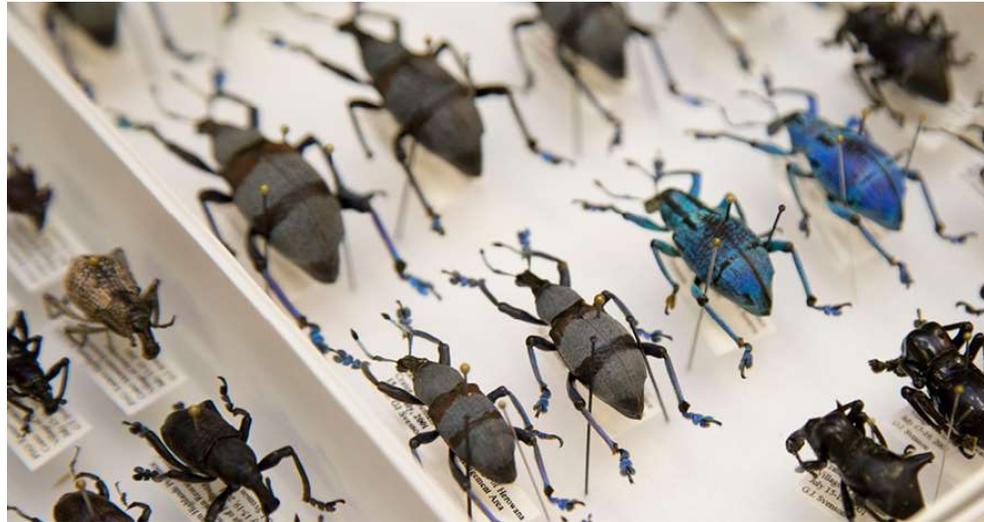
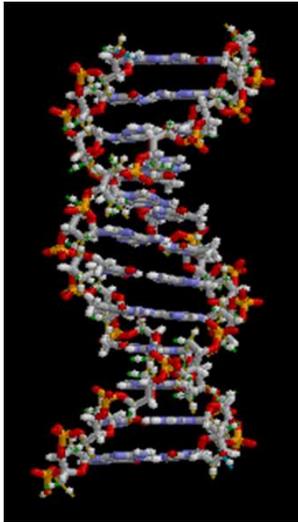


*Proyecto **CanaryBarcode** y sus
aplicaciones en conservación de la
biodiversidad*



Dr. Heriberto López
Dr. Brent Emerson





10 -100 millones de especies de organismos en la Tierra



1,7 millones de especies han sido formalmente descritas



Recuerda y reconoce unas 1000 especies



Crisis taxonómica

¿Cómo completamos la descripción de las especies restantes y cómo las reconocemos una vez descritas?

Solución – Crear un sistema de identificación basado en la genética.
Código de barras de ADN



Una misión global

Fundada en 2010, **iBOL** es una alianza de investigación que involucra a naciones con el deseo de transformar la ciencia de la biodiversidad mediante la construcción de:

- Bibliotecas de referencia de **códigos de barras de ADN**
- Las instalaciones de secuenciación
- Las plataformas informáticas
- Los protocolos analíticos



Identificación a través del ADN

- El código de barras de ADN es un método de identificación de muestras usando segmentos cortos y estandarizados de ADN.



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- Estos códigos de barras de ADN se pueden comparar con una biblioteca de referencia para proporcionar una identificación.





Procedimientos básicos

Las tecnologías utilizadas para la investigación ADN barcode han ido creciendo y evolucionando, pero el proceso básico permanece inalterado.

- Paso 1 – Extraer ADN
- Paso 2 – Amplificar
- Paso 3 – Secuenciar
- Paso 4 – Comparar

El barcoding en artrópodos de Canarias

- 8.204 spp de artrópodos (3.284 spp endémicas).
- Hay barcode publicados y recogidos en bases de datos online de secuencias (*Acalles*, *Torneuma*, *Herpisticus*, *Dysdera*, etc.).

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Pérdida de recursos humanos especializados

- Problema para el estudio y gestión de la biodiversidad.
- Se genera incertidumbre científica y administrativa en torno a la biodiversidad del territorio insular.

