

THE BIODIVERSITY OF THYSANOPTERA AT THE GREAT SMOKY MOUNTAINS NATIONAL PARK (U.S.A.), AN INTRODUCTION

Arturo Goldarazena¹ & Laurence Mound²

¹ NEIKER, Instituto Vasco de Investigación y Desarrollo Agrario. Departamento de Producción y Protección Vegetal.

Antigua Carretera Nacional 1 km 255 Granja Modelo Arkaute. Álava Euskadi, Spain – a.goldarazena@neiker.net

² CSIRO Department of Entomology. GPO Box 1700 Canberra A.C.T. 2601 Australia – Laurence.Mound@csiro.au

Abstract: In this paper the preliminary results about the biodiversity of the Order Thysanoptera (Class Insecta) from the Smokie Mountains National Park (United States of America) are presented. The thrips have been sampled using Malaise traps and leaf litter samples processed in Tüllgren funnels. The traps have been distributed in different ecosystems throughout the Park in the States of Tennessee and North Carolina.

Key words: Thysanoptera, thrips, Biodiversity, Smokie Mountains National Park, Apalachian trail, United States of America

Biodiversidad de Thysanoptera en el Parque Nacional de las Smokie Mountains (Estados Unidos de América), una introducción

Resumen: En este trabajo se presentan los resultados preliminares correspondientes al estudio de la biodiversidad del Orden Thysanoptera (Clase Insecta) del Parque Nacional de las Smokie Mountains (Estados Unidos de América). Los thrips han sido capturados mediante trampas Malaise y mediante la extracción de muestras de suelo que han sido procesadas en embudos de Tüllgren. Las trampas estaban colocadas en distintos ecosistemas a lo largo del Parque en los Estados de Tennessee y Carolina del Norte.

Palabras clave: Thysanoptera, thrips, Biodiversidad, Parque Nacional de las Smokie Mountains, Apalaches, Estados Unidos de América.

1. Introduction

1.1. The study of the diversity of life in the Smokies

Great Smoky Mountains National Park comprises more than half a million acres and serves as refuge for one of the richest and most diverse communities of plants and animals in the temperate world. The richness has led to the park's designation as an International Biosphere Reserve. Climate, topography, the north-south orientation of the mountains, large tracts of old-growth and contiguous forests, and protection as a national park have all contributed to this abundance.

But while we know the park possesses a vast and varied assemblage of life forms, there is still much we don't know in terms of the number and identity of species. Consider, for instance, that some people estimate the park possesses more than 100,000 species excluding bacteria –yet only a small percentage has been surveyed and identified. Because of this lack of basic resource knowledge, National Park Service managers are continually hampered in their critical decision making efforts.

A new research initiative has grown from the need to learn more about all of the park's varied species. Termed an All Taxa Biodiversity Inventory (ATBI), this research effort represents a comprehensive inventory of all life forms in Great Smoky Mountains National Park. It may be completed in 10-15 years and therefore represents a comprehensive undertaking. Before it is finished, the project will tap the expertise of taxonomists (*people who differentiate, classify plants and animals and are interested in discovering how they live*), data specialists, biologists, botanists and ecologists, among others. Once completed ATBI will provide a baseline from which to measure change. In conduc-

ting their research, these specialists will sample the park, discovering and documenting nearly all the species that occur there. This type of scientific survey has never been undertaken on such a scale anywhere in the world, and it will serve as a model for future projects in other national parks and protected areas. This effort is founded on the notion that knowledge is essential for effective preservation.

The park must complete its all taxa inventory as soon as possible if it hopes to preserve the greatest number of resources and acquire the knowledge necessary to make better informed management decisions. Specifically, the goals of the inventory are to:

1. Complete a comprehensive "Checklist" of life forms in the park.
2. Gather data to create initial range maps for each species. These maps, based on extrapolations from sampled habitats, will be crucial for the protection of natural resources.
3. Compile natural history information on each species, including its relative abundance, its response to various climatic conditions, photographs of each of its life stages, its role in the greater ecosystem, its relationship with other species, and digital recordings of its calls or sounds.
4. Organize the information gathered and make it available to scientist, educators, land managers, students, and all other interested parties via the World Wide Web and other media.

The project is funded by universities, colleges, museums, other government agencies and many private partners. As a result, a non-profit organization formed from the

park's non-government partners called Discover Life in America (<http://www.discoverlifeinamerica.org>) is working with the National Park Service and other interested agencies to design the project, make the necessary field collections, process and identify specimens, analyze and archive the data, organize volunteers, accommodate scientist, obtain funding, and maintain web pages of resulting information.

1.2. The knowledge of the fauna of the Thysanoptera in the Smokies

This report contains the first comprehensive study of the fauna of the Order Thysanoptera in the Smoky Mountains National Park. More than 1,200 specimens were studied from more than 30 sampling plots distributed in Tennessee and North Carolina. These specimens were collected by Discover Live in America in Malaise traps, Pit fall traps and Lindgren traps, during 1996-1997 and 2002-2003. As a result, these specimens lack information about their host plants and the micro-ecosystems and their fungal associations. During summer 2005 the senior author has been sampling at the Smoky Mountains National Park funded partially by Discover Life in America (DLIA2005-17). Most than 200 samples were collected including biological information (host plants, fungal associations, georeferences etc). This material will be studied next winter and probably the results will increase the number of species shown on this paper.

In United States, the most comprehensive faunistic studies, with keys to families and genera, deal with the faunas of Illinois (Stannard, 1968) and California (Bailey, 1957 ; Cott, 1956). Some keys for Phlaeothripid genera of North America are also available (Stannard, 1957). Nakahara (1994) provided keys to the New World members of the genus *Thrips*, together with a key to distinguish this genus from several similar genera. J. D. Hood of Cornell University described about 1000 species of thrips from the New World (Hoebeker, 1974; Pitkin, 1978), but he did not publish keys to identify these species, nor any biological overview to guide new students.

