

On Some Phytoseiid Mites (Parasitiformes, Phytoseiidae) from Styria (Austria)*

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With 1 table and 1 figure

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Summary: A survey on phytoseiid mites associated with different plants was carried out in Styria (Austria). 17 species were collected; among them, *Amblyseius finlandicus* (OUDEMANS) was the most abundant species followed by *Anthoseius verrucosus* WAINSTEIN, *Amblyseius andersoni* (CHANT), *Anthoseius clavatus* WAINSTEIN, *Typhlodromus cryptus* ATHIAS-HENRIOT, and *Kampimodromus aberrans* (OUDEMANS). The remaining species are apparently rare. Information on the distribution and on some biological data of the six most abundant species is also given. Eleven of the species collected are recorded for the first time in Styria.

Zusammenfassung: Über einige Raubmilben (Parasitiformes, Phytoseiidae) aus der Steiermark (Österreich). – In der Steiermark wurde eine Untersuchung über pflanzenbewohnende Raubmilben durchgeführt. Dabei wurden 17 Arten gesammelt; von diesen war *Amblyseius finlandicus* (OUDEMANS) die häufigste Art, gefolgt von *Anthoseius verrucosus* WAINSTEIN, *Amblyseius andersoni* (CHANT), *Anthoseius clavatus* WAINSTEIN, *Typhlodromus cryptus* ATHIAS-HENRIOT, und *Kampimodromus aberrans* (OUDEMANS). Die restlichen Arten wurden nur selten gefunden. Ergänzend dazu finden sich Hinweise auf die Verbreitung und einige biologische Daten der sechs oben genannten häufigen Arten. Elf der insgesamt gesammelten Arten stellen Erstnachweise für die Steiermark dar.

Introduction

As it is already well known, phytoseiid mites are considered the most important biological agents to control phytophagous mites. Since when the work by NESBITT was published (1951), many species have been described and many surveys have been carried out in different parts of the world, to have a more detailed picture of the distribution of these useful arthropods.

As far as Austria is concerned not many records have been reported and even fewer are available if we consider the phytoseiid fauna in Styria. For this reason, during the first EURAAC meeting held in Graz in 1988, the senior Author collected some phytoseiid mites living on plants in Styria.

Materials and Methods

Mites were collected in different parts of Styria. Specimens were preserved in 70% alcohol, cleared in Nesbitt's solution (chloral hydrate 40, distilled water 25, concentrated hydrochloric acid 2,5), mounted in Hoyer's fluid (distilled water 50, amorphous arabic gum 30, chloral hydrate 200, glycerine 20), and observed under a differential interference microscope for identification.

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Results

In fig. 1 we report the location of different localities where the collections were carried out and in table 1 the list of species collected. Among them, *Amblyseius finlandicus* (OUDEMANS) was the most common species collected on different plants, followed by a group of five species, *Anthoseius verrucosus* WAINSTEIN, *Amblyseius andersoni* (CHANT), *Anthoseius clavatus* WAINSTEIN, *Typhlodromus cryptus* ATHIAS-HENRIOT, and *Kampimodromus aberrans* (OUDEMANS). The remaining species were collected sporadically. We also give report for the most frequently found species, the distribution, the host plants, and the number of specimens collected.

Amblyseius finlandicus (OUDEMANS, 1915)

Type locality and habitat: *Salix caprea*, Åbo (Finland) (NESBITT, 1951).

Location of types: Rijkmuseum van Natuurlijke Historie, Leiden (The Netherlands) (NESBITT 1951).