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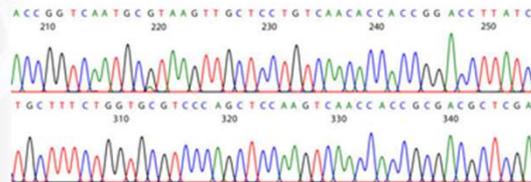
Pérdida de recursos humanos especializados

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Una biblioteca de referencia de códigos de barras más completa reducirá la incertidumbre



Holotrichapion sp.
La Gomera, Islas Canarias



BOLD SYSTEMS DATABASES IDENTIFICATION TAXONOMY WORKBENCH RESOURCES LOGIN

ANIMAL IDENTIFICATION [COI] FUNGAL IDENTIFICATION [ITS] PLANT IDENTIFICATION [RBCL & MATK]

The BOLD Identification System (IDS) for COI accepts sequences from the 5' region of the mitochondrial Cytochrome c oxidase subunit I gene and returns a species-level identification when one is possible. Further validation with independent genetic markers will be desirable in some forensic applications.

Historical Databases: **Current** Jul-2019 Jul-2018 Jul-2017 Jul-2016 Jul-2015 Jul-2014 Jul-2013 Jul-2012 Jul-2011 Jul-2010 Jul-2009

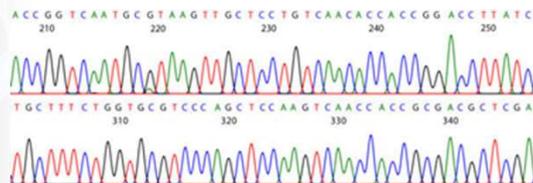
Search Databases:

- All Barcode Records on BOLD (11,483,297 Sequences)**
Every COI barcode record on BOLD with a minimum sequence length of 500bp (warning: unal dated library and includes records without species level identification). This includes many species represented by only one or two specimens as well as all species with interim taxonomy. This search only returns a list of the nearest matches and does not provide a probability of placement to a taxon.
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Subset of the Species library with a minimum sequence length of 500bp and containing both public and private records. This library is intended for short sequence identification as it provides maximum overlap with short reads from the barcode region of COI.

Enter fasta formatted sequences in the forward orientation:



Holotrichapion sp.
La Gomera, Islas Canarias



BOLDSYSTEMS

[DATABASES](#)
[IDENTIFICATION](#)
[TAXONOMY](#)
[WORKBENCH](#)
[RESOURCES](#)
[LOGIN](#)

ANIMAL IDENTIFICATION [COI]
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Enter fasta formatted sequences in the forward orientation:

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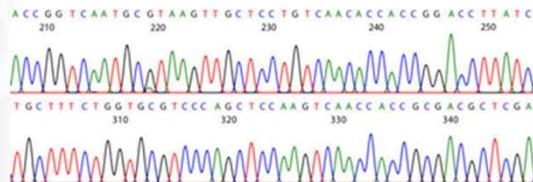
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AAGATTTTGATTACTACCGCCTTCATTAACTACTAATTAAGTAGAATTGTAGAAAAGGGGCAGGTACAGGATGAACCGTCTATCCTCTTTAGCCTCTAACATTGCTCATGGGGGAGC
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TTTACTTGAGCTGTAAAATTACTGCTATCTTTTACTCTTTTCTTTACTCTGACTAGCAGGGGCAATTACTATACTTCTTACTGACCGTAATATTAACACTTCTTTTITGACCCGG
                    