The objective of this project is to increase the knowledge of the biodiversity of thrips of the Great Smoky Mountains National Park. Thrips exhibit a wide range of life-histories, from flower feeding to fungus-feeding and predation, and they share with the Hymenoptera the tendency to sociality (Mound & Teulon, 1995; Crespi et al. 2004). They are small to minute insects, with the adult body size ranging from 0.5 mm to 15 mm. Adults typically have four slender wings, each with a long fringe of marginal cilia, but their most remarkable feature is the asymmetry of the mouthparts; only the left mandible is present. The tarsal claws are reduced in adults to an arolium that can be dilated hydrostatically (Mound and Heming, 1991). The life cycle is intermediate between holometabolous and hemimetabolous insects (Moritz, 1995). There are several previous studies on North American Thysanoptera. The most comprehensive faunistic studies, with keys to families and genera, deal with the faunas of Illinois (Stannard, 1968) and California (Bailey, 1957 ; Cott, 1956). Some keys for Phlaeothripid genera of North America are also available (Stannard, 1957). Nakahara (1994) provided keys to the New World members of the genus *Thrips*, together with a key to distinguish this genus from several similar genera.

2. Material and Methods

Collecting. The specimens of this report were collected in Pitfall traps, Malaise traps and Lindgren funnel traps and in Berlese funnels. Most of the material collected during the survey throughout July 2005 will be studied and published next year. The thrips were collected into AGA fluid (60% alcohol, glacial acetic acid; glycerine in the proportions 10:1:1), to keep the specimens relaxed. In order to produce the very best microscopical preparations it is advisable to manipulate each specimen within 24 hours of collecting using micro-pins, with the intention of leaving each one fully stretched; the abdominal intersegmental membranes should be visible, the legs and wings extended, and the antennae laid horizontal by pressing on the basal segments. Specimens can then be stored in 60% alcohol in a refrigerator for some weeks before being mounted onto slides.

Habitats for sampling. It is essential to make careful observations on living specimens living in flowers and on leaves, dead branches and dead leaves. The quickest way to sample thrips and to obtain specimens in good condition is to beat flowers, vegetation and dead branches over a small plastic tray. Specimens are then picked up into a small vial with AGA using a small brush. It is very important to collect thrips from individual leaves, flowers and other microecosystems to certify their host association. All the samples will be entered against each serial number in a suitable note book computer. This serial number will be appear on the label of each slide-mounted specimen. The computer record will be enriched by recording the numbers and sexes of all specimens that are not mounted onto slides.

Microscopic slide preparation. The specimens will be prepared in Canada Balsam according to Mound & Marullo (1996). For quick identifications some of the specimens will be mounted on Hoyers water soluble mountant.

3. Results

Family PHLAEOTHIRIPIDAE

Subfamily PHLAEOTHIRIPINAE

Genus *Eurythrips*

Eurythrips batesi

Eurythrips longilabris

Eurythrips hindsii

Eurythrips tarsalis

Eurythrips pusillus

Genus *Glyptothrips*

Glyptothrips reticulatus

Glyptothrips claviger

Glyptothrips flavescens

Genus *Haplothrips*

Haplothrips subtilissimus

Genus *Hoplandrothrips*

Hoplandrothrips jennei

Genus *Hoplothrips*

Hoplothrips pergandei

Genus *Karnyothrips*

Karnyothrips sonorensis

Karnyothrips sp.

Genus *Leptothrips*

Leptothrips mali

Genus *Liothrips*
Liothrips sp.

Genus *Lissothrips*
Lissothrips muscorum

Genus *Malacothrips*
Malacothrips zonatus

Genus *Neurothrips*
Neurothrips magnafemoralis

Genus *Plectrothrips*
Plectrothrips antennalis

Genus *Pygmaeothrips*
Pygmaeothrips angusticeps

Family AEOLOTHRIPIDAE
Aeolothrips albicinctus

Family HETEROTHRIPIDAE
Heterothrips moestus
Heterothrips vitifloridus

Family THRIPIDAE

Subfamily PANCHAETOTHRIPINAE
Genus *Caliothrips*
Caliothrips phaseoli

Subfamily DEBDROTHRIPINAE
Genus *Leucothrips*
Leucothrips piercei

Subfamily SERICOTHRIPINAE
Genus *Neohydatothrips*
Neohydatothrips nubilipennis
Neohydatothrips sambuci
Neohydatothrips tiliae

Genus *Sericothrips*
Sericothrips cingulatus

Subfamily THRIPINAE
Genus *Anaphothrips*
Anaphothrips obscurus

Genus *Aptinothrips*
Aptinothrips rufus
Aptinothrips stylifer

Genus *Chirothrips*
Chirothrips falsus

Genus *Echinothrips*
Echinothrips subflavus

Genus *Frankliniella*
Frankliniella fusca
Frankliniella occidentalis
Frankliniella tritici

Genus *Odontothrips*
Odontothrips sp.

Genus *Oxythrips*
Oxythrips sp.

Genus *Plesiothrips*
Plesiothrips perplexus

Genus *Scirtothrips*
Scirtothrips sp.

Genus *Taeniothrips*
Taeniothrips inconsequens

Genus *Thrips*
Thrips albogilvus Nakahara
Thrips thalictri

Material studied (Genera listed in alphabetical order)

SUBORDER TEREBRANTIA

Genus *Aeolothrips* Haliday

About 80 species are currently recognised in this genus, almost all from the Holarctic region. The species live in flowers, feed on pollen and on small arthropods but some of them live at the base of grasses. The systematics of North American species require further study (Mound and Marullo, 1996).

Aeolothrips albicinctus Haliday, 1836

1 female [aptera] North Carolina (Coyle) Tullgren trap 17 July 1997.

Aeolothrips sp.

1 male North Carolina (Coyle) Tullgren trap 17 July 1997; 1 male North Carolina (Coyle) Tullgren trap 22 September 1996.

Genus *Anaphothrips* Uzel

About 55 species are currently included in this genus, with 17 species recorded in North America, and all are associated with Gramineae (Nakahara 1995).

Anaphothrips obscurus (Müller, 1776)

1 female Tennessee (Blount Co., Cades Cove) Pitfall 14 leg. Parker, Stocks and Petersen 3-17 June 2002.

Genus *Aptinothrips* Haliday

This genus includes four species, all wingless and with a particularly long slender body. They are associated with grasses and one species is now widespread around the world (Palmer, 1975).

Aptinothrips rufus (Haliday, 1836)

1 female North Carolina (Swain Co., Ravensford grassland) Tullgren sample near Pitfall 1, leg. Parker, Stocks and Petersen, 30 October 2001; 2 females North Carolina (Swain Co., Andrews Bald) Pitfall 51, leg. Parker, Stocks and Petersen, 19 June-3 July 2002; 15 females North Carolina (Coyle) Tullgren trap, 17 July 1997; 2 females North Carolina (Coyle) Tullgren trap 22 September 2006; 9 females North Carolina (Coyle) Tullgren trap, 15 May 1997; 5 females North Carolina (Coyle) Tullgren trap, 5 June 1996; 10 females North Carolina (Coyle) Tullgren trap, 8 August 1996; 2 females North Carolina (Coyle) Tullgren trap, 6 September 1997; 1 female North Carolina (Coyle) Tullgren trap, 10 June 1997; 2 females North Carolina (Coyle) Tullgren trap, 27 June 1996; 3 females Tennessee (Blount Co., Cades Cove) Pitfall 14, 15 leg. Parker, Stocks and Petersen 3-17 June and 12-26 August 2002. All the studied specimens were apterous.

