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Argentine ant in Rolf's tattoo parlor.

Where Do Insect Invaders Come From?

66.2% Western Palearctic (i.e. Europe)

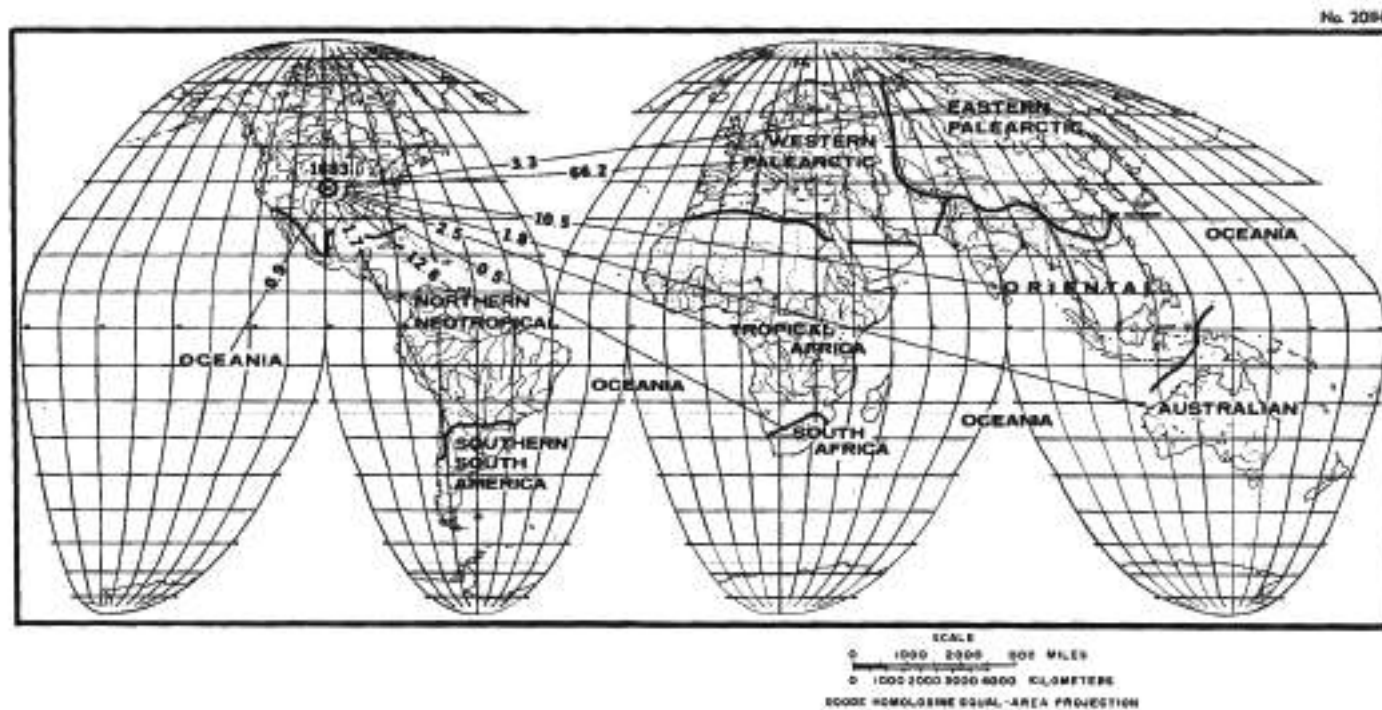
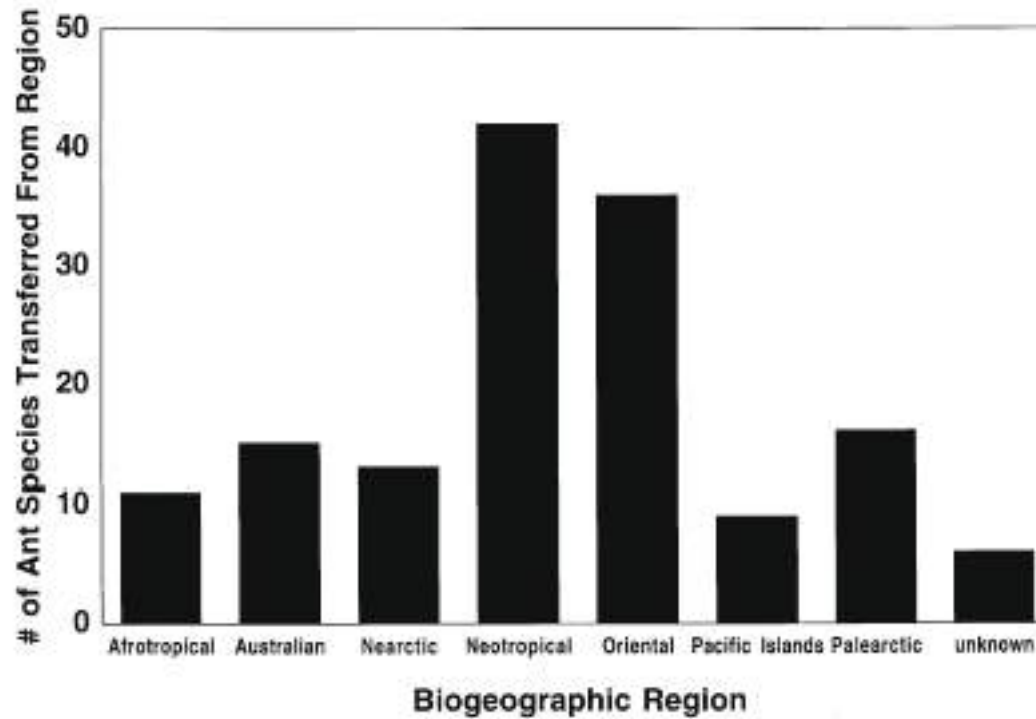


