminished their range within Finland during this century. One such species is the leaf beetle *Chrysolina sanguinolenta* (Linnaeus), which during the last decades has spread west from south-eastern Finland (Silfverberg 1983).

An expansion ends sooner or later, and is often followed by a decline, when much of the new territory is lost; Warren (1992) has described such a fluctuation for *Polygonia c-album* (Linnaeus) in Britain. Kaisila (1962) described

the Finnish expansion of *Maniola jurtina* (Linnaeus), and soon thereafter that species went into a decline, slowly disappearing from almost all of Finland (Järventausta 1987). Now it seems to be returning again. The dragonfly *Libellula depressa* also disappeared from a large part of the area it had colonized during the early 20th century (Hämäläinen & Valtonen 1986), and seems now to be returning (Valtonen 1995).

It is difficult to see any reason why the ranges of some particular insect species have expanded, and for others, seemingly similar, they have not. Therefore we can only expect to be surprised again and again. Some species are at present expanding in areas near Finland, and their expansion may continue. For example, among Coleoptera *Isorhipis marmottani* (Bonvouloir) (Eucnemidae) and *Tritoma subbasalis* (Reitter) (Erotylidae) have expanded recently in the Baltic area (Roosileht 1994 & Öunap 1993); in Hymenoptera the bumble bee *Bombus schrencki* Morawitz has shown a similar expansion (Krzysztofciak 1992 & Paikans 1990). In future years they may at least be worth looking for.

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