SFA - ANAFORCAL

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Capteurs de pollens et pollution : étude Européenne AIS Life

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RNSA (Réseau National de Surveillance Aérobiologique)

Life

RNSA
RÉSEAU NATIONAL DE SURVEILLANCE AÉROBIOLOGIQUE

AIS

Liens d'intérêt

Capteurs de pollens et pollution : étude Européenne AIS Life - Samuel Monnier

- **Intérêts financiers : néant**
- **Liens durables ou permanents : néant**
- **Interventions ponctuelles : néant**
- **Intérêts indirects : néant**

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Aerobiological Information Systems and allergic respiratory disease management
AIS LIFE (AIS LIFE LIFE13 ENV/IT/001107)

University of Florence-Department of Agrifood Production and Environmental Sciences, Florence, Italy (UNIFI)

University of Pisa -Department of Biology, Pisa, Italy (UNIPI)

CNR Institute of Clinical Physiology, Pisa, Italy (IFC-CNR)

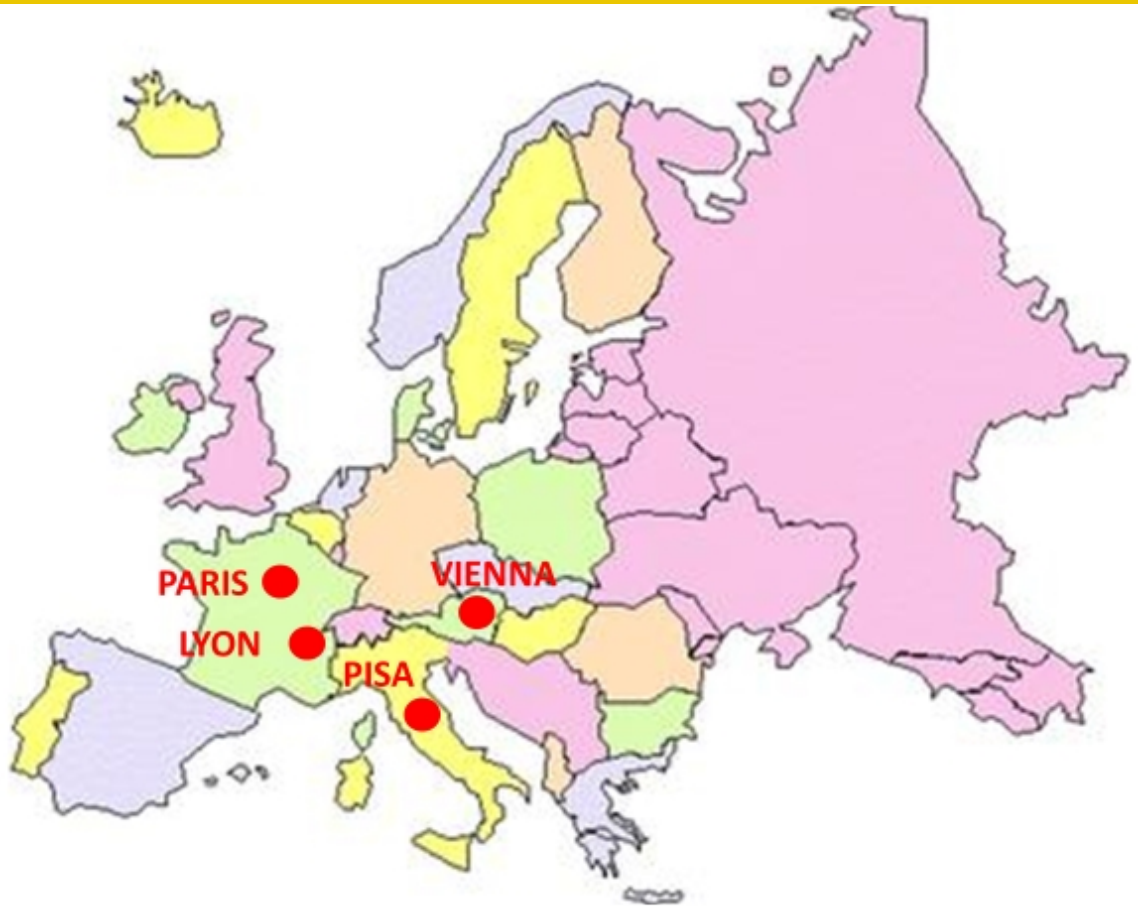
Medizinische Universitaet, Wien, Vienna, Austria (MUW)

Réseau National de Surveillance Aérobiologique Lyon, France (RNSA)

Université Pierre et Marie Curie, Paris, France (UPMC)

Institut national de la santé et de la recherche médicale, Paris, France (INSERM)