Fig. 4. Origins of the immigrant arthropod fauna, with the total number of recorded species and the percentage of species contributed by different world biogeographic regions. (Prepared by Limhout Nong.)

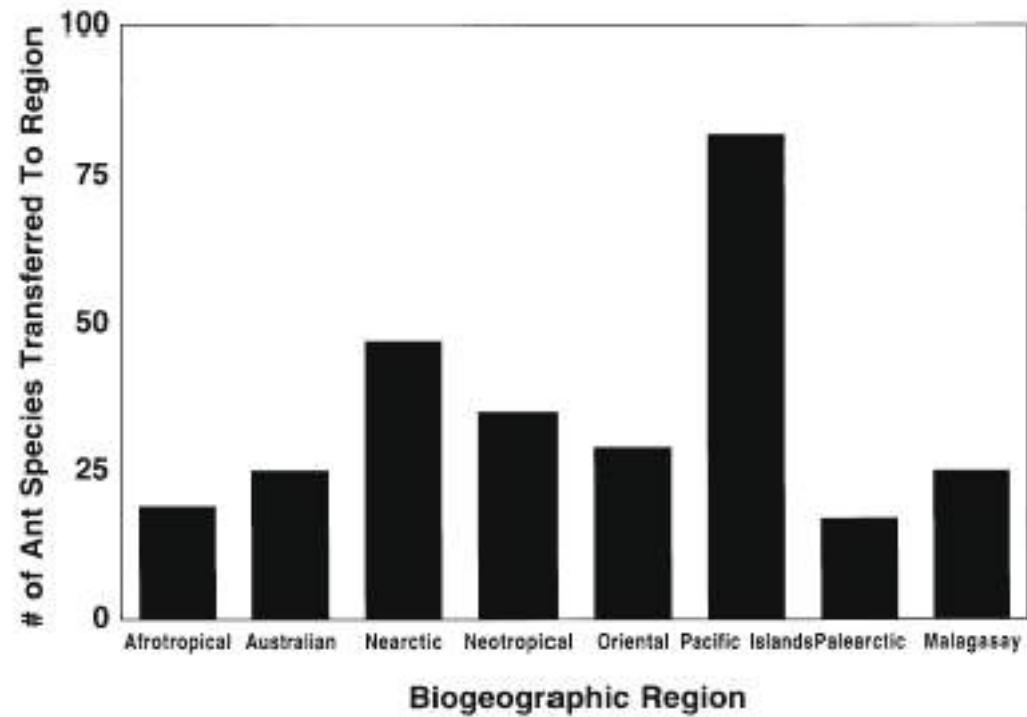
Source: Sailer 1983

Where are introduced ants coming from?



Source: McGlynn 1999

Where are introduced ants established?



Source: McGlynn 1999

Characteristics of ant invaders

General diet and nesting requirements

High abundance (at least in introduced range)

Small body size

High queen number

Unicoloniality

Good competitor

Escape from natural enemies

Elevated aggression (compared to natives)

Generalities would be nice!

