

Researchers in the field
of entomology

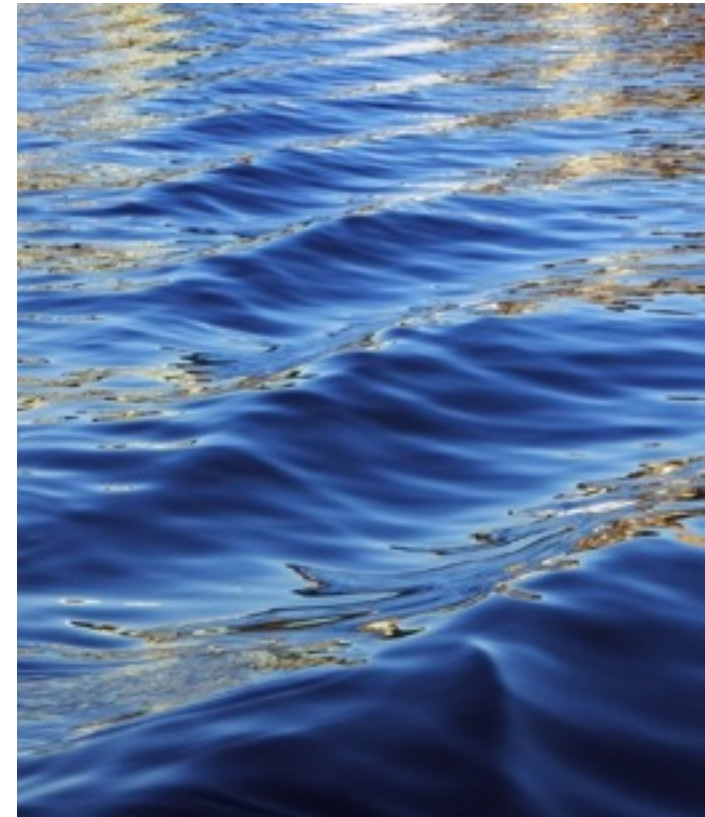


ILHAM-EC

Special Mobility
strand

Sassari, 12-16 June 2017

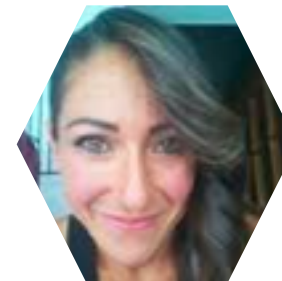
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Research Group

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List of Research Themes

- Agricultural Entomology
- Forest Entomology
- Biotechnology applied to entomology
- Medical and Veterinary Entomology
- Apidology, Beekeeping and Hive Products

The Entomology Section of Sassari University covers historically a wide range of entomological research fields.

The diversification of scientific expertise is due to the strong connection with the territory and the needs of Sardinian agriculture. The wide range of fields covered is facilitated by the insularity.

In the last decades, the research has evolved toward an international perspective.

However, the themes of interest to the island's productive sectors has not been neglected.

Agricultural Entomology - Some Recent Topics

- Integrated Pest Management



Vine mealybug

Planococcus ficus



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Vine mealybug
Planococcus ficus

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Tomato leafminer
Tuta absoluta



Agricultural Entomology - Some Recent Topics

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Tomato leafminer
Tuta absoluta



Applied studies to improve pest control in IPM programmes

- ✓ Mating disruption
- ✓ Mass trapping
- ✓ Native parasitoids for improvement of conservation biological control
- ✓ Reliable and efficient sampling method and within-plant distribution
- ✓ Seasonal phenology of *T. absoluta*

Forest Entomology - Historical Topics

- Lepidopteran defoliators in Sardinian cork oak forests and their biological control