```

SUBMIT



~~Holotrichapion sp.~~

La Gomera, Islas Canarias



Eutrichapion vorax

Especie nativa para las Islas Canarias

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Enter fasta formatted sequences in the forward orientation:

Display:

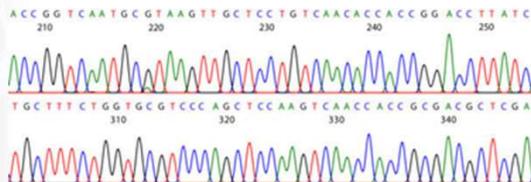
Top 20 Matches

Phylum	Class	Order	Family	Genus	Species	Subspecies	Similarity (%)	Status
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>		100	Published 🔗
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>		99.51	Published 🔗
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>		99.51	Published 🔗
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>		99.35	Published 🔗
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>		99.19	Private
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>		99.19	Published 🔗
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>		98.86	Published 🔗
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>erwi</i>		88.46	Published 🔗
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>erwi</i>		88.46	Private
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>erwi</i>		88.46	Private

Umbral de identificación: similitudes iguales o superiores al 95%



Holotrichapion sp.
La Gomera, Islas Canarias



Eutrichapion vorax

~~Especie nativa para las Islas Canarias~~

Probable introducción

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Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>	UK	99.51	Published
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>	Alemania	99.51	Published
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>	Austria	99.35	Published
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>	Italia	99.19	Private
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>	Portugal	99.19	Published
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>vorax</i>	Dinamarca	98.86	Published
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>erwi</i>		88.46	Published
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>erwi</i>		88.46	Private
Arthropoda	Insecta	Coleoptera	Brentidae	<i>Eutrichapion</i>	<i>erwi</i>		88.46	Private

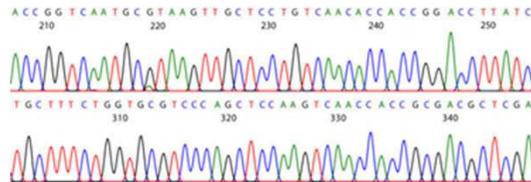
Umbral de identificación: similitudes iguales o superiores al 95%