Make invasion biology a more predictive science

Stages of invasion

1. Opportunity (transport)

2. Establishment

3. Spread

(different characteristics may be important at different stages)

Opportunity

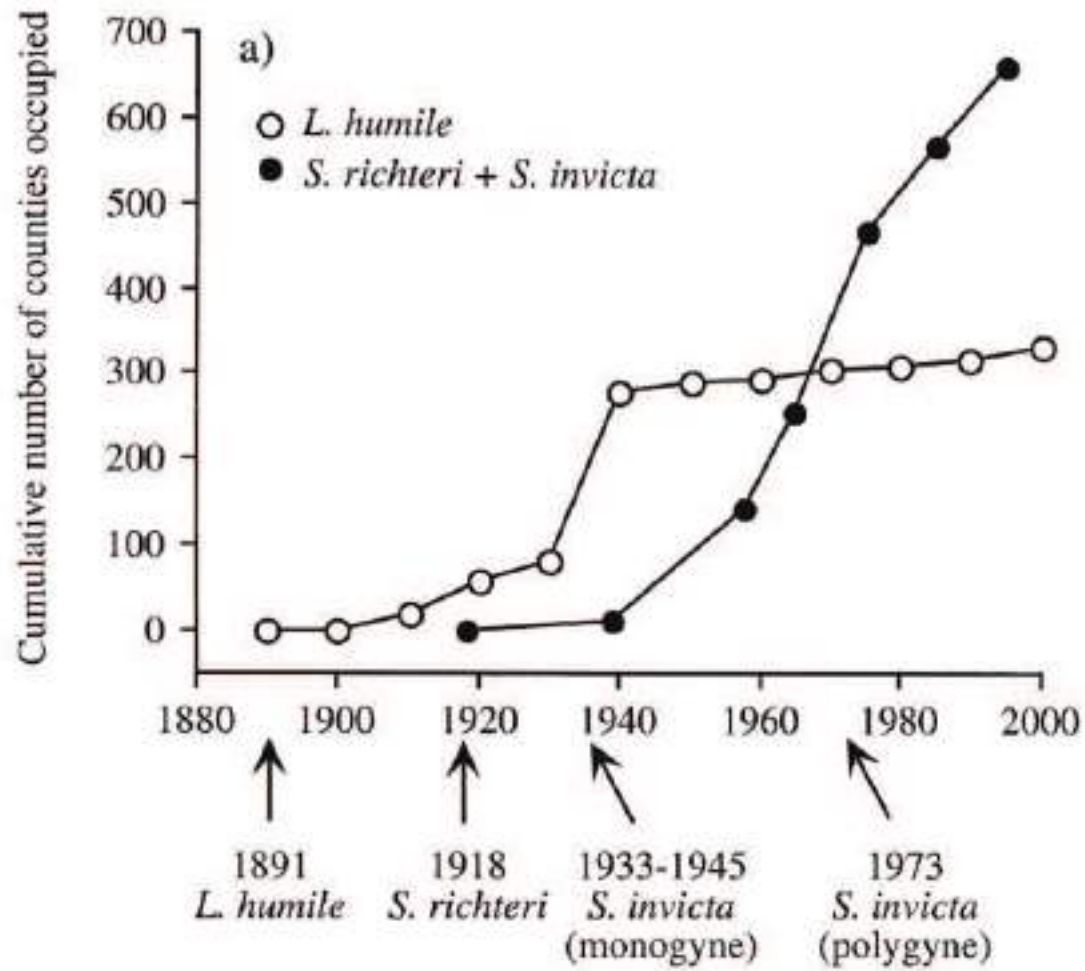
-the final frontier-



Approach

Port Of Entry (POE) data base

United States National Museum
394 records from U.S. quarantine facilities
1920s-1970s