Aptinothrips stylifer Trybom, 1894

1 female North Carolina (Coyle) Tullgren trap 22 September 2006; 17 females North Carolina (Coyle) Tullgren trap, 17 July 1997; 2 females North Carolina (Coyle) Tullgren trap, 15 May 1997; 6 females North Carolina (Coyle) Tullgren trap, 5 June 1996; 2 females North Carolina (Coyle) Tullgren trap, 8 August 1996. All the studied specimens were apterous.

Genus *Caliothrips* Daniel

Twenty species are currently recognised in this genus (Nakahara, 1991), about a half of them from the USA but the others from different parts of the tropics worldwide. Some of the species seem to be associated with grasses but *C. phaseoli* some times is a minor pest of beans and cotton.

Caliothrips phaseoli Hood, 1912

1 male North Carolina (Swain Co., Ravensford wellard), Tullgren sample near Pitfall 27 30 October 2001.

Genus *Chirothrips* Haliday

These thrips live in grass flowers and Zur Strassen (1960) provided keys to the world species. All the members of the group breed only in the flowers of Gramineae (Mound and Marullo, 1996).

Chirothrips falsus Priesner, 1925

1 female North Carolina (Coyle), Tullgren trap 5 June 1996.

Genus *Echinothrips* Moulton

This is a highly characteristic New World genus. Three species have been recorded in the USA. Some of them are apparently host-specific, but the various hosts are quite unrelated (Mound and Marullo, 1996).

Echinothrips subflavus Hood, 1927

1 female North Carolina (Haywood Co., Cataloochee), Malaise trap 09 leg. Parker, Stocks and Petersen 10-18 October 2001; 1 female Tennessee (Sevier Co., Twin Creeks) Pitfall 06 leg. Parker, Stocks and Petersen 6-30 May 2002.

Genus *Frankliniella* Karny

This is a large genus of about 180 species, 90% of which are from the Neotropics (Jacot-Guillarmod, 1974). Many species live in flowers and are associated with Compositae, but others seem to be polyphagous. Some species are important pests and has economic importance in agriculture.

Frankliniella fusca Hinds, 1902

1 female [macroptera] North Carolina (Haywood Co., Purchase Knob) Pitfall 84 leg., Parker, Stocks and Petersen 10-26 April 2002; 1 female North Carolina (Sevier Co., Brushy Mountain), Lindgren funnel trap 10 leg. Parker, Stocks and Petersen 27 March to 11 April 2002; 1 female North Carolina (Coyle) Tullgren trap 15 May 1997; 3 females [1 microptera] North Carolina (Coyle) Tullgren trap 17 July 1997; 1 female [microptera] North Carolina (Coyle) Tullgren sample, 5 June 1996; 5 females [macropterae] North Carolina (Coyle) Tullgren sample, 10 June 1997; 1 female [macroptera] North Carolina (Coyle) Tullgren sample, 27 June 1996; 1 female [macroptera] North Carolina (Coyle) Tullgren sample, 16 May 1997; 2 females [macropterae] and 2 males [macropterae] North Carolina (Swain Co., Andrews Bald) Pitfall 52, 54, 58, 60 leg. Parker, Stocks and Petersen 14-27 April and 19 June-3 July 2002; 9 females [macropterae] North Carolina (Haywood Co., Cataloochee) Pitfall 49, 50 leg., Parker, Stocks and Petersen 10-26 April and 18 June-3 July 2002; 5 females [macropterae], 7 females [micropterae] and 1 male Tennessee (Blount Co., Cades Cove), Pitfalls 11, 14, 16, 17, 18 and 19 leg. Parker, Stocks and Petersen 24 April-12 August 2002; 2 females Tennessee (Cocke Co., Snackeden Ridge) Lindgren funnel traps 19, 20 leg. Parker, Stocks and Petersen 6 April-6 May 2002; 1 female [macroptera] Tennessee (Cocke Co., Allbright Grove) Pitfall 86 leg., Parker, Stocks and Petersen 29 April-6 May 2002; 1 female [macroptera] Tennessee (Cocke Co., Allbright Grove) Lindgren funnel trap 17 leg., Parker, Stocks and Petersen 12 May-15 June 2002; 4 females [macropterae] Tennessee (Sevier Co., Clingmans Dome) Pitfall 72, 75 leg., Parker, Stocks and Petersen 10 May-19 June 2002; 2 females [macropterae] Tennessee (Sevier Co., Porter's Cove Trail) 200 passes beyond Point Creek bridge 24-25 August 1996; 27 females [macropterae] Tennessee (Sevier Co., Brushy Mountain) Pitfall 66, 67, 69, 70 leg., Parker, Stocks and Petersen 30 April-18 June 2002; 1 female [macroptera] Tennessee (Sevier Co., Brushy Mountain) Lindgren funnel trap 04 leg., Parker, Stocks and Petersen 30 June-16 July 2002; 6 females [macropterae] and 2 males [macropterae] Tennessee (Sevier Co., Indian Gap) Pitfall 22, 26 and 29 leg., Parker, Stocks and Petersen 27 April-19 June 2002; 1 female [macroptera] Tennessee (Blount Co., Cades Cove) Pitfall 13, leg., Parker, Stocks and Petersen 23 April-12 May 2003; 2 female [macropterae] Ten-

nessee (Blount Co., Cades Cove) Lindgren funnel traps 03, 04 leg., Parker, Stocks and Petersen 26 April-9 May 2002.