Drusia tenerifensis (Alonso, Ibañez & Díaz, 1985)

Especie endémica de Tenerife

“Especies en peligro de extinción” del Catálogo Canario de Especies Protegidas (Ley 4/2010, de 4 de junio)



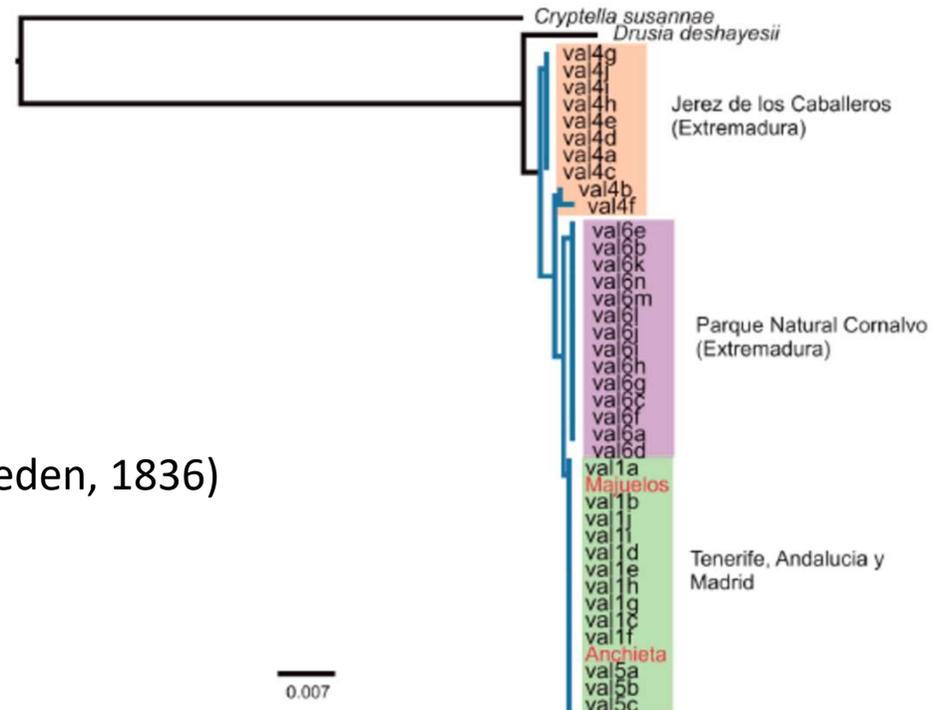
Drusia valenciennii (Webb & Van Beneden, 1836)
 > 99 % similaridad

~~*Drusia tenerifensis* (Alonso, Ibañez & Díaz, 1985)~~

~~Especie endémica de Tenerife~~

Probable introducción

~~“Especies en peligro de extinción” del Catálogo
 Canario de Especies Protegidas (Ley 4/2010, de 4 de
 junio)~~



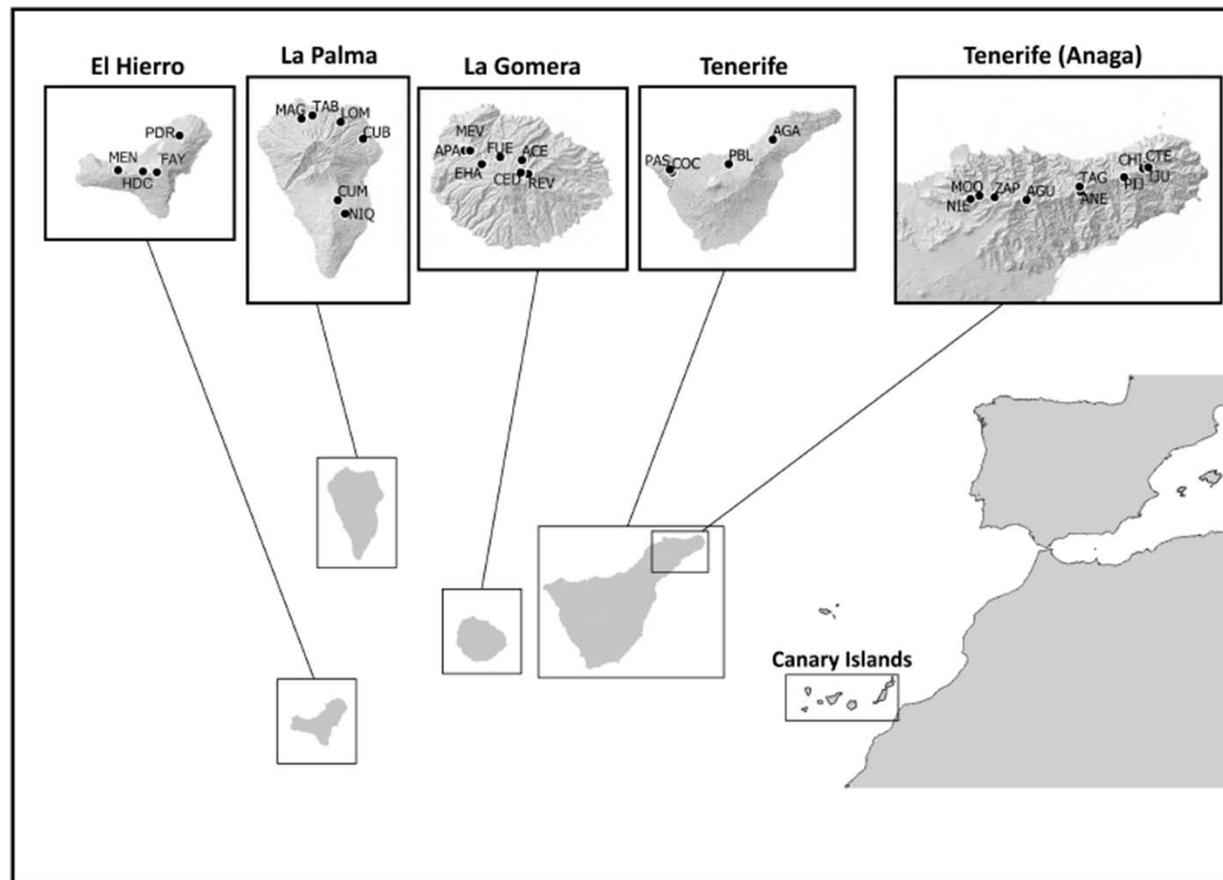
Received: 23 January 2023 | Revised: 11 April 2023 | Accepted: 14 April 2023
DOI: 10.1111/mec.16962

ORIGINAL ARTICLE

MOLECULAR ECOLOGY WILEY

Towards understanding insect species introduction and establishment: A community-level barcoding approach using island beetles

Eduardo Jiménez-García^{1,2} | Carmelo Andújar¹ | Heriberto López¹ | Brent C. Emerson¹



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Towards understanding insect species introduction and establishment: A community-level barcoding approach using island beetles