Type of data collected

year

port of entry

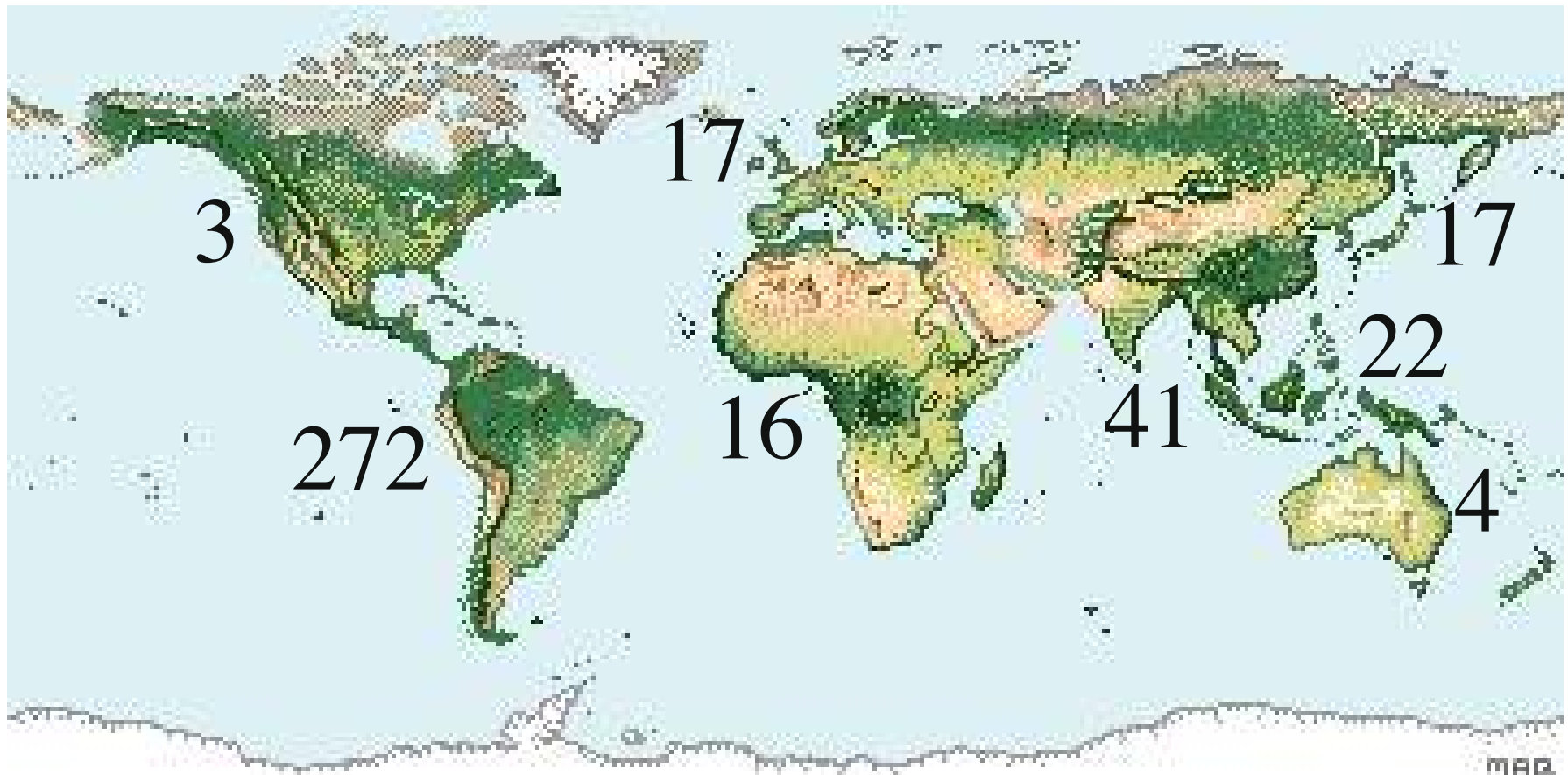
port of departure (source)

substrate

collector

identity and amount of material (ants)

Where are they coming from?



Of 363 records, 94% intercepted ants were on plants.

Predominant categories included:

orchids and bromeliads (49%)

fruits (14%)

other ornamental plants (11%)

Acacia (4%)