AIS LIFE_Map



Main objectives

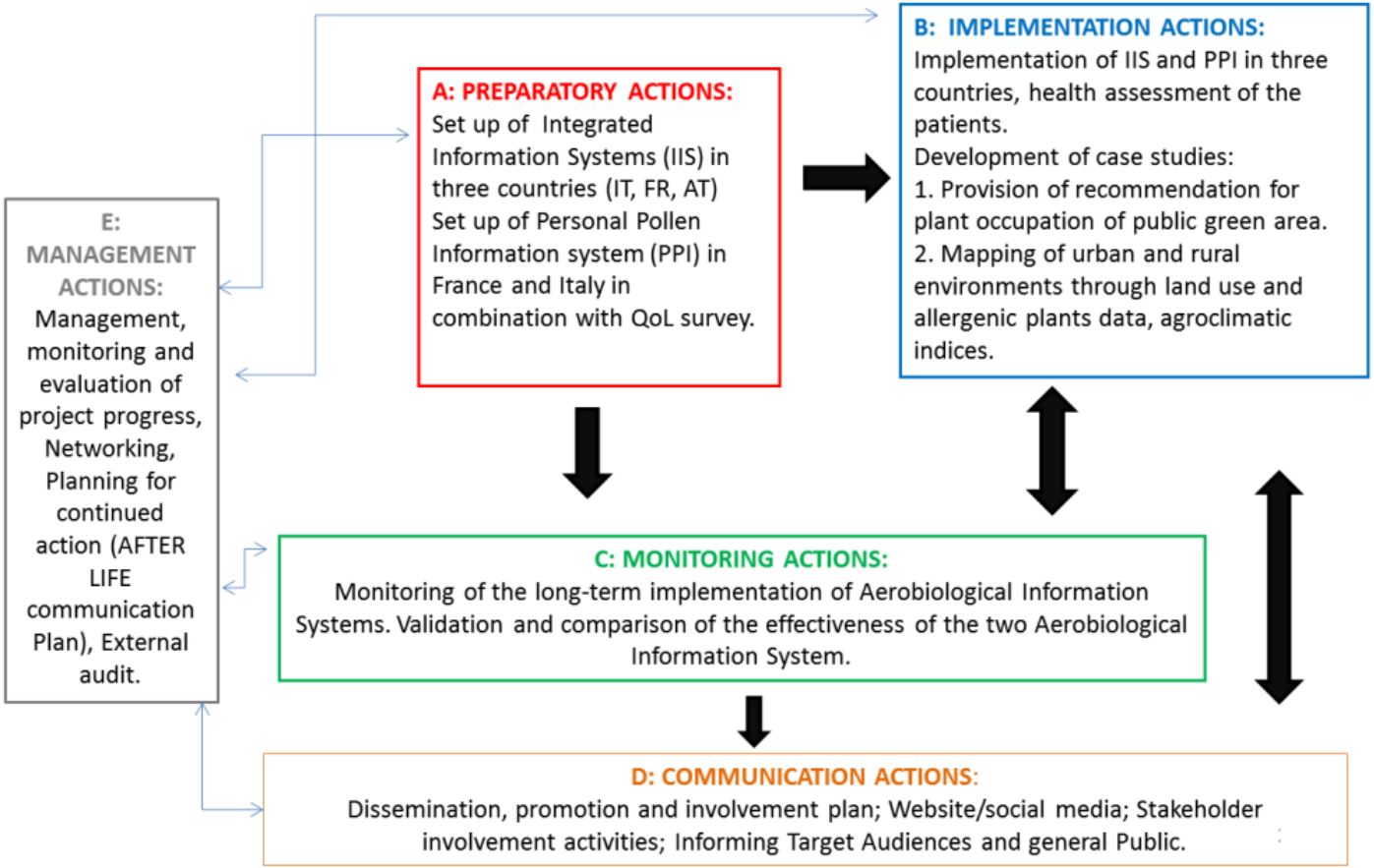
To develop the information base for policy on environment and health addressing of pollen-related allergic respiratory diseases.

The specific objectives:

- ✓ To improve pollen-related allergic respiratory disease management through the permanent setup of Aerobiological Information Systems (AIS) in three European countries, contributing to disease control, improved quality of life and direct/indirect reductions of direct/indirect of costs.
- ✓ To assess exposure to pollen at the general population level, by considering pollen count and interaction with air pollutans.

LIFE AIS project

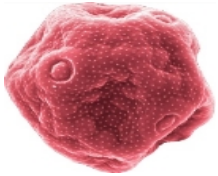
Main objective: to develop the information base for policy on environment and health, in term of improved management of pollen-related allergic respiratory diseases



Aerobiological Information Systems IMPLEMENTATION

Two aerobiological information systems will be developed and evaluated in terms of effectiveness:

- Integrated Information System **(IIS)** providing past weekly pollen and air pollutants concentrations, current weekly tendency and clinical recommendations
- Personalised Pollen Information System **(PPI)** showing a general and personal pollen information, with their tendency for the next 3 days.