Eduardo Jiménez-García^{1,2} | Carmelo Andújar¹ | Heriberto López¹ | Brent C. Emerson¹



360 especies de coleópteros en los bosques de laurisilva

- 268 identificadas a nivel de especie
- 92 identificadas a nivel de género

Asignación de categoría de origen (BIOTA / barcode)

- 224 clasificadas como endémicas
- 6 especies nuevas citas para Canarias
- 56 nativas no endémicas - resultaron ser **39**
- 19 introducidas - resultaron ser **38**
- 55 especies sin asignación de categoría de origen

Received: 2 December 2021 | Revised: 14 March 2022 | Accepted: 23 March 2022

DOI: 10.1111/jbi.14388

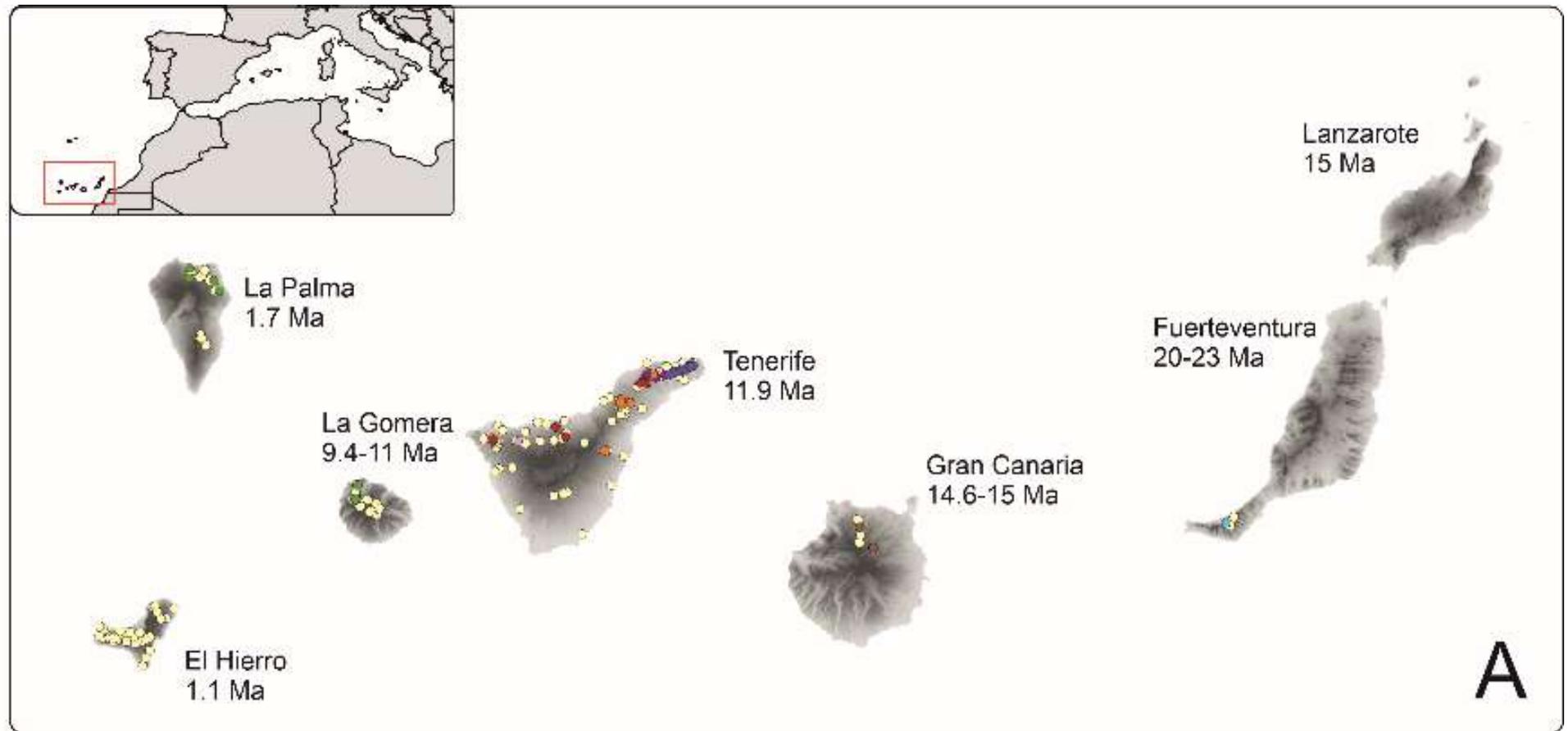
Journal of
Biogeography
WILEY

RESEARCH ARTICLE

Hidden island endemic species and their implications for cryptic speciation within soil arthropods

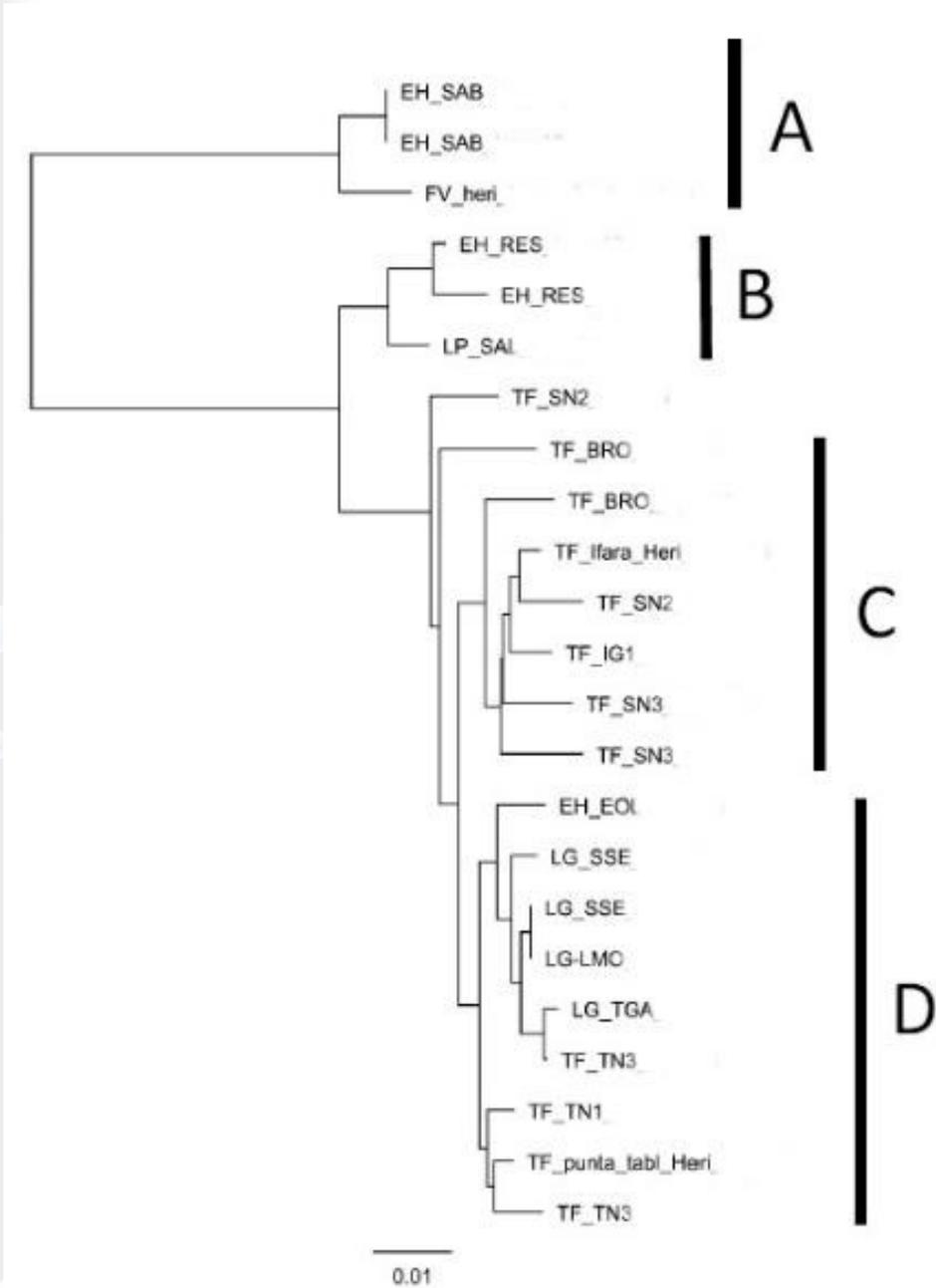
Antonio J. Pérez-Delgado^{1,2} | Paula Arribas¹ | Carles Hernando³ |
Heriberto López¹ | Yurena Arjona¹ | Daniel Suárez-Ramos^{1,2} | Brent C. Emerson¹ |
Carmelo Andújar¹



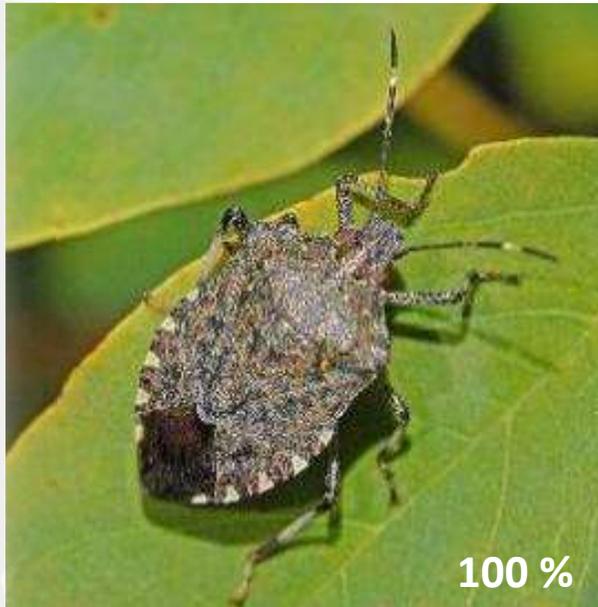