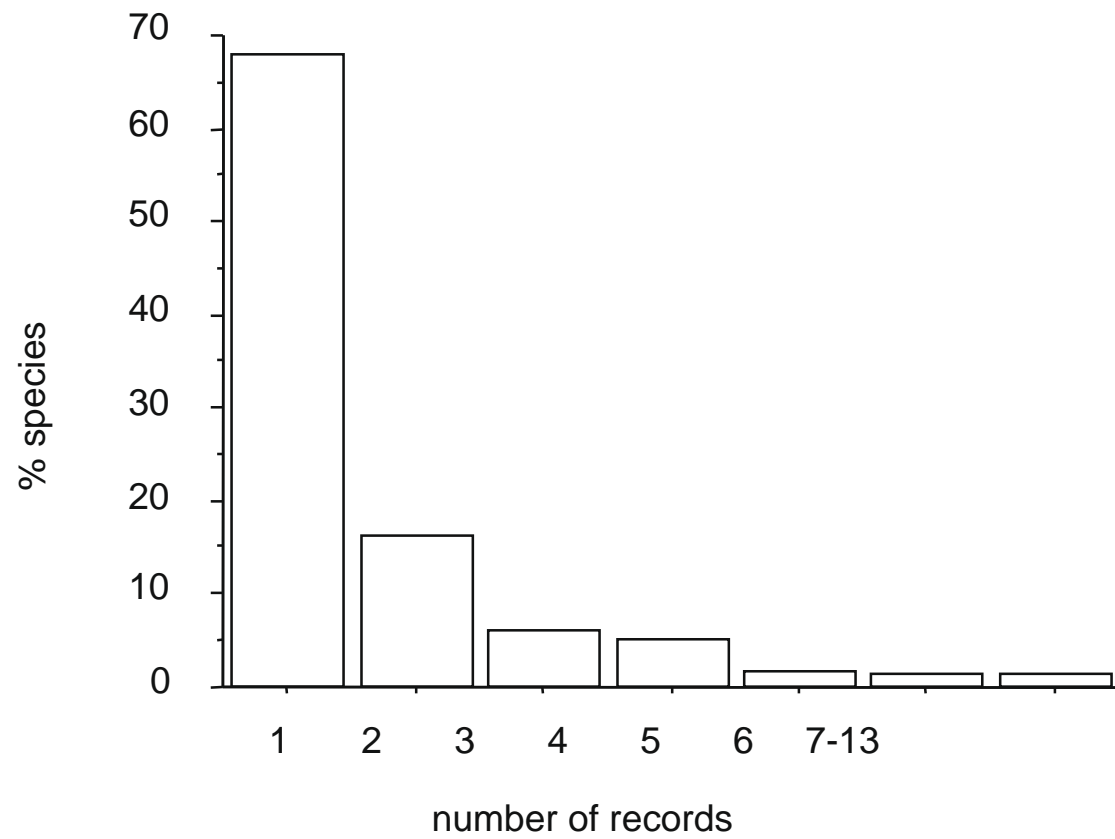
Other less important categories included:

cactus, sugar cane, ferns, moss, and non-plant material such as soil, pallets and military cargo.



394 interception records yielded 232 different species from 58 genera. 29 species from 17 genera are established in the U.S.





Taxonomic distribution of POE ants

<u>Subfamily</u>	<u>POE</u>	<u>Bolton 1995</u>
Cerapachyinae	<1%	2%
Dolichoderinae	11%	6%
Ecitoninae	1%	2%
Formicinae	22%	27%
Myrmicinae	47%	47%
Ponerimorphs	11%	14%
Pseudomyrm...	7%	2%

<u>Genus</u>	<u>number of records established</u>	
	<u>yes</u>	<u>no</u>
<i>Azteca</i>	0	9
<i>Dolichoderus</i>	0	13
<i>Tapinoma</i>	4	11
<i>Camponotus</i>	11	52
<i>Paratrechina</i>	2	9
<i>Crematogaster</i>	0	15
<i>Temnothorax</i>	0	18
<i>Pheidole</i>	2	18
<i>Solenopsis</i>	1	9
<i>Pachycondyla</i>	1	7
<i>Pseudomyrmex</i>	3	32
<i>Linepithema</i>	1	10
<i>Cardiocondyla</i>	8	0
<i>Monomorium</i>	12	9
<i>Tetramorium</i>	15	2
<i>Technomyrmex</i>	4	3



Linepithema humile



Linepithema iniquum

Commodity	% of Records	
	NZ	USA
Ornamental Plants		60
Fresh Produce	47	14
Shipping Containers	22	3
Personal Items	16	1
Vehicle	11	1
Timber	4	4
Other*		17

*Including soil and other plant materials.

Species	Origin
<i>Anoplolepis gracilipes</i>	Sub-Saharan Africa or tropical Asia
<i>Linepithema humile</i>	Central South America
<i>Pheidole megacephala</i>	Sub-Saharan Africa
<i>Solenopsis geminata</i>	Tropical Central and South America
<i>Solenopsis invicta</i>	Tropical and subtropical South America
<i>Wasmannia auropunctata</i>	Tropical Central and South America
<i>Lasius neglectus</i>	Probably Turkey (Seifert 2000, Cremer et al. 2008)
<i>Myrmica rubra</i>	Palaearctic North Temperate Zone (Grodén et al. 2005)
<i>Pachycondyla chinensis</i>	North Temperate to subtropical Asia (Nelder et al. 2006)
<i>Tetramorium tsushimae</i>	North Temperate China and Japan (Steiner et al. 2006)

Future priorities:

- 1) Need to develop regional / global databases of intercepted ants
 - Proper curation of material
 - Imaging of specimens
 - Include both historical and contemporary records
- 2) Need to develop easy-to-use keys for use in quarantine
 - PIAkey
- 3) Coordinate efforts among regions / agencies
- 4) Develop genetic resource (e.g. DNA bar coding)
 - Determine if new records of already established species come from different source populations
 - Identify sources