Records: at Graz, August 5, 1988: on strawberry (*Fragaria* sp.), 1 deutonymph; on hazelnut (*Corylus avellana*), 2 females; on undetermined plant, 1 female; on *Cercis siliquastrum*, 5 females, 1 deutonymph; on *Syringa* sp., 2 deutonymphs; on *Prunus cerasus*, 5 females, 1 male; on *Cornus* sp., 4 females, 1 male. At Stübing bei Graz (Freilichtmuseum), August, 6, 1988: on *Pyrus* sp., 1 female, 2 deutonymphs; on *Fagus sylvatica*, 2 females. At Riegersburg, August 5, 1988: on *Quercus* sp., 5 females, 3 males, 1 deutonymph; on *Prunus cerasus*, 2 females, 1 male; on *Castanea sativa*, 9 females, 1 male, 1 deutonymph. At Bad Gleichenberg, August 7, 1988: on *Pinus strobus*, 1 female; on *Fraxinus excelsior*, 3 females, 1 male; on *Cercis canadensis*, 5 females, 1 male. At Schloß

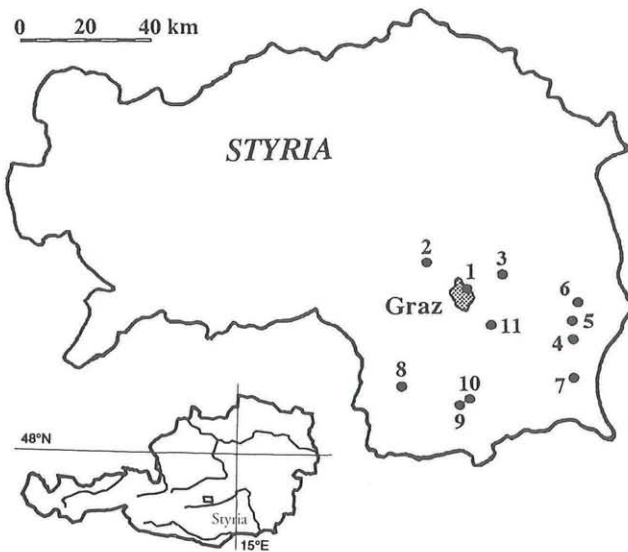


Fig. 1: Phytoseiids collection sites: 1. Graz; 2. Stübing bei Graz (Freilichtmuseum); 3. Eggersdorf; 4. Feldbach; 5. Schloß Kornberg bei Feldbach; 6. Riegersburg; 7. Bad Gleichenberg; 8. Laßnitzklause bei Deutschlandsberg; 9. Kitzcek im Sausal; 10. Greith bei Kitzcek; 11. Hühnerberg bei Hausmannstätten

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Kornberg bei Feldbach, August 7, 1988: on *Carpinus betulus*, 4 females; on *Cedrus* sp., 2 females. At Kitzreck im Sausal, August 13, 1988: on *Syringa* sp., 3 females, 1 deutonymph. At Laßnitzklause bei Deutschlandsberg, August 13, 1988: on *Lupinus* sp., 1 female. At Hühnerberg bei Hausmannstätten, August 13, 1988: on *Pteridium aquilinum*, 3 females, 2 males.

Amblyseius andersoni (CHANT, 1957)

Type locality and habitat: prune leaves, Rosedale, British Columbia (CHANT 1959).
Location of types: Canadian National Collection (CHANT 1959).

Records: at Graz, August 5, 1988: on strawberry (*Fragaria* sp.), 1 female; on *Actinidia*, 3 females; on *Crataegus monogyna*, 6 females, 1 male, 1 deutonymph; on *Rhus typhia*, 4 females, 1 male, 5 protonymphs; on hazelnut (*Corylus avellana*), 2 females, 1 deutonymph; on *Cotoneaster* sp., 10 females, 1 male; on *Spiraea* sp., 15 females, 5 males, 2 deutonymphs; on *Cornus sanguineus*, 1 male; on undetermined, 1 female. At Stübing bei Graz (Freilichtmuseum), August 6, 1988: on *Sambucus nigra*, 1 male; on *Vitis vinifera*, 3 females, 2 deutonymphs. At Bad Gleichenberg, August 7, 1988: on *Pinus strobus*, 4 females, 1 male, 2 deutonymphs; on *Fraxinus excelsior*, 1 female. At Feldbach August 7, 1988: on *Tilia* sp., 1 female, 1 male; on grass, 3 females. At Eggersdorf, August 7, 1988: on *Rubus fruticosus*, 1 female.

Anthoseius verrucosus WAINSTEIN, 1972

Type locality and habitat: *Abies*, Batumi (Georgia) (WAINSTEIN 1972).