Frankliniella occidentalis (Pergande, 1895)

2 females Tennessee (Sevier Co., Tween Creeks) Pitfall 01, 02 leg., Parker, Stocks and Petersen 8-15 April and 16-31 July 2002; 1 female Tennessee (Sevier Co., Twin Creeks) Lindgren funnel trap 02 leg. Parker, Stocks and Petersen 21 June-2 July 2002; 1 female Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 04 16 August-23 September 2002; 1 female Tennessee (Blount Co., Cades Cove) Pitfall 20 leg., Parker, Stocks and Petersen 1-14 August 2002; 3 females Tennessee (Cocke Co., Snackeden Ridge) Lindgren funnel traps 19, 20 leg. Parker, Stocks and Petersen 5-21 June and 2 July-7 August 2002; 1 female North Carolina (Swain Co., Andrews Bald) Lindgren funnel trap 12 leg., Parker, Stocks and Petersen 7 August-4 September 2002. All the specimens studied were macropterous.

Frankliniella tritici Fitch, 1855

3 males North Carolina (Coyle) Tullgren sample, 8 August 1996; 4 females North Carolina (Coyle) Tullgren sample 27 June 1996; 1 female North Carolina (Coyle) Tullgren sample 8 August 1996; 9 females and 1 male North Carolina (Coyle) Tullgren sample 10 June 1997; 3 females North Carolina (Coyle) Tullgren sample 22 September 1996; 1 female North Carolina (Coyle) Tullgren sample 6 September 1997; 2 females and 2 males North Carolina (Coyle) Tullgren sample 15 May 1997; 5 females and 10 males North Carolina (Coyle) Tullgren sample 4 June 1996; 14 females and 7 males North Carolina (Swain Co., Andrews Bald) Pitfall 51, 55, 53, 57, 58, 60 leg. Parker, Stocks and Petersen 10 May-3 July 2002; 32 females and 7 males North Carolina (Swain Co., Andrews Bald) Lindgren funnel trap 11, 12 leg., Parker, Stocks and Petersen 3 July-11 September 2002; 14 females North Carolina (Haywood Co., Purchase Knob) Lindgren funnel traps 07, 08 leg., Parker, Stocks and Petersen 10 April-20 August 2002; 1 male North Carolina (Haywood Co., Purchase Knob) Pitfall 37 leg., Parker, Stocks and Petersen 26 April-8 May 2002; 21 females North Carolina (Haywood Co., Cataloochee) Lindgren funnel traps 09, 10 leg., Parker, Stocks and Petersen 26 April-10 August 2002; 1 female North Carolina (Haywood Co., Cataloochee) Pitfall 47 leg., Parker, Stocks and Petersen 26 April-8 May 2002; 4 females and 2 males Tennessee (Sevier Co., Twin Creeks), Lindgren funnel trap 01, 02, 14, leg. Parker, Stocks and Petersen, 30 May-14 August 2002; 5 females Tennessee (Sevier Co., Twin Creeks), Pitfall 05, 06, leg., Parker, Stocks and Petersen 6-21 July 2002; 18 females and 36 males Tennessee (Blount Co., Cades Cove) Pitfall 11, 13, 15, 16, 17, 18, 19 leg., Parker, Stocks and Petersen 7 October-17 July 2002; 9 females and 1 male Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 04 leg., Parker, Stocks and Petersen 15-26 August 2002; 21 females and 25 males Tennessee (Sevier Co., Brushy Mountains) Lindgren funnel traps 14-17 leg., Parker, Stocks and Petersen 24 May-16 July 2002; 28 females and 11 males Tennessee (Sevier Co., Brushy Mountain) Pitfall 61, 63, 66, 67, 68, 69, 70 leg., Parker, Stocks and Petersen 3 June-25 November 2002; 35 females and 1 male Tennessee (Sevier Co., Clingmans Dome) Lindgren funnel traps 15, 16 leg., Parker, Stocks and Petersen 30 August-12 September 2002; 2 females Tennessee (Sevier Co., Clingmans Dome) Pitfall 72 leg., Parker, Stocks and Petersen 10 May-19 June 2002; 7 females and 2 males Tennessee (Cocke Co., Allbright Grove) Lindgren funnel traps 17, 18 leg., Parker, Stocks and Petersen 14 April-15 June 2002; 1 female Tennessee (Cocke Co., Allbright Grove) Pitfall 03 leg., Parker, Stocks and Petersen 12 May-15 June 2002; 6 females Tennessee (Cocke Co., Snackeden Ridge) Lindgren funnel traps 19, 20 leg., Parker, Stocks and Petersen 2 July-1 August 2002; 6 females Tennessee (Sevier Co., Goshen Prong)

Lindgren funnel trap 21 leg., Parker, Stocks and Petersen 25 April 2002; 2 females Tennessee (Sevier Co., Gosheng Prong) Pitfall 10 leg., Parker, Stocks and Petersen 7-20 June 2002; 6 females and 1 male Tennessee (Sevier Co., Indian Gap) Lindgren funnel traps 05, 06 leg., Parker, Stocks and Petersen 3-18 July 2002; 1 female Tennessee (Sevier Co., Indian Gap) Pitfall 28 leg., Parker, Stocks and Petersen 2-18 October 2002; All the specimens studied were macropterous.

Genus *Heterothrips* Hood

The family Heterothripidae is distributed entirely in the New World. Almost nothing is known of the biology of any of these species because they are so uncommonly collected, although they seem to be flower living. At present 61 species are recognised in this genus with three species in synonymy (Mound and Marullo, 1996). Bailey and Cott (1955) provided keys to the North American and Johansen (1989) gave keys for Mexican species but the range of characters used for species discrimination is not adequate in either key. Nineteen species have been recorded in USA.

Heterothrips moestus De Santis, 1966

4 female and 1 male Tennessee (Sevier Co., Brushy Mountain) Pitfalls 61-63-64 leg. Parker, Stocks and Petersen 27 March- 11 April, 11-30 April 2002; 1 female Tennessee (Sevier Co., Brushy Mountain) Lindgren funnel trap 13 leg. Parker, Stocks and Petersen 17 March-11 April 2002; 1 female Tennessee (Sevier Co., Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 25 August 2002; 1 female Tennessee (Sevier Co., Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 25 April 2002; Tennessee (Sevier Co., Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 1-11 April 2002; 1 female Tennessee (Sevier Co., Clingmans Dome) Lindgren funnel trap 15 leg. Parker, Stocks and Petersen 14 March to 10 May 2003; 1 female Tennessee (Sevier Co., Clingmans Dome) Lindgren funnel trap 16 leg. Parker, Stocks and Petersen 10 May to 19 Jun 2003; 1 female Tennessee (Cocke Co., Snakeden Ridge) Lindgren funnel trap 20 leg. Parker, Stocks and Petersen 6 April-6 May 2002; 6 females Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 03 leg. Parker, Stocks and Petersen 31 March-23 April 2003; 1 female Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 04 leg. Parker, Stocks and Petersen 18-31 March 2003; 1 female North Carolina (Swain Co., Andrews Bald) Lindgren funnel trap 12 leg. Parker, Stocks and Petersen 20 March-14 April 2002; 2 female North Carolina (Haywood Co., Purchase Knob) Lindgren funnel trap 07, 08 leg. Parker Stocks and Petersen 15 March-10 May 2003 and 10-26 April 2002.