- Muestreos en 357 puntos, incluyendo los 4 principales tipos de habitats
- Se encontró *G. franzi* en 58 puntos, todos en laurisilva, salvo uno

XXXXXX exophthalmus n. sp.



Halyomorpha halys



100 %

Foto: Hectonichus

Leptoglossus occidentalis



100 %

Foto: M. Arechavaleta

Cicada barbara



99,5 %

Foto: Luis Fernández García

Wasmannia auropunctata



99,5 %

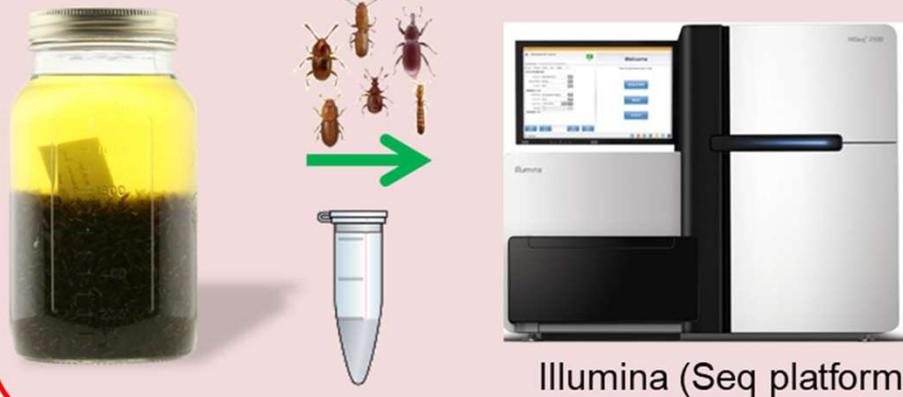
Foto: AntWeb.org

CanaryBarcode ↔ Biota

- Biblioteca de secuencias barcode referencia con crecimiento exponencial
- Identificación taxonómica a nivel genético (*Drusia tenerifensis*)
- Asignación de categorías de origen
- Datos de distribución de especies **de forma masiva**

Nuevas tecnologías

MetaBARCODING



Secuenciación NEXT GENERATION

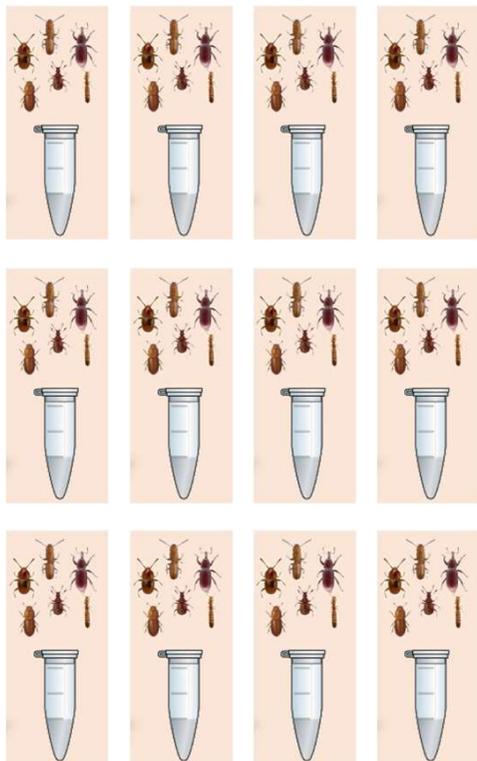
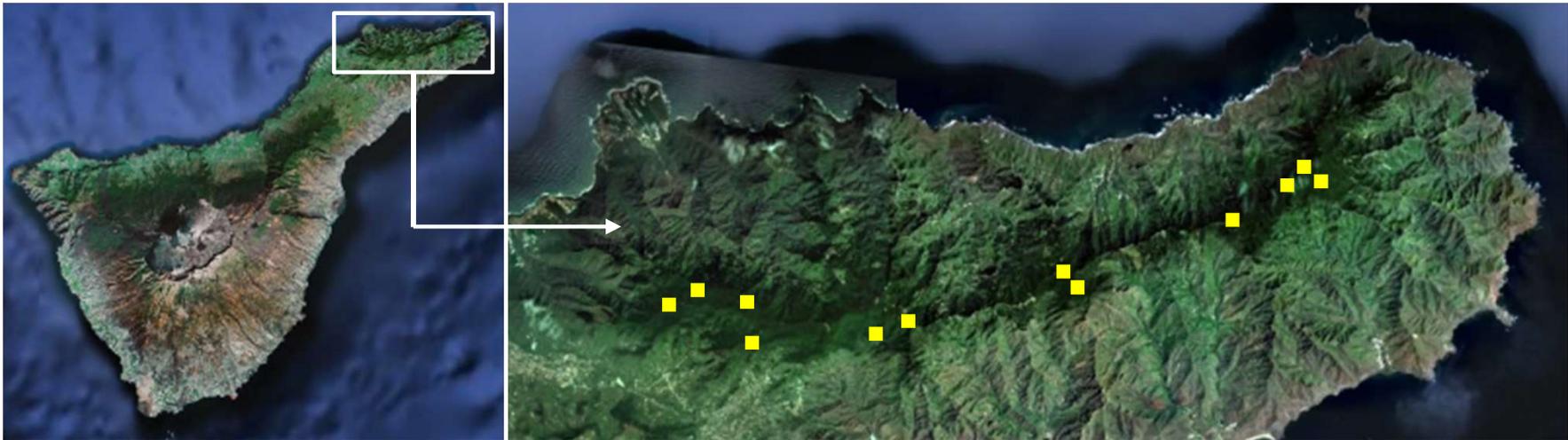
```
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GTTATACCTATTATAATTGGAGGATTTGGA  
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GTTATACCTATTATAATTGGAGGATTTGGA  
TGGAGTTATACCTATTATAATTGGAGGATT  
TGGAGTTATACCTATTATAATTGGAGGATT
```

MegaBARCODING



Secuenciación NEXT GENERATION