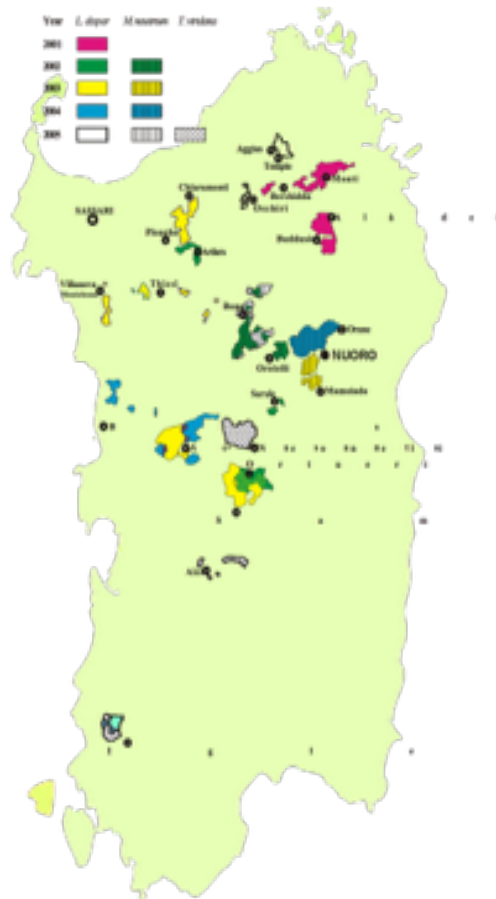
Forest Entomology

- Lepidopteran defoliators in Sardinian cork oak forests and their biological control





Sardinian cork oak forests and their biological control



Sardinian cork oak forests treated during the period 2001-2005.

Microbiological control program

2001-2014

Involved 116,000 ha of cork oak forests

- ✓ Formulation of insecticides
- ✓ Mode of distribution
- ✓ Effectiveness on *L. dispar* larvae
- ✓ Influence on non-target species
- ✓ Biological control with *Entomophaga maimaga*
- ✓ Sampling methods (*M. neustrium*)



Pine processionary moth (*Thaumetopoea pityocampa*)



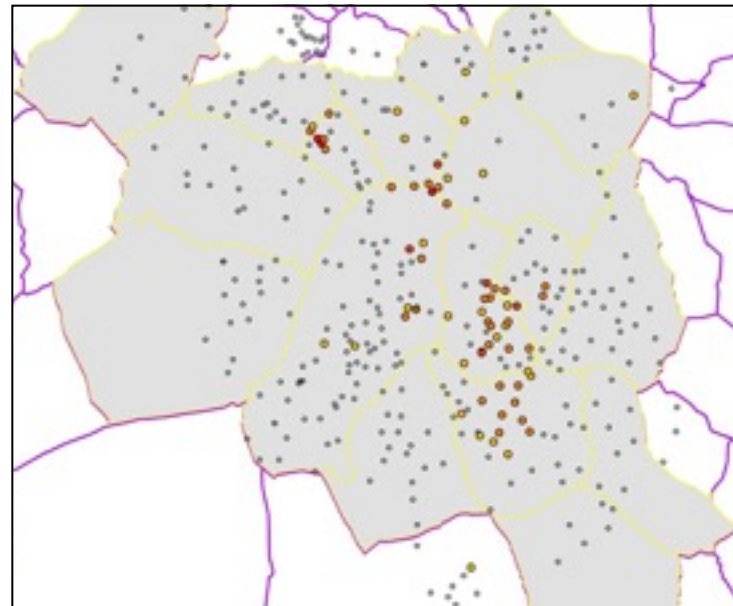
First recorded in spring 2006  Eradication program started in 2011

The main steps of the **eradication program** were:

- 1) estimation of the pest spread by a network of pheromone traps;
- 2) detection and mapping of infested pine trees and pine forests;
- 3) ground insecticides application and physical nest removal on isolated trees;
- 4) aerial application of *Bacillus thuringiensis kurstaki* on pine forests;
- 5) technical and scientific support to develop the program and evaluate progress towards successful eradication