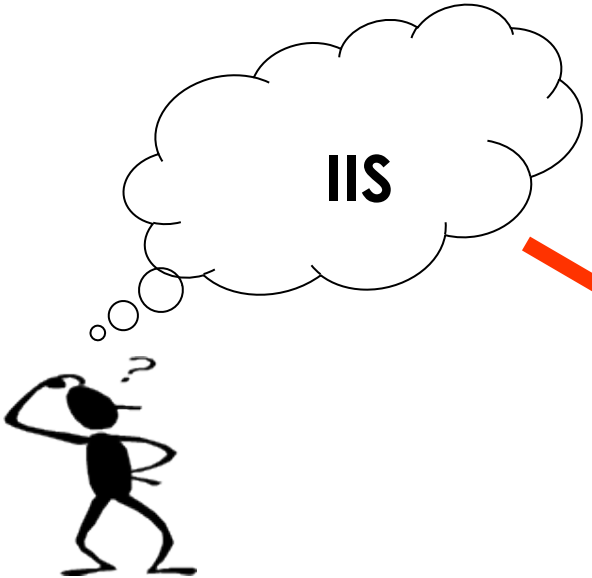


System 1.

Pollen data

Meteorologica data

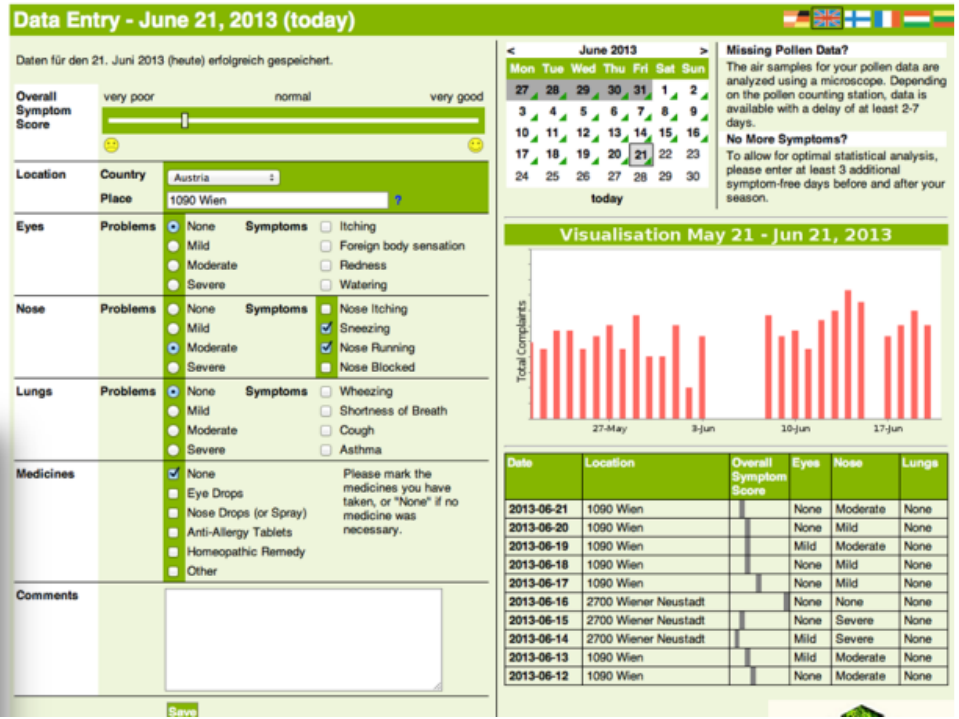
Air quality data: analysis of pollutions



Medical indication

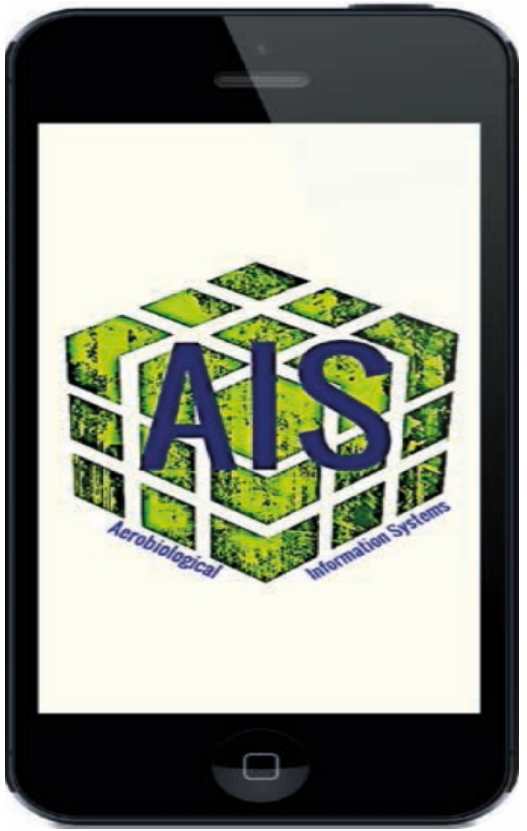
Improve the management of respiratory diseases