Records: at Graz, August 5, 1988: on *Prunus cerasus*, 2 females; on *Rhus typhia*, 1 male; on *Picea excelsa*, 2 females; on *Quercus* sp., 2 females; on undetermined, 1 female. At Stübing bei Graz (Freilichtmuseum), August 6, 1988: on *Fagus sylvatica*, 1 male; on *Sambucus nigra*, 1 female; on hazelnut (*Corylus avellana*), 2 females; on maple (*Acer* sp.), 1 female; on *Pyrus* sp., 1 female; on vine (*Vitis vinifera*), 4 females, 1 male. At Bad Gleichenberg, August 7, 1988: on *Fraxinus excelsior*, 1 female. At Feldbach, August 7, 1988: on *Malus* sp., 1 female. At Schloß Kornberg bei Feldbach, August 7, 1988: on hazelnut (*Corylus avellana*), 1 female, 1 male; on *Carpinus betulus*, 1 female; on *Cedrus* sp., 2 females. At Greith bei Kitzreck, August 13, 1988: on *Vitis vinifera*, 12 females.

Anthoseius clavatus WAINSTEIN, 1972

Type locality and habitat: *Picea*, Zschvali (Georgia) (WAINSTEIN 1972).

Records: at Graz, August 6, 1988: on *Cornus* sp., 1 female. At Stübing bei Graz (Freilichtmuseum), August 6, 1988: on maple (*Acer* sp.), 2 females; on *Sambucus nigra*, 6 females, 1 male; on *Pyrus* sp., 1 female; on *Vitis vinifera*, 3 females. At Bad Gleichenberg, August 7, 1988: on *Pinus strobus*, 1 female. At Feldbach, August 7, 1988: on *Malus* sp., 4 females. At Laßnitzklause bei Deutschlandsberg, August 13, 1988: on raspberry (*Rubus idaeus*), 1 female.

Typhlodromus cryptus ATHIAS-HENRIOT, 1960

Type locality and habitat: *Crataegus oxyacantha* subsp. *monogyna*, Algiers (Algeria) (ATHIAS-HENRIOT 1960).

Location of types: Laboratoire d'Acarologie de l'Ecole Pratique des Hautes Etudes, Paris (ATHIAS-HENRIOT 1960).

Records: at Graz, August, 7, 1988: on *Cotoneaster* sp., 1 female; on *Picea excelsa*, 1 female; on *Rhus typhya*, 1 female; on *Taxus* sp., 1 female. At Riegersburg, August 7, 1988: on *Prunus cerasus*, 1 male; on *Quercus* sp., 1 female. At Schloß Kornberg bei Feldbach, August, 7, 1988: on *Cedrus* sp., 5 females.; on *Picea excelsa*, 3 females. At Hühnerberg bei Hausmannstätten, August, 13, 1988: on *Picea excelsa*, 5 females; on *Vitis vinifera*, 3 females. At Greith bei Kitzreck, August 13, 1988: on *Vitis vinifera*, 1 female.

***Kampimodromus aberrans* (OUDEMANS, 1930)**

Type material and habitat: *Tilia platyphyllos*, Arnhem (The Netherlands). Topotypic female on *Corylus* sp. at Arnhem (RAGUSA DI CHIARA & TSOLAKIS 1994a).

Location of types: Rijksmuseum van Natuurlijke Historie, Leiden (The Netherlands)-Istituto di Entomologia agraria, Palermo (Italy) (RAGUSA DI CHIARA & TSOLAKIS 1994a).

Records: at Graz, August,6,1988: on *Crataegus monogyna*, 1 female. At Stübing bei Graz (Freilichtmuseum), August 6, 1988: on hazelnut (*Corylus avellana*), 1 female. At Feldbach, August, 7, 1988: 3 females, 1 male. At Riegersburg, August 7, 1988: on *Cydonia oblonga*, 2 deutonymphs; on *Castanea sativa*, 6 females, 1 male. At Bad Gleichenberg, August 7, 1988: on *Cercis canadensis*, 1 male. At Schloß Kornberg bei Feldbach, August 7, 1988: on hazelnut (*Corylus avellana*), 1 female, 1 male. At Hühnerberg bei Hausmannstätten August 13, 1988: on *Vitis vinifera*, 1 deutonymph.