```
GTTATACCTATTATAATTGGAGGATTTGGA  
GTTATACCTATTATAATTGGAGGATTTGGA  
GTTATACCTATTATAATTGGAGGATTTGGA  
GTTATACCTATTATAATTGGAGGATTTGGA  
TGGAGTTATACCTATTATAATTGGAGGATT  
TGGAGTTATACCTATTATAATTGGAGGATT
```



<u>Barcodes</u>	<u>Librería de Barcodes</u>	<u>Identificación</u>
	100%	<i>Camisia borealis</i>
	100%	<i>Galumna alata</i>
	100%	<i>Atractides rutae</i>
	100%	<i>Neoliodes ionicus</i>
	100%	<i>Nothrus silvestris</i>
	98%	<i>Pirnodus soyeri</i>
	100%	<i>Eupelops hirtus</i>
	100%	<i>Xenillus moyae</i>
	99%	<i>Aceria sheldoni</i>
	97%	<i>Cilliba cassidea</i>

GEEI (Grupo de Ecología y Evolución en Islas - IPNA/CSIC)



Brent Emerson



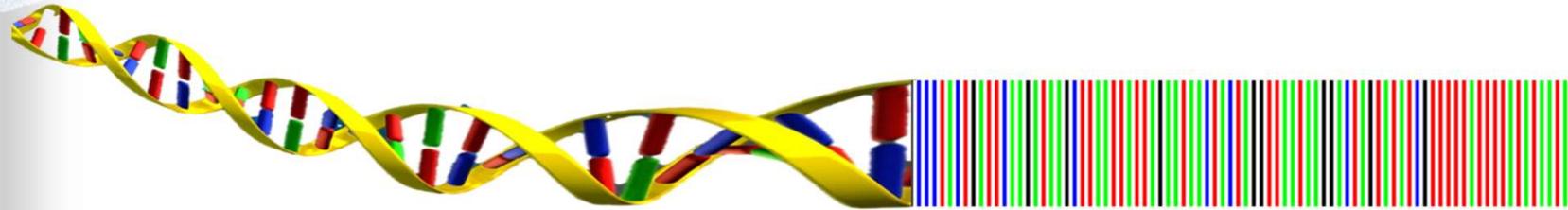
Paula Arribas



Carmelo Andújar



Heriberto López



FIN