System 2.
Symptoms Evaluation: method developed in Austria



App Information

Receive your personal pollen information



Plant cultivation in green spaces; French case study

The aims of study are to provide recommendations for plant cultivation in public green areas, to assess pollen counts in public gardens and to formulate recommendations in order to protect allergic patients

RNSA actions B4. Summary

- **WHAT:** Pollen count and allergens
- **HOW:** Pollen traps for analysis of local pollen dispersion:
- Sigma 2 passive pollen trap (change slide daily)
- Hirst pollen trap at proximity (change drum once a week)
- Slides are analysing by the RNSA (in partnership with LHVP).
- **WHERE:** Public gardens in Paris and Lyon
- **WHEN:** 2 campaigns 16 weeks = 32 weeks
  - Campaign 1: March 2015 to mid-June 2015
  - Campaign 2: March 2016 to mid-June 2016
- **LEADER:** INSERM, RNSA will be coordinators of the field survey in their Centers (Paris and Lyon), UPMC will support the activities of the action.
- **Expected results:** field assessment of pollen count during pollen season. Study of distribution of pollen in public green spaces according to season. Recommendations on plant occupation of public green spaces.

RNSA actions B4:
Pictures of the Hirst pollen traps in Paris

Paris Pasteur

The pollen trap is located on the roof of the Pasteur Institute in the 15th district.

Long. 2°20 – Lat. 48°52 – Alt. 60 m – pollen trap brand : Lanzoni– number of people concerned : 2 500 000

Paris LHVP

The pollen trap is located on the roof of the LHVP (Laboratory of Hygiene of the city of Paris) in the 13th district.

Long. 2°21 – Lat. 48°49 – Alt. 60 m – pollen trap brand : Lanzoni– number of people concerned : 2 500 000

RNSA actions B4:
Pictures of the Hirst pollen traps in Lyon

Lyon HEH

The pollen trap is located on the roof of the Hospital Edouard Herriot (HEH) in the 3th district in Lyon.

Long. 4°53 – Lat. 45°44 – Alt. 52 m • pollen trap brand: Lanzoni • number of people concerned: 1 000 000

Lyon Gerland

The pollen trap is located on the roof of the Biomnis and Inserm Institute in the 7th district Gerland.

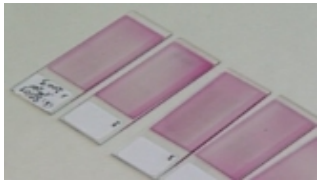
Long. 0°38 – Lat. 44°12 – Alt. 48 m • pollen trap brand : Lanzoni • number of people concerned : 1 000 000

RNSA actions B4.
Material and Methods

- *Sigma2-like traps (SLT): passive pollen trap*
- SLT is composed on one hand of a transfer zone of air flow (high part) and on the other hand of a reception zone of particles by sedimentation (low part). Air flow goes through the trap in central zone, particles sediment and come on a coated slide disposed in the lower part of the trap
- The slides are changed every day
- Then the slides are send to the RNSA and analyzed with an optical microscope to obtain pollen counts (number of pollen grains by unit of time).