Heterothrips vitifloridus Bailey and Cott, 1955

4 females Tennessee (Sevier Co., Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 7 March-25 April 2002; 1 female Tennessee (Sevier Co. Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 1-11 April 2002; 1 female Tennessee (Sevier Co., Gosheng Prong) Lindgren 21 leg. Parker, Stocks and Petersen Lindgren funnel trap 21 7 March-1 April 2002; 1 female Tennessee (Cocke Co., Allbright Grove) Lindgren funnel trap 17, 18, leg. Parker, Stocks and Petersen 14-29 April and 29 April-6 May 2002.

Genus *Leucothrips* Reuter

The species that are currently placed in the genus can be collected frequently from the juvenile foliage of trees in many parts of Central America and the Caribbean. These species are all pale, almost white in colour, and they are very difficult to prepare for detailed study. As a result it is not possible at present to be sure how many species should be distinguished (Mound and Marullo, 1996).

Leucothrips piercei (Morgan, 1913)

1 female Tennessee (Cocke Co., Allbright Grove) Lindgren funnel trap 18 leg. Parker. Stocks and Petersen 1-14 August 2002.

Genus *Neohydatothrips* John

About 80 species worldwide are currently placed in this genus. Colour patterns of the wings and body are used extensively to define species in this group, but there is little field-based evidence that these colour patterns are entirely stable.

Neohydatothrips nubilipennis (Hood, 1924)

1 female and 1 male Tennessee (Sevier Co., Twin Creeks) Lindgren funnel trap 01, leg. Parker, Stocks and Petersen 31 July-15 August 2002; 1 female North Carolina (Coyle) Tullgren trap 8 August 1996.

Neohydatothrips sambuci (Hood, 1924)

1 male Tennessee (Sevier Co., Twin Creeks) Lindgren funnel trap 14, leg. Parker, Stocks and Petersen 31 July-15 August 2002; 1 male North Carolina (Swain Co., Andrews Bald), Lindgren funnel trap 12, leg. Parker, Stocks and Petersen 10 May-19 June 2002; 2 females North Carolina (Haywood Co., Purchase Knob) Lindgren funnel trap 07 and 08, 7 October-9 November 2002; 1 male North Carolina (Swain Co., Ravensford upland forest) near Pitfall 31 leg., Parker, Stocks and Petersen 30 October 2001; 1 female North Carolina (Coyle) Tullgren sample, 6 September 1997.

Neohydatothrips tiliae (Hood, 1931).

1 female Tennessee (Cocke Co., Allbright Grove) Lindgren funnel trap 17, leg. Parker, Stocks and Petersen 24 August-13 September 2002

Genus *Odontothrips* Amyot and Serville

These species are associated with Fabaceae and most of the species are Palaearctic.

Odontothrips sp.

3 females Tennessee (Cocke Co., Snakeden Ridge) Lindgren funnel trap 20 leg. Parker, Stocks and Petersen 14 May-6 June 2002.

Genus *Oxythrips* Uzel

There are about 45 species in this genus, most of which are listed by Johansen and Mojica (1986), who also provide a key to the New World species. Several species in the Holarctic area are associated with the male cones of Pinus trees.

Oxythrips sp.

9 females and 1 male Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 03, 04 leg. Parker, Stocks and Petersen 23 April-12 May 2003 and 31 March-23 April 2003; 2 females Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 04 leg. Parker, Stocks and Petersen 9 May-3 June 2002; 2 female and 1 male Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 03 leg. Parker, Stocks and Petersen 31 March-23 April 2003; 2 females and 3 males Tennessee (Cocke Co., Allbright Grove) Lindgren funnel trap 17 leg. Parker, Stocks and Petersen 20 March-29 April 2002; 4 females Tennessee (Cocke Co., Snakeden Ridge) Lindgren funnel trap 20 leg. Parker, Stocks and Petersen 3 March-30 April 2002; 1 female Tennessee (Cocke Co., Snakeden Ridge) Lindgren funnel trap 20 leg. Parker, Stocks and Petersen 6 April-6 May 2002; 3 females Tennessee (Swain Co. Andrews Bald Lindgren funnel trap 12 leg. Parker, Stocks and Petersen 14-27 April 2002).

Genus *Plesiothrips* Hood

This is a complex Neotropical genus of about 18 species which presumably live on Gramineae (Mound and Marullo, 1996). Six species have been recorder in the USA.

Plesiothrips perplexus Beach, 1897

1 female North Carolina (Coyle) Tullgren trap 22 September 1996.

Genus *Scirtothrips* Shull

Almost 60 species are now placed in this worldwide genus, several of which are important pests (Mound and Palmer, 1981). The species are all leaf-feeders.

Scirtothrips sp.

1 female Tennessee (Sevier Co., Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 25 April 2002

Genus *Scotothrips* Hinds

There are about 18 species in this genus, and Priesner (1950) provided the most recent taxonomic account and key to species. These thrips are predators of spider mites and they have been found throughout the world (Mound and Marullo, 1996).

Scotothrips sp.

1 female Tennessee (Sevier Co., Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 25 April 2002

Genus *Sericothrips* Haliday

The genus is now restricted to a small group of species all of which show a tendency toward wing-reduction (Bhatti, 1973). The fully macropterous species are currently placed in *Hydatothrips* or *Neohydatothrips*, depending on the form of the metasternum (Nakahara, 1988).