***Typhlodromus ernesti* RAGUSA & SWIRSKI, 1978**

Type locality and habitat: *Taxus baccata*, Monte Amiata (Tuscany-Italy) (RAGUSA & SWIRSKI 1978).

Location of types: Istituto di Entomologia agraria-Palermo (Italy) and Division of Entomology, A.R.O., Bet-Dagan (Israel) (RAGUSA & SWIRSKI 1978).

Records: at Graz, August 5, 1988: on *Picea excelsa*, 1 female; on *Taxus* sp., 1 female. At Schloß Kornberg bei Feldbach, August 7, 1988: 3 females. At Hühnerberg bei Hausmannstätten, August 13, 1988: 4 females.

***Phytoseius ribagai* ATHIAS-HENRIOT, 1960**

Type locality and habitat: nettle, Italy (CHANT & ATHIAS-HENRIOT 1960).

Location of types: École Pratique des Hautes Études, Paris (CHANT & ATHIAS-HENRIOT 1960).

Records: at Graz, August 5, 1988: on undetermined plant, 1 female. At Stübing bei Graz (Freilichtmuseum), August 6, 1988: on hazelnut (*Corylus avellana*), 1 male. At Eggersdorf, August 7, 1988: on *Salix* sp., 1 deutonymph; on *Rubus fruticosus*, 1 female.

***Typlodromus tiliarum* OUDEMANS, 1930**

Type locality and habitat: *Tilia* sp., Dahlem (Germany) (CHANT 1959).

Location of types: Rijksmuseum van Natuurlijke Historie, Leiden (The Netherlands) (CHANT 1959).

Records: at Feldbach, August 7, 1988: on *Tilia* sp., 8 females. At Bad Gleichenberg, August 7, 1988: on *Cercis canadensis*, 1 female. At Schloß Kornberg bei Feldbach, August 7, 1988: on *Carpinus betulus*, 1 female.

***Typhlodromus pyri* SCHEUTEN 1857, sensu ABBASOVA, 1970**

Type locality and habitat: pear leaves, Bonn (Germany) (CHANT 1959).

Location of types: Scheuten's type material was lost (CHANT 1959).

Records: at Graz, August 5, 1988: on *Vitis vinifera*, 1 female. At Laßnitzklause bei Deutschlandsberg, August 13, 1988: on *Lupinus* sp., 1 female.

***Typhlodromus affinis laurae* ARUTUNIAN, 1974**

Type locality and habitat: *Pinus*, in Stepanovsky region, around Giulagarak at m 1830 a.s.l. (ARUTUNIAN 1974).

Location of types: Zoological Institute of the Academy of Sciences (ARUTUNIAN 1974).

Records: at Riegersburg, August 7, 1988: on *Pinus* sp., 5 females, 3 males, 1 deutonymph; on undetermined, 3 females.

Taxonomic note: this species very closely resembles *Typhlodromus laurae* described by ARUTUNIAN 1974. It should be however mentioned that in his description ARUTUNIAN reported only one macroseta on tarsus IV, while three macrosetae are present on leg IV in our specimens. Moreover CHANT & YOSHIDA-SHAUL 1987 in their revision reported *T. laurae* with two macrosetae. As a consequence we consider at the moment the specimens collected by us as *T. affinis laurae*. To decide definitely, the type material has to be checked for a comparison.

***Typhlodromus exhilaratus* RAGUSA, 1977**

Type locality and habitat: *Rosmarinus officinalis*, Scillato (Palermo-Italy) (RAGUSA 1977).

Location of types: Istituto di Entomologia agraria, Palermo (Italy) (RAGUSA 1977).

Records: at Greith bei Kitzeck, August 13, 1988: on *Vitis vinifera*, 2 females.

***Amblyseius rademacheri* DOSSE, 1958**

Type locality and habitat: apple, Stuttgart (Germany) (DOSSE 1958).