Analyses in a lab

→

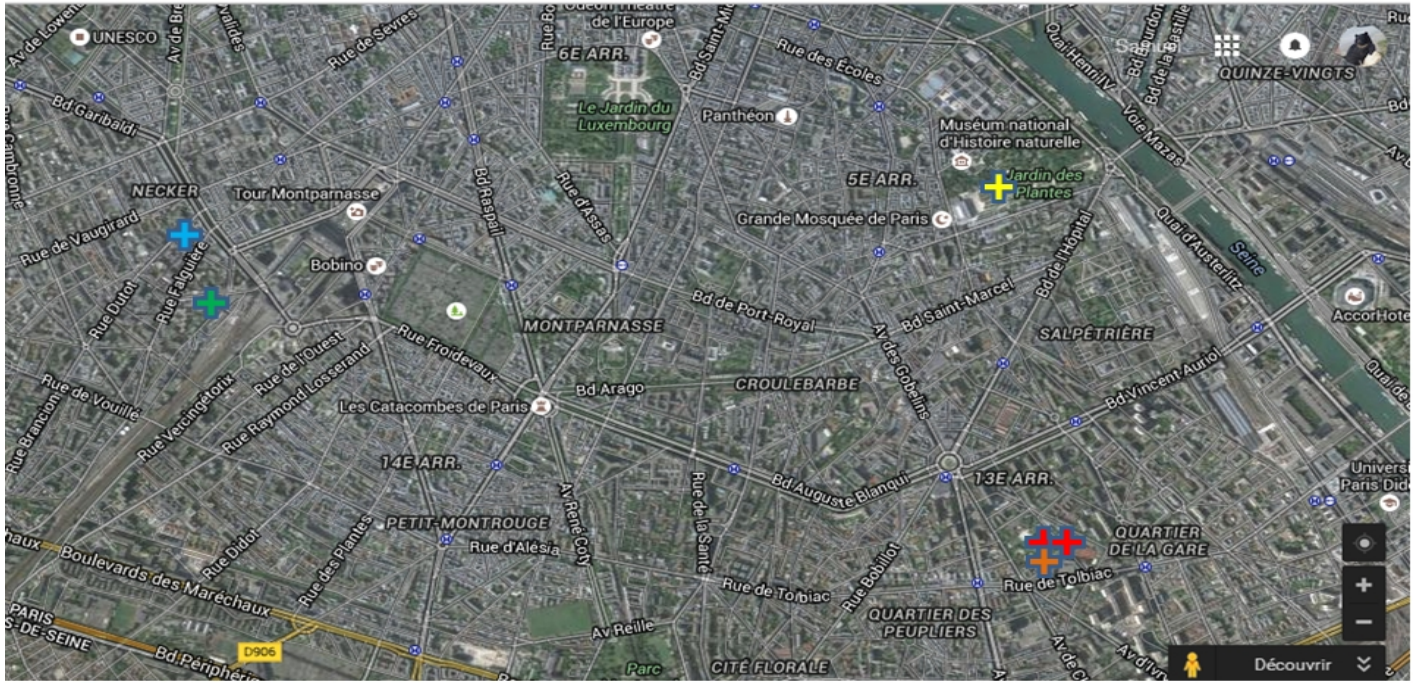


1 slide by day

→

counting pollen through a speech recognition system with an optical microscope

RNSA actions B4.
Presentation of the gardens



- SLT Choisy 1 et Choisy 2
- SLT Jardin des plantes
- SLT Dalpayrat
- Hirst Paris Pasteur
- Hirst Paris LHVP

Paris

RNSA actions B4.
Presentation of the gardens

- **Parc de Choisy** : It's a public garden of 43 000m² which was created in 1937.
  Address : Avenue de Choisy 75013 Paris France.

2 SLT pollen traps have been installed and the slides are changed every day by trained staff from LHVP (Laboratoire d'Hygiène de la Ville de Paris) who work next to the parc.

RNSA actions B4.
Presentation of the gardens

- **Parc Pierre Adrien Dalpayrat** : It's a public garden of 9898 m² which was created in 1985.

  Address : 2 Rue André Gide, 75015 Paris France.

1 SLT pollen trap has been installed and the slides are changed every day by trained staff from city hall of Paris ("service exploitation des jardins") who work in the parc.

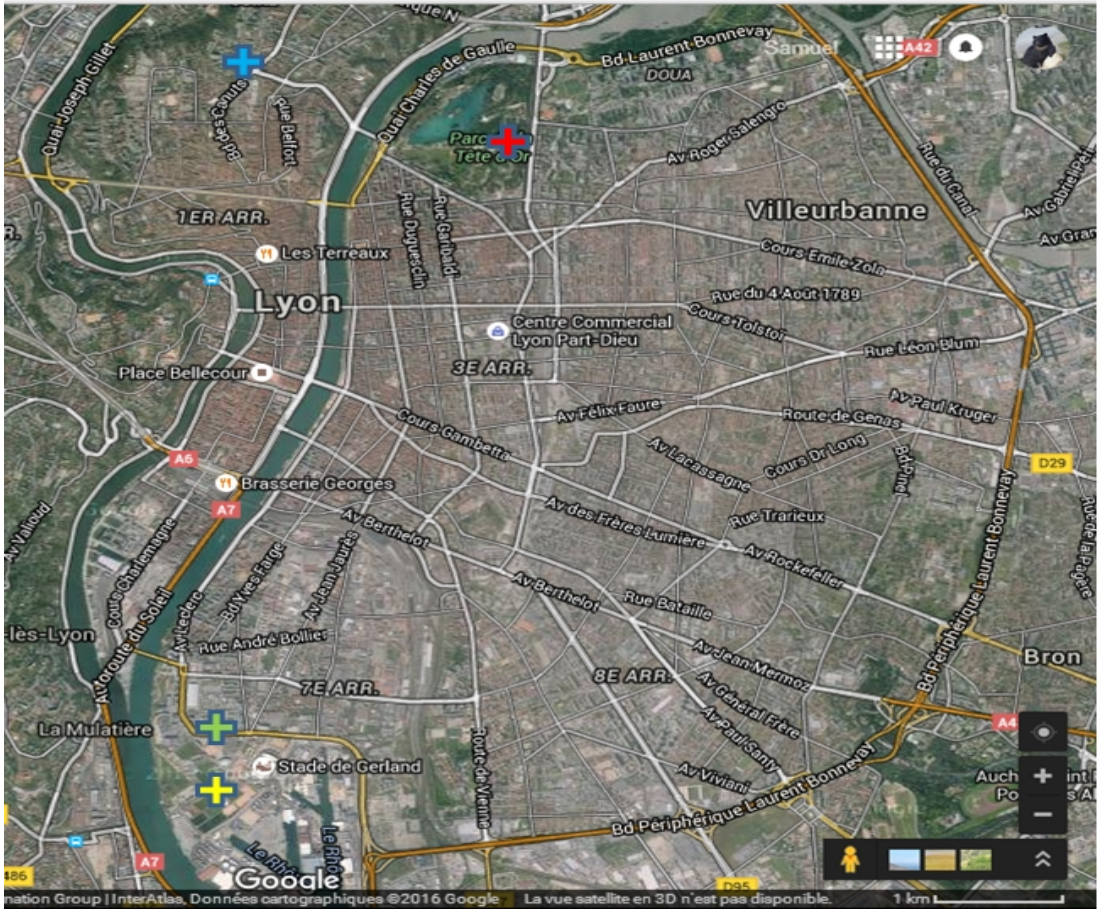
RNSA actions B4.
Presentation of the gardens