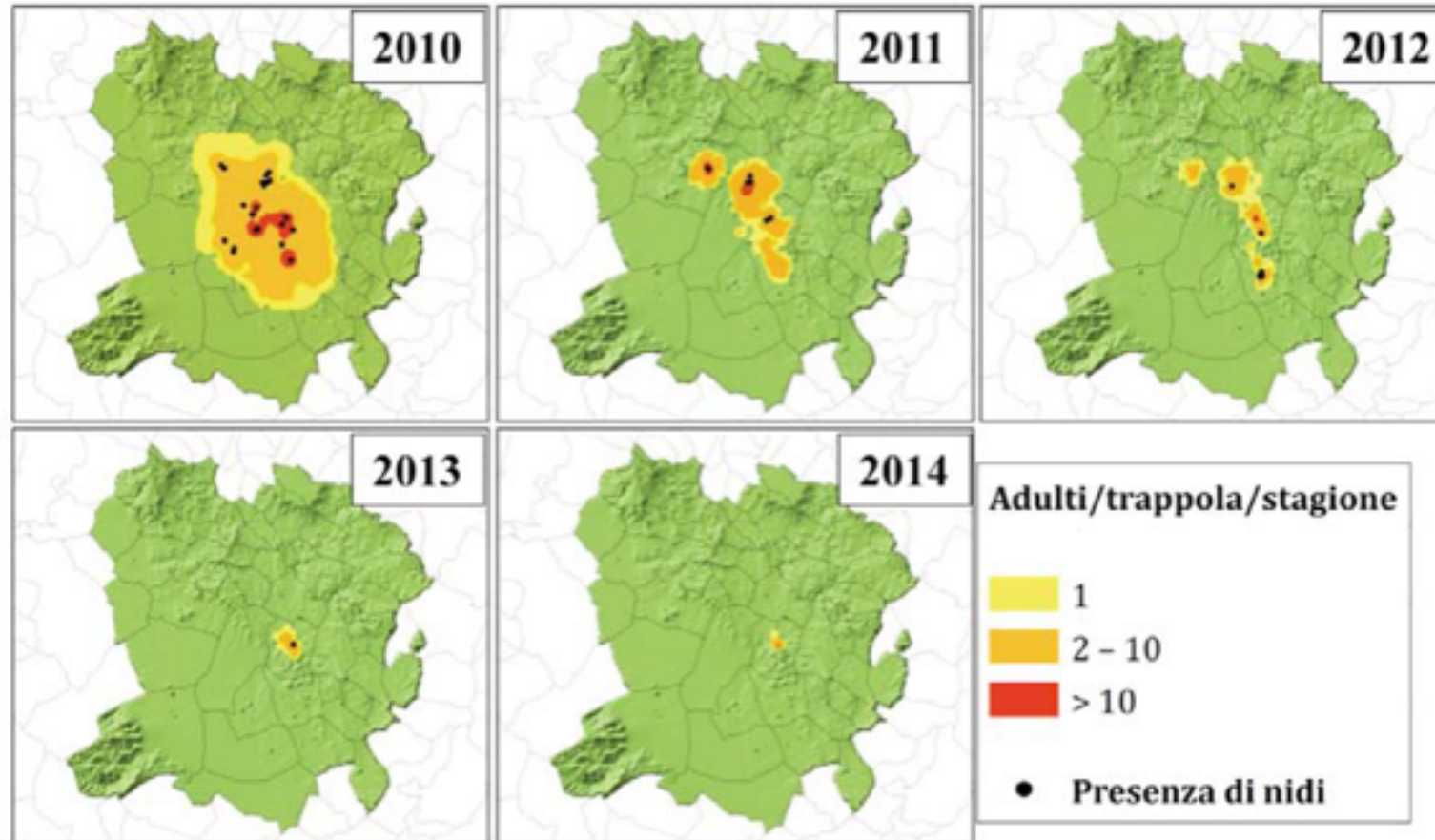
Pine processionary moth



Pine processionary moth



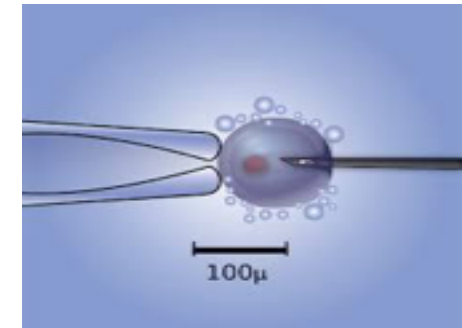
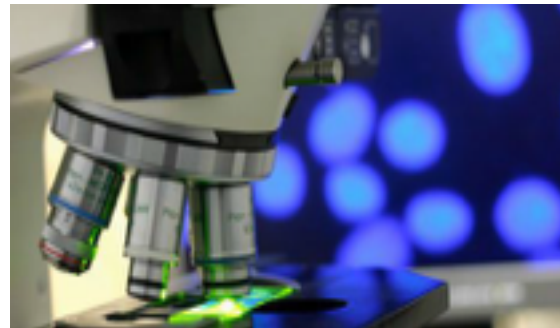
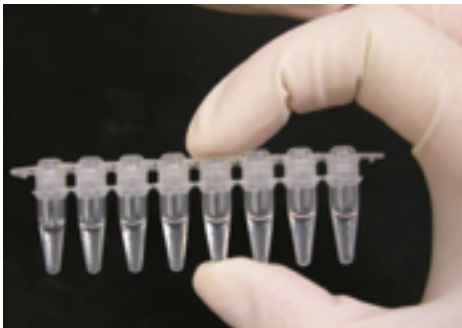
Pine processionary moth