Location of types: Institut für Pflanzenschutz der Landwirtschaftlichen Hochschule, Stuttgart-Hohenheim (Germany) (DOSSE 1958).

Records: at Laßnitzklause bei Deutschlandsberg, August 13, 1988: on *Lupinus* sp., 3 females, 1 deutonymph; on raspberry (*Rubus idaeus*), 4 females, 3 males.

***Typhlodromus recki* (WAINSTEIN, 1958)**

Type locality and habitat: *Salvia nemorosa*, Tbilisi (Georgia) (WAINSTEIN 1958).

Location of types: in Dr. WAINSTEIN's collection (WAINSTEIN 1958).

Records: at Hühnerberg bei Hausmannstätten, August 13, 1988: on *Pteridium aquilinum*, 3 females, 1 male.

***Kampimodromus ericinus* RAGUSA & TSOLAKIS, 1994**

Type locality and habitat: *Rubus* sp., Soriano (Catanzaro) (Italy) (RAGUSA DI CHIARA & TSOLAKIS 1994a).

Location of types: Istituto di Entomologia agraria, Palermo (Italy).

Records: at Graz August 5, 1988: on hazelnut (*Corylus avellana*), 2 females.

Amblyseiella setosa MUMA, 1955

Type locality and habitat: scaly orange leaves, Tampa, Florida (CHANT 1959).

Location of types: in the United States National Museum (CHANT 1959).

Records: at Riegersburg, August 7, 1988: on grass, 1 female.

Seiulus amaliae RAGUSA & SWIRSKI, 1976

Type locality and habitat: *Citrus limonum*, Bagheria (Palermo) (Italy) (RAGUSA & SWIRSKI 1976).

Location of types: Istituto di Entomologia agraria, Palermo (Italy) and Division of Entomology, A. R. O., Bet-Dagan (Israel) (RAGUSA & SWIRSKI, 1976).

Records: at Graz, August 5, 1988: on *Vitis vinifera*, 1 female.

Taxonomic note: this species is very close to *Seiulus talbii* (ATHIAS-HENRIOT) (RAGUSA & SWIRSKI 1976). This latter species has been already noted in Austria by EL-BOROLOSSY & FISCHER-COLBRIE (1991), but according to the figure drawn by them (fig. 15 at page 12) the insemination apparatus does not correspond to that of *S. talbii*.

Table 1: Phytoseiid mites collected in Styria.

1. <i>Amblyseius finlandicus</i> (Oudemans)	10. <i>Typhlodromus pyri</i> Scheuten
2. <i>Amblyseius andersoni</i> (Chant)	*11. <i>Typhlodromus</i> aff. <i>laurae</i> Arutunian
*3. <i>Anthoseius verrucosus</i> Wainstein	*12. <i>Typhlodromus exbilaratus</i> Ragusa
*4. <i>Anthoseius clavatus</i> Wainstein	*13. <i>Amblyseius rademacheri</i> Dosse
*5. <i>Typhlodromus cryptus</i> Athias-Henriot	*14. <i>Typhlodromus recki</i> (Wainstein)
6. <i>Kampimodromus aberrans</i> (Oudemans)	*15. <i>Kampimodromus ericinus</i> Ragusa & Tsolakis
*7. <i>Typhlodromus ernesti</i> Ragusa & Swirski	*16. <i>Amblyseiella setosa</i> Muma
8. <i>Phytoseius ribagai</i> Athias-Henriot	*17. <i>Seiulus amaliae</i> Ragusa & Swirski
9. <i>Typhlodromus tiliarum</i> Oudemans	

(* recorded for the first time)

Discussion

A. finlandicus is a widespread species, mainly present in orchards where sprayings are limited where it lives preying upon tetranychids and eriophyids (STERK & VANWETSWINKEL 1988; AMANO & CHANT 1986); it should be however mentioned that the species showed a limited searching capacity when preys were not abundant (AMANO & CHANT 1986). The species was already mentioned for Austria (BÖHM 1960; EL-BOROLOSSY & FISCHER-COLBRIE 1989a). Its wide distribution could, however, be due to the fact that we are dealing with a complex species, which should be studied and identified carefully. As far as specimens collected by us are concerned, they were compared to the type material and they were similar in all their characteristics and measurements.