- **Parc Jardin des Plantes du Museum d'Histoire Naturelle:** It's a big public garden of 24 hectares open to the public for over 400 years with a wide variety of species.

  Address : 57 Rue Cuvier, 75005 Paris France

1 SLT pollen trap has been installed and the slides are changed every day by trained staff from the natural history museum (MNHN) who works in the garden.

RNSA actions B4.
Presentation of the gardens



- SLT Tête d'Or
- SLT Croix Rousse
- SLT Gerland
- Hirst Lyon Gerland

Lyon

➢ **Parc de la Tête d'Or :**

The "Parc de la Tête d'Or" is one of the bigger public parc in France.
It was designed on the model of the English garden and was created in 1857.
Address : Boulevard de Stalingrad 69006 Lyon France

1 SLT pollen trap has been installed and the slides are changed every day by trained student staff from Lyon.

RNSA actions B4.
Presentation of the gardens

- **Parc de Gerland:** It's the second bigger parc in Lyon; it occupies an area of 18 hectares and was created recently in 2000.
  Address : Avenue Jean Jaures 69007 Lyon

1 SLT pollen trap has been installed and the slides are changed every day by trained staff from "jardin des fleurs" of the parc de Gerland in Lyon.

RNSA actions B4.
Presentation of the gardens

- **Parc de l'Hôpital de la Croix Rousse:** It's a parc of 4.5 ha located in the 4th arrondissement of Lyon next to the Croix-Rousse hospital. It was designed by René-Edouard André in 1913 and includes about 1200 trees.
  Address : 103 Grande Rue de la Croix-Rousse 69004 Lyon France

1 SLT pollen trap has been installed and the slides are changed every day by trained student staff from Lyon.

RNSA actions B4.
Large public communication to present the action in each gardens

Jardin des plantes

Dalpayrat

Tête d'or

Gerland

Choisy

Croix Rousse

Paris

Lyon

Allergy potency

Pollen allergy depends on several parameters such as the amount of pollen in the air, the sensitivity of people and the allergy potency of the pollen of each plant species

The pollen allergy potency of a plant species is the ability of its pollen to cause an allergy to a significant part of the population

The pollen allergy potency can be:

Low or negligible: No problem to plant them in urban garden

Moderate: Only a few species can be planted in the same garden

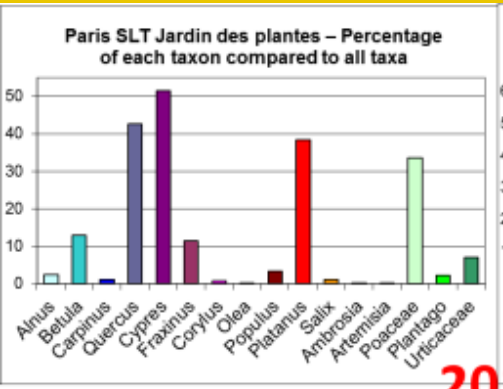
High: This species must not be planted in urban places

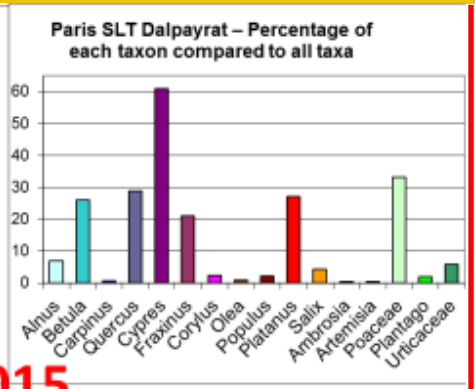
Species or genus with a strong AP **in red** should be labeled as **"Not to be planted in habitation or residence area "**, those with moderate AP **in yellow** should be labeled as **"Not to be planted in big quantities in habitation or residence area".** Other species with low or negligible AP **in green** **may not be affected by public information.**