Sericothrips cingulatus Hinds, 1902

3 females [apterae] and 2 males [apterae] Tennessee (Blount Co., Cades Cove) Pitfall 14 leg. Parker, Stocks and Petersen 21 October-26 August and 26 April-9 May 2002; 3 female [apterae] Tennessee (Blount Co., Cades Cove) Pitfall 11 leg. Parker, Stocks and Petersen 29 July-26 August 2002; 7 females [apterae] and 2 males [apterae] Tennessee (Blount Co., Cades Cove) Pitfall 13 leg. Parker, Stocks and Petersen 29 July-12 August 2002; 2 females [apterae] Tennessee (Blount Co., Cades Cove) Pitfall 11 leg. Parker, Stocks and Petersen 12-26 August 2002; 4 females [apterae] Tennessee (Blount Co., Cades Cove) Pitfall 13 and 19 leg. Parker, Stocks and Petersen 26 August-23 Septiembre 2002; 1 female [aptera] Tennessee (Cocke Co., Snakeden Ridge) Lindgren funnel trap 19, leg. Parker, Stocks and Petersen 30 August-13 September 2002; 1 female [macroptera] Tennessee (Sevier Co., Clingmans Dome) Lindgren funnel trap 16 leg. Parker, Stocks and Petersen 19 June-18 July 2002; 2 females [apterae] North Carolina (Swain Co., Andrews Bald) Pitfall 51 leg. Parker, Stocks and Petersen 19 Jun-3 July 2002.

Genus *Taeniothrips* Amyot and Serville

This genus now includes about 20 species, all but one from the Old World and most of them from south east Asia. .

Taeniothrips inconsequens Uzel, 1845

This European species has long been regarded as a pest of pome fruit trees in California and more recently of sugar maple trees in the eastern States (Teulon % Cameron, 1995). 3 females Tennessee (Sevier Co. Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 7 March-1 April 2002; 1 female Tennessee (Sevier Co., Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 25 April 2002; 1 female Tennessee (Sevier Co., Gosheng Prong) Malaise trap 21 leg. Parker, Stocks and Petersen 28 March-9 April 2001; 3 females Tennessee (Cocke Co., Allbright Grove) Lindgren funnel trap 17 leg. Parker, Stocks and Petersen 14-29 April 2002; 1 female Tennessee (Cocke Co., Allbright Grove) Lindgren funnel trap 18 leg. Parker, Stocks and Petersen 29 March-29 April; 1 female Tennessee (Cocke Co., Snakeden Ridge) Lindgren funnel trap 19 leg. Parker, Stocks

and Petersen 6 April-6 May 2002; 1 female North Carolina (Haywood Co., Cataloochee) Lindgren funnel trap 09 leg. Parker, Stocks and Petersen 10-22 April 2002; 3 females North Carolina (Haywood Co., Purchase Knob) Lindgren funnel trap 08 and 07 15 March-10 May 2003.

Genus *Thrips* Linnaeus

With about 280 species, this is one of the largest genera in the Thysanoptera (Mound and Marullo, 1996). Nakahara (1994) included 62 species in the genus *Thrips* from North America (43 endemics).

Thrips albogilvus Nakahara, 1994

1 female Tennessee (Sevier Co., Gosheng Prong) Lindgren funnel trap 21 leg. Parker, Stocks and Petersen 25 April 2002.

Thrips thalictri Hood, 1931.

1 female Tennessee (Sevier Co., Clingmans Dome) Lindgren funnel trap 15 leg. Parker, Stocks and Petersen 19 June-18 July 2002; 3 females Tennessee (Blount Co., Cades Cove) Pitfall 17 leg. Parker, Stocks and Petersen, 1-17 June 2002; 1 female North Carolina (Swain Co., Andrews Bald) Lindgren funnel trap 11 leg. Parker, Stocks and Petersen 10 May-19 June 2002.

SUBORDER TUBULIFERA

Genus *Eurythrips* Hinds

All the species included in this genus are fungus-feeders in leaf litter. Some species in *Eurythrips* have a very wide geographical distribution in the New World between southern Brazil and northern USA. Fourteen species have been recorded in the USA (Mound, 1976). *Eurythrips*, *Tylothrips* and *Terthrothrips* have a very wide geographical distribution in the New World although *Tylothrips osborni* has been recorded in Spain (Goldarazena and Mound, 1997).

Eurythrips batesi (Watson, 1935)

1 female and 2 males North Carolina (Swain Co., Ravensford upland forest) near Pitfall 35, leg. Parker, Stocks and Petersen, 30 October 2001; 1 female North Carolina (Swain Co., Ravensford upland forest) near Pitfall 37, leg. Parker, Stocks and Petersen, 28 December 2001; 3 females North Carolina (Swain Co., Ravensford wetland) Tullgren sample of mosses along the stream, leg. Parker, Stocks and Petersen, 30 October, 2001.

Eurythrips hindsii Morgan, 1913

1 female [aptera] Tennessee (Blount Co., Cades Cove), Pitfall 17, leg. Parker, Stocks and Petersen, 1-15 June 2002; 21 females [apterae] Tennessee (Blount Co., Cades Cove), Pitfall 18, leg. Parker, Stocks and Petersen, 9 May-26 August; 1 female [macroptera], 5 females [apterae] Tennessee (Blount Co., Cades Cove), Pitfall 19, leg. Parker, Stocks and Petersen, 1 July-12 August 2002; 8 females [apterae] and 1 male [aptera] North Carolina (Swain Co., Ravensford grassland) Pitfall 7, leg. Parker, Stocks and Petersen, 30 October 2001; 12 females [apterae] and 2 males [apterae] North Carolina (Swain Co., Ravensford grassland) near Pitfall 3, leg. Parker, Stocks and Petersen, 30 October 2001; 1 female [aptera] and 1 male [aptera] North Carolina (Coyle) Tullgren trap, 17 July 1997; 1 female North Carolina (Coyle) Tullgren trap, 5 June 1996; 2 females [macroptera] North Carolina (Coyle) Tullgren trap, 8 August 1996.

Eurythrips longilabris Watson, 1921

1 female Tennessee (Blount Co., Cades Cove), Pitfall 17, leg. Parker, Stocks and Petersen, 4-8 November 2002.

Eurythrips pusillus Hood, 1957

5 females and 1 male [apterae] North Carolina (Coyle) Tullgren trap, 17 July 1997; 2 males North Carolina (Coyle) 15

May 1997; 7 females [apterae] and 3 males [aptera] North Carolina (Coyle) 8 August 1996; 9 females [apterae] and 2 males [apterae] North Carolina (Coyle) Tullgren trap, 15 May 1997; 2 females [apterae] North Carolina (Coyle) Tullgren trap, 5 June 1996; 2 females [apterae] Tennessee (Blount Co., Cades Cove) Pitfall 17, leg. Parker, Stocks and Petersen, 1-29 July 2002; 1 female [aptera] and 2 males [apterae] Tennessee (Blount Co., Cades Cove) Pitfall 13, leg. Parker, Stocks and Petersen, 1-15 June 2002.