Another common species is *K. aberrans*, already recorded for Austria (EL-BOROLOSSY & FISCHER-COLBRIE 1989a). This species is very common on vines in Italy, France, and Switzerland (KREITER & BRIAN 1987; BAILLOD 1984; CASTAGNOLI & LIGUORI 1985) where it is used to control phytophagous mites associated with that crop showing a high oviposition rate, and a quick capability to increase and spread its population (IVANCICH-GAMBARO 1987). If the species is not present in vineyards, it is possible to introduce specimens from other vineyards where it is present (GIROLAMI 1987). Strains resistant to OP (Organophosphorous) compound have recently appeared in field (CORINO, BAILLOD & DUVERNEY 1986). A revision of genus *Kampimodromus*, has been done, and the

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topotypic female of *K. aberrans* was described (RAGUSA DI CHIARA & TSOLAKIS 1994a); as a matter of fact, as it is known, the species was described from nymphs (CHANT 1959).

Due to the widespread presence of the two above mentioned species in Austria, studies were carried out to deepen our knowledge on their biology, checking the effect of different foods on their development, reproduction, and life tables (SCHAUSBERGER 1991, 1992), and testing the side effects of dormant and pre-blossom sprayings on overwintering populations (FISCHER-COLBRIE & EL-BOROLOSSY 1988). Moreover the population dynamics of *K. aberrans*, considered the most common species in Austrian fruit orchards, was also ascertained (EL-BOROLOSSY & FISCHER-COLBRIE 1989b).

A. andersoni, already mentioned for Austria (EL-BOROLOSSY & FISCHER-COLBRIE 1989a), is a very common species in fruit orchards in Europe, USA, Canada and Japan (MORAES, MCMURTRY & DENMARK 1986). The species prefers *Panonychus citri* (MCGREGOR) as prey, but also likes *Tetranychus urticae* KOCH even if its young stages die easily because they are trapped by the silk the latter produces (RAGUSA DI CHIARA & TSOLAKIS 1995a). *A. andersoni* is able to accomplish its postembryonic development and to oviposit on different kinds of pollens (TSOLAKIS & RAGUSA DI CHIARA 1994; RAGUSA DI CHIARA & TSOLAKIS 1995a) as well as on young stages of *Parabemisia myricae* (KUWANA) (RAGUSA DI CHIARA & TSOLAKIS 1994b), and *Aleurothrixus floccosus* (MASK) (RAGUSA DI CHIARA & TSOLAKIS 1995a). Resistant strains have been found in field also for this species (IVANCICH-GAMBARO 1975).

The species was reported by many authors as *Amblyseius potentillae* (GARMAN); but it was recently demonstrated that this latter species is synonym of *A. andersoni* (CHANT & YOSHIDA-SHAUL 1990).

A. clavatus and *A. verrucosus* described by WAINSTEIN 1972 were also found in Crimea (KOLODOCHKA 1981). These species are now mentioned for the first time in Styria (Austria). No data on their biology are known; but, due to their frequent presence in the region, it would be worthwhile deepening our knowledge on their biological parameters.

T. cryptus described from Algeria (ATHIAS-HENRIOT 1960) is very common in the Mediterranean region and in Canada (MORAES, MCMURTRY & DENMARK 1986); in Sicily (Italy) it was surveyed as the most common species associated with different kinds of plants (RAGUSA DI CHIARA & TSOLAKIS 1995b). The species is new for Styria (Austria).

As far as the remaining species, *T. affinis laurae*, *T. recki*, *T. exhilaratus*, *T. ernesti*, *S. amaliae*, *K. ericinus*, *A. rademacheri*, *A. setosa*, *T. pyri* and *T. tiliarum*, are concerned, only few specimens were collected and sporadically; the first eight species are here recorded for the first time in Styria (Austria), while the last two were already reported (EL-BOROLOSSY & FISCHER-COLBRIE 1989a).

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