Results Paris : Number of pollen grains for each allergenic taxon : March-June 2015 and March-June 2016

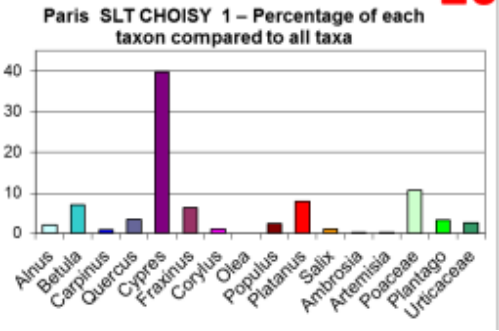
Pollen traps / Taxon	SLT CHOISY 1 2015	SLT CHOISY 1 2016	SLT CHOISY 2 2015	SLT CHOISY 2 2016	SLT Jardin des Plantes 2015	SLT Jardin des Plantes 2016	SLT Jardin Dalpayrat 2015	SLT Jardin Dalpayrat 2016
Betula	2537	3575	1913	2709	2860	3236	2415	3724
Carpinus	310	2697	233	1938	237	1189	63	1667
Cupressus	14371	8745	9700	3871	5453	6206	5660	2859
Quercus	1249	2202	1284	1891	9453	4802	2664	1750
Fraxinus	2312	760	1591	338	2536	527	1950	482
Populus	890	1271	508	532	728	225	202	535
Platanus	2864	1090	2679	842	8515	4229	2513	1091
Salix	350	294	218	182	244	186	409	348
Poaceae	2323	22015	7460	867	3065	21781	2370	2519
Urticaceae	994	631	1096	626	1560	1016	617	494
Total	**29342**	**52050**	**27791**	**18355**	**35312**	**49690**	**19733**	**22442**

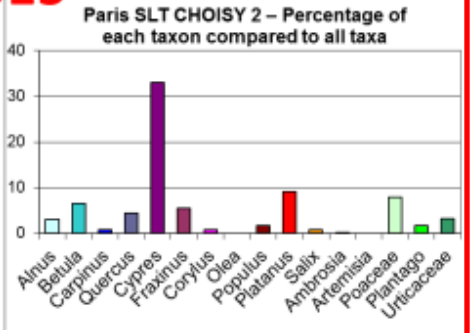
Percentage of each taxon compared to all taxa