Eurythrips tarsalis Hood, 1925

4 females [1 macroptera] and 2 males [apterae] North Carolina (Coyle) Tullgren trap 15 May 1997; 4 females [2 macropterae] and 2 males [apterae] North Carolina (Coyle) Tullgren trap 17 July 1997; 1 female [aptera] North Carolina (Coyle) Tullgren trap 15 June 1996.

Genus *Glyptothrips* Hood

All of species included in the genus are fungus-feeders in leaf litter. Six species have been recorded in the USA (Mound and Marullo, 1996).

Glyptothrips claviger (Hood, 1941)

1 female and 1 male North Carolina (Haywood Co., Purchase Knob) Pitfall 31, leg. Parker, Stocks and Petersen, 20 August-2 October 2002.

Glyptothrips flavescens Hood, 1912

5 females and 2 males Tennessee (Blount Co., Cades cove) Pitfall 12, leg. Parker, Stocks and Petersen, 23 April-12 May, 17 June-15 July and 12-26 August 2002; 2 females and 1 male Tennessee (Blount Co., Cades Cove) Pitfall 17, leg. Parker, Stocks and Petersen 17 June-1 July and 29 July-12 August 2002; 1 female and 1 male Tennessee (Blount Co., Cades cove) Pitfall 11, leg. Parker, Stocks and Petersen, 3-17 June 2002; 1 male Tennessee (Blount Co., Cades cove) Pitfall 13, leg. Parker, Stocks and Petersen, 23 April- 12 May 2003; 3 females and 1 male North Carolina (Coyle) Tullgren trap, 15 May 1997; 1 female and 1 male North Carolina (Coyle) Tullgren trap, 17 July 1997; 1 female North Carolina (Coyle) Tullgren trap, 8 August 1996.

Glyptothrips reticulatus Watson, 1934

1 female Tennessee (Sevier Co., Porter's Cove Trail 200 passes beyond Creek bridge), leg. Parker, Stocks and Petersen, 24-25 August 1996

Genus *Haplothrips* Amyot & Serville

Most Haplothrips species are flower living, particularly in the flowers of Compositae and Gramineae, although a few are predatory on small arthropods. More than 200 species are currently placed in the genus, largely from Europe and the Old World Tropics.

Haplothrips subtilissimus Haliday, 1852

3 females Tennessee (Cocke Co., Albright Grove) Lindgren funnel traps 17-18, leg. Parker, Stocks and Petersen 12 May-15 June and 24 August-13 September 2002; 4 females Tennessee (Haywood Co., Purchase Knob) Lindgren funnel trap 07, leg. Parker, Stocks and Petersen 4 September-17 October 2002.

Genus *Hoplandrothrips* Hood

This genus includes more than 80 species worldwide, most of them fungus-feeders on dead branches (Mound and Marullo, 1996). Twenty three species have been recorded in the USA.

Hoplandrothrips jennei (Jones, 1912)

2 females Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 03-04, leg. Parker, Stocks and Petersen 29 July-12 August and 12-26 August 2002.

Genus *Hoplothrips* Amyot & Serville

This genus is a worldwide assemblage of 150 fungus-feeder species. Many of the New World species are listed by Stannard (1957) under the generic name of *Phlaeothrips*, and the genus requires considerable study.

Hoplothrips pergandei (Hood, 1927)

2 females North Carolina (Swain Co., Ravensford Crescent) near Pitfall 9, leg. Parker, Stocks and Petersen, 30 October 2001; 12 females North Carolina (Swain Co., Ravensford wetland) Tullgren funnel (a sample of mosses) leg. Parker, Stocks and Petersen, 30 October 2001; 5 females and 2 males North Carolina (Swain Co., Ravensford forest) Near Pitfall 37 Tullgren sample 30 October 2001; 2 females and 2 males North Carolina (Swain Co., Ravensford forest) near Pitfall 21, leg. Parker, Stocks and Petersen, 30 October 2001; 44 females and 9 males North Carolina (Swain Co., Ravensford upland forest) near Pitfalls 9, 21, 23, 27, 31, leg. Parker, Stocks and Petersen, 30 October 2001; 3 females and 3 males North Carolina (Swain Co., Ravensford wetland) near Pitfall 29, 28 December 2001; 1 female North Carolina (Haywood Co., Purchase Knob) Pitfall 38, leg. Parker, Stocks and Petersen, 8 May-4 June 2002; 3 males North Carolina (Coyle) Tullgren trap, 10 June 1997; 1 female North Carolina (Coyle) Tullgren trap, 15 May 1997; 1 female and 2 males Tennessee (Sevier Co., Twin Creeks) Pifall 06, leg. Parker, Stocks and Petersen, 8-25 April 2002; 1 female Tennessee (Sevier Co., Twin Creeks) Pifall 06, leg. Parker, Stocks and Petersen, 6-30 May 2002. All the studied specimens were apterous.

Genus *Karnyothrips* Watson

Karnyothrips species are commonly found on dead twigs in association with other thrips, although some species are probably predatory on scale insects. Seventeen species have been recorded in USA.

Karnyothrips sonorensis (Stannard, 1956)

1 female Tennessee (Sevier Co., Twin Creeks) Lindgren funnel trap 01, leg. Parker, Stocks and Petersen, 30 May-26 June 2002.

Karnyothrips sp.

1 female [aptera] North Carolina (Coyle) 5 June 1996; 1 female [aptera] and 1 female [macroptera] North Carolina (Coyle) 17 July 1997; 1 female [aptera] North Carolina (Coyle) 15 May 1997; 2 females North Carolina (Coyle) Tullgren sample, 8 August 1996.

Genus *Leptothrips* Hood

This genus includes black species which are predatory on mites. Twenty two species have been recorded in USA (Mound & Morullo, 1996).

Leptothrips mali (Fitch, 1855)

2 female Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 03 and 04, leg. Parker, Stocks and Petersen 1-15 June 2003 and 1-15 July 2002; 1 female Tennessee (Sevier Co., Twin Creeks) Lindgren funnel trap 02, leg. Parker, Stocks and Petersen 21 July-15 August 2002; 1 female Tennessee (Sevier Co., Brushy Mountain) Pitfall 66, leg. Parker, Stocks and Petersen, 27 March-11 April 2002; 1 male Tennessee (Sevier Co., Brushy Mountain) Lindgren funnel trap 13, leg. Parker, Stocks and Petersen, 11 April-12 May 2002; 1 female Tennessee (Sevier Co., Clingmans Dome) Lindgren funnel trap 15 leg. Parker, Stocks and Petersen, 18 October-4 November 2002; 1 female North Carolina (Coyle) Tullgren trap 17 July 1997; 1 female and 1 male North Carolina (Swain Co., Ravensford wetland) Tullgren sample near Pitfall 27 and 31, 30 October 2001; 1 female and 1 male North Carolina (Swain Co., Andrews Bald) Lindgren funnel traps 11, 13, leg. Parker,

Stocks and Petersen, 10 May-3 July 2002; 1 female North Carolina (Coyle) Tullgren sample 8 August 1996.