The control strategies used were effective and it is reasonable to assume that the pine processionary moth will be eradicated within a few years

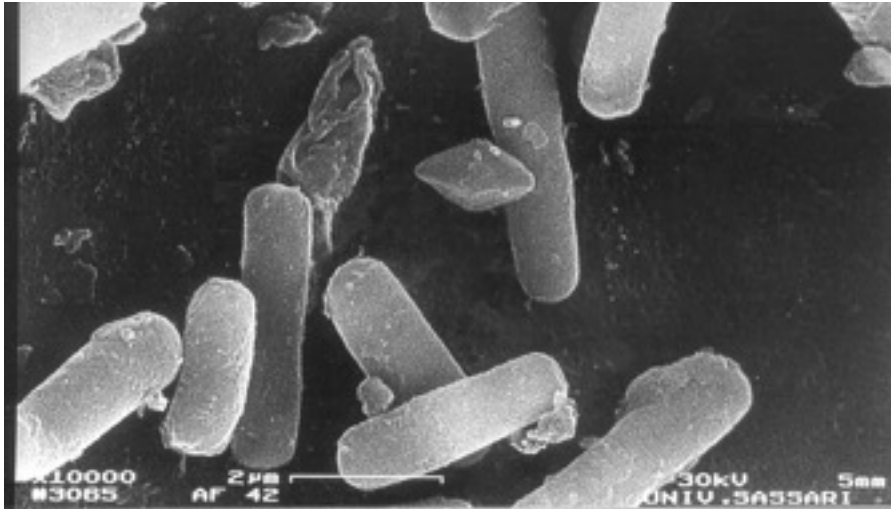
Biotechnology applied to entomology

- Biotechnology for the management of noxious insect species (classical biological control, semiochemicals, new biological control agents, genetic techniques, technology innovations, patenting)



Biotechnology applied to entomology

- Molecular studies on microbial entomopathogens



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- Screening on new bacterial isolates
- Identification and characterization of new toxins
- Mode of action studies

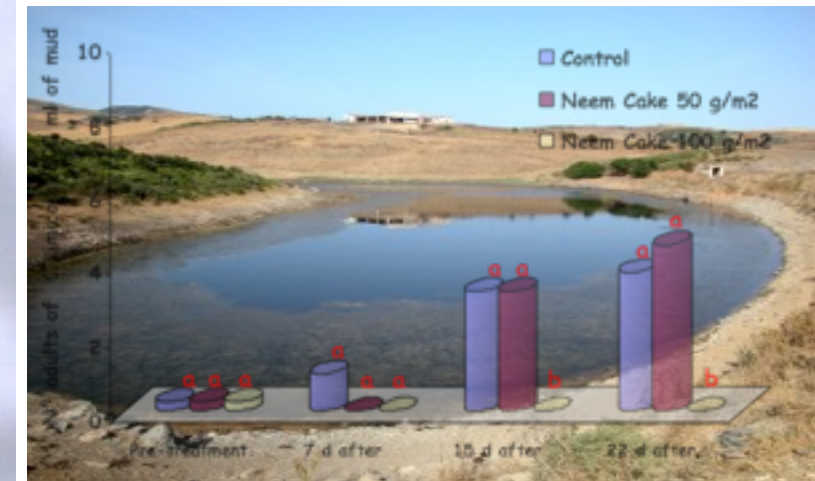


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- Isolation of new species
- Efficacy evaluation
- Mode of action studies

Medical and Veterinary Entomology

- Distribution and Control of *Culicoides imicola* and other *Culicoides* spp. as vectors of the Bluetongue Virus



Chemical, microbiological and plant derived insecticides were tested in laboratory assays and field trials against *Culicoides* larvae.

Bti was not effective in field trials, whereas Dimilin and Neem Cake applications determined a reduction in *Culicoides* larval population. Neem Cake at a dosage of 100 g/m², was effective against *Culicoides* spp. larvae, especially *C. imicola*. Neem Cake a plant derived product harmless to the warm-blooded animals, might represent a valuable alternative replacing chemical pesticides for the control of *Culicoides* larvae.