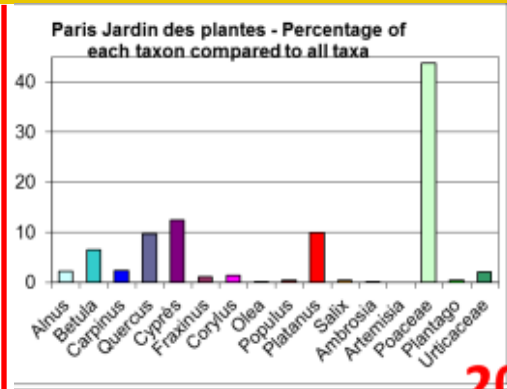


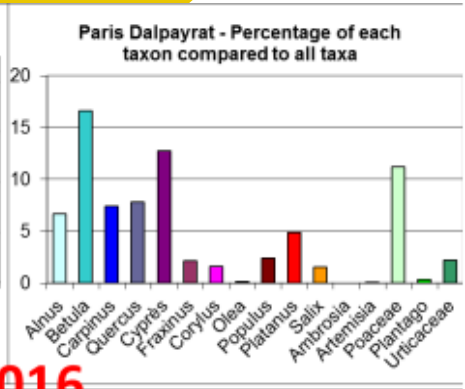


2015

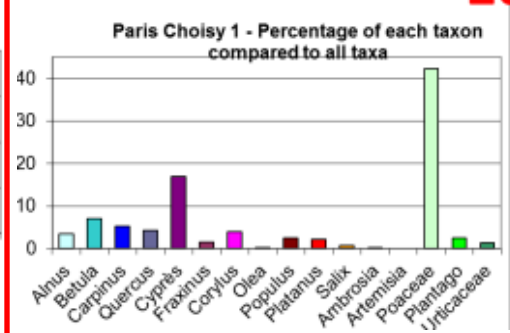


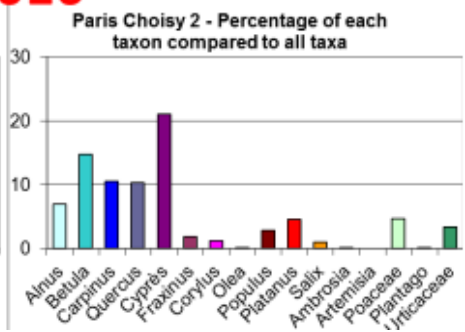






2016

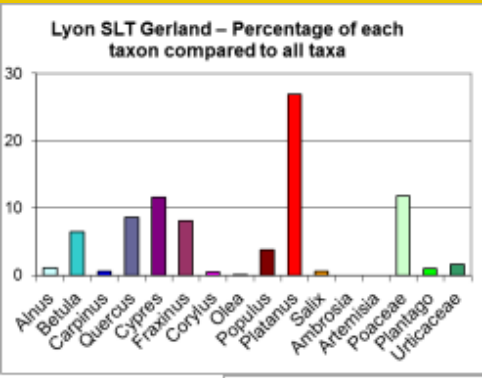


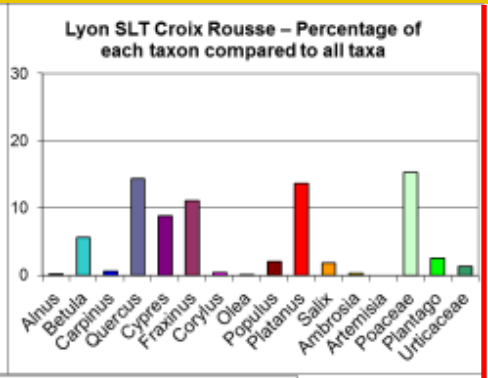


Results Lyon : Number of pollen grains for each allergenic taxon : March-June 2015 and March-June 2016

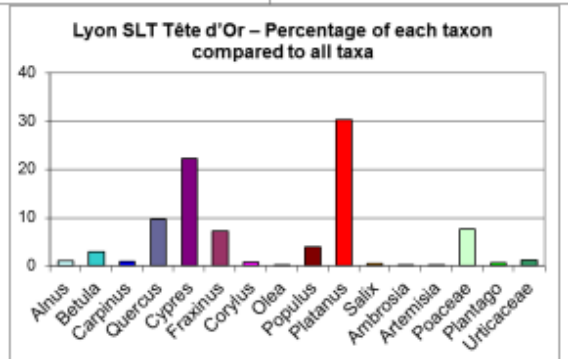
Pollen trap / Taxon	SLT Gerland 2015	SLT Gerland 2016	SLT Croix-Rousse 2015	SLT Croix-Rousse 2016	SLT Tête d'Or 2015	SLT Tête d'Or 2016
Betula	2731	5198	2544	2660	1829	1299
Carpinus	329	1905	302	2307	515	1410
Cupressus	6239	2960	4296	3390	14748	2575
Quercus	4618	1989	6964	2307	6338	2033
Fraxinus	4352	1445	5344	1696	4749	1158
Populus	2050	2865	991	1543	1420	1394
Platanus	14383	10366	6607	13146	20090	23397
Salix	326	211	879	160	288	149
Poaceae	6224	3287	7401	3503	5037	3079
Urticaceae	865	441	678	492	678	95
Total	**42117**	**37021**	**36006**	**40818**	**55692**	**42832**

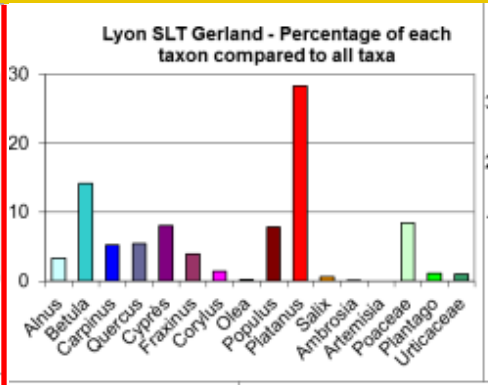
Percentage of each taxon compared to all taxa

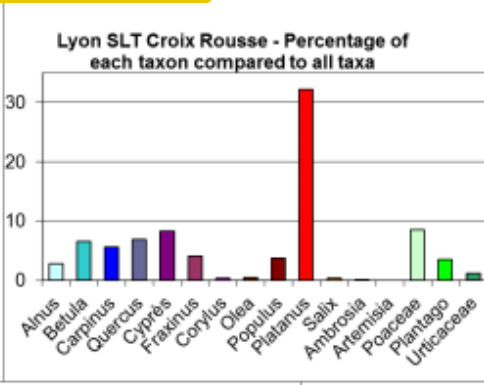




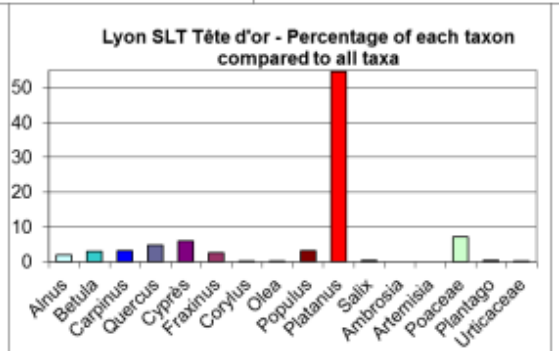
2015