Genus *Liothrips* Uzel

This is one of the largest genera in the Thysanoptera with about 230 listed species. These species are all leaf-feeding. A few species that are used in the biological control of weeds apparently have a restricted host-range, although there is little evidence to support the host-specificity in most of the species. Thirty four species have been recorded in the USA (Mound and Marullo, 1996).

Liothrips sp.

1 female North Carolina (Coyle) Tullgren trap 27 June 1996.

Genus *Lissothrips* Hood

These species all seem to be associated with mosses (Mound, 1989). One species has been recorded in the USA.

Lissothrips muscorum Hood, 1908

1 female Tennessee (Blount Co., Cades Cove) Pitfall 19, leg. Parker, Stocks and Petersen, 18-31 March 2003; 7 females and 1 male Tennessee (Sevier Co., Rainbow Falls), leg. E. Bernard, 4 May 1999; 1 female North Carolina (Coyle) Tullgren trap 8 August 1996; 1 female North Carolina (Coyle) Tullgren trap 5 June 1996; 1 male North Carolina (Coyle) 5 June 1996; 2 females and 2 males North Carolina (Coyle) 17 July 1997; 1 male North Carolina (Swain Co., Ravensford forest) near Pitfall 37 Tullgren sample 30 October 2001.

Genus *Malacothrips* Hinds

This genus includes 17 fungus-feeding species, eight from the Old World. Four species have been recorded in the USA (Mound and Marullo, 1996).

Malacothrips zonatus Hinds, 1902

2 females North Carolina (Swain Co., Ravensford grassland, near Pitfall 7) Tullgren sample, leg. Parker, Stocks and Petersen, 12 October, 2001; 1 female North Carolina (Swain Co., Ravensford grassland, near Pitfall 1) Tullgren sample, leg. Parker, Stocks and Petersen, 30 October, 2001; 1 female and 1 male North Carolina (Coyle) Tullgren sample, 17 July 1997

Genus *Neurothrips* Hood

Seven species are currently placed in this genus, two recorded in the USA. The species live on dead twigs and branches.

Neurothrips magnafemoralis (Hinds, 1902)

1 female Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 03, leg. Parker, Stocks and Petersen 18-31 March 2003; 1 female North Carolina (Swain Co., Andrews Bald) Lindgren funnel trap 12, leg. Parker, Stocks and Petersen 7 August-11 September 2002; 1 female North Carolina (Haywood Co., Purchase Knob) Lindgren funnel trap 08, 15 March-10 May 2003.

Genus *Plectrothrips* Hood

This genus currently includes 31 species from various parts of the tropic and subtropics (Okajima, 1981). Four species have been recorded in the USA.

Plectrothrips antennatus Hood, 1908

1 female Tennessee (Sevier Co., Brushy Mountain) Lindgren funnel trap 14, leg. Parker, Stocks and Petersen, 16 July-3 August 2002.

Genus *Pygmaethrips* Karny

Only one species is recognised in the genus, although it has six synonyms (Mound and Marullo, 1996).

Pygmaethrips angusticeps (Hood, 1908)

1 female Tennessee (Cocke Co., Allbright Grove) Lindgren funnel trap 17, leg. Parker, Stocks and Petersen, 13 July-6 August 2002; 1 male Tennessee (Blount Co., Cades Cove) Lindgren funnel trap 04, leg. Parker, Stocks and Petersen, 23 September-7 October 2002.

Genus *Trachythrips* Hood

The eleven described members of this genus living in leaf litter. Five species have been described from the USA.

Trachythrips watsoni Hood, 1930

1 female North Carolina (Coyle) Tullgren trap 17 July 1997.

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CATÁLOGO DE LOS DIPTERA DE ESPAÑA, PORTUGAL Y ANDORRA (INSECTA)

Miguel Carles-Tolrá Hjorth-Andersen (coordinador)

Resumen: Se presenta, por primera vez, un catálogo de los dípteros citados en España, Portugal y Andorra, es decir, de la Península Ibérica, de las Islas Baleares, de las Islas Canarias, de Azores y de Madeira. En total se incluyen 115 familias con 6.433 especies en España, 1.941 en Portugal y 892 en Andorra. Se indica la distribución geográfica de cada especie en los diferentes países y áreas geográficas, así como el número total de especies europeas, paleárticas y mundiales de cada familia. El catálogo se presenta en tres idiomas: español, portugués e inglés.

Palabras clave: Catálogo, Díptera, España, Portugal, Andorra

Catálogo dos Díptera de Espanha, Portugal e Andorra (Insecta)

Resumo: Apresenta-se, pela primeira vez, um catálogo dos dípteros citados de Espanha, Portugal e Andorra, ou seja, da Península Ibérica, das Ilhas Baleares e dos arquipélagos das Canárias, dos Açores e da Madeira. No total incluem-se 115 famílias com 6.433 espécies em Espanha, 1.941 em Portugal e 892 em Andorra. Indica-se a distribuição geográfica de cada espécie nos diferentes países e áreas geográficas, bem como o número total de espécies europeias, paleárticas e mundiais de cada família. O catálogo apresenta-se em três idiomas: espanhol, português e inglês.

Palavras-chave: Catálogo, Díptera, Espanha, Portugal, Andorra.

Catalogue of the Díptera of Spain, Portugal and Andorra (Insecta)

Abstract: A catalogue of the recorded Díptera from Spain, Portugal and Andorra, that is, Iberian Peninsula, Balearic Islands, Canary Islands, Azores and Madeira, is presented for the first time. Altogether 115 families with 6.433 species in Spain, 1.941 in Portugal and 892 in Andorra are included. The geographical distribution of each species in the different countries and geographical areas, as well as the total number of European, Palaearctic and Worldwide species of each family are indicated. The catalogue is presented in three languages: Spanish, Portuguese and English.

Key words: Catalogue, Díptera, Spain, Portugal, Andorra

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Avda. Radio Juventud, 37

50012 - Zaragoza (España) amelic@telefonica.net

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