Apidology, Beekeeping and Hive Products - Recent Topics

- Studies on the defense mechanisms of *Apis mellifera* at individual and colony level through molecular approaches



- ✓ Innate immune response
- ✓ Microbial community

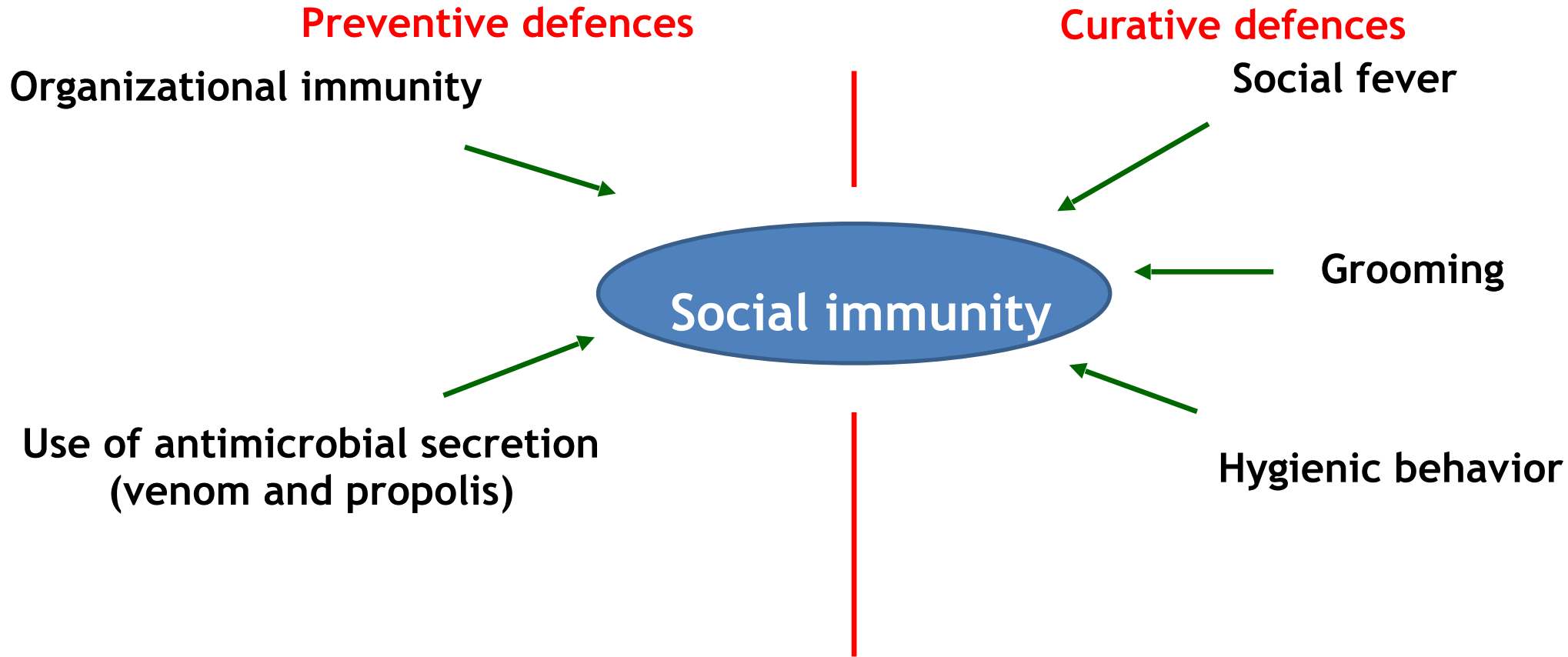


- ✓ Immune-related gene expression
- ✓ Microbial community dynamics

Apidology, Beekeeping and Hive Products

-

Social immunity in Honey bee





Apidology, Beekeeping and Hive Products

- Use of propolis in the hive is a case of self-medication?



The composition of propolis produced in *Varroa* infested colonies is different from that produced in non infested ones ?



Varroa infested colonies collect more propolis than non infested ones?



Apidology, Beekeeping and Hive Products

Propolis effects on *Nosema ceranae* microsporidia

- **Positive effect in *Apis mellifera* : Lifespan/energetic stress**
- **Negative effect on *Nosema* spp.: spore load**

A greater knowledge of the antifungal properties of propolis will allow to implement new strategies for the management of the hive with a more ecological approach. In addition, this research line will produce benefits for the agri-food sector by improving the quality of the products of the hive.

Use of antimicrobial secretion venom - Open questions -



- Selfgrooming and allogrooming could help spread the poison throughout the bee's body ?
- Does the bee venom have an acaricide or repulsive effect against *V. destructor*?
- Does grooming behavior (self-grooming / allogrooming) increase in *Varroa* infested groups?
- Is the amount of venom (or of its components) on the body of bees from *Varroa* infested groups higher than in *Varroa* free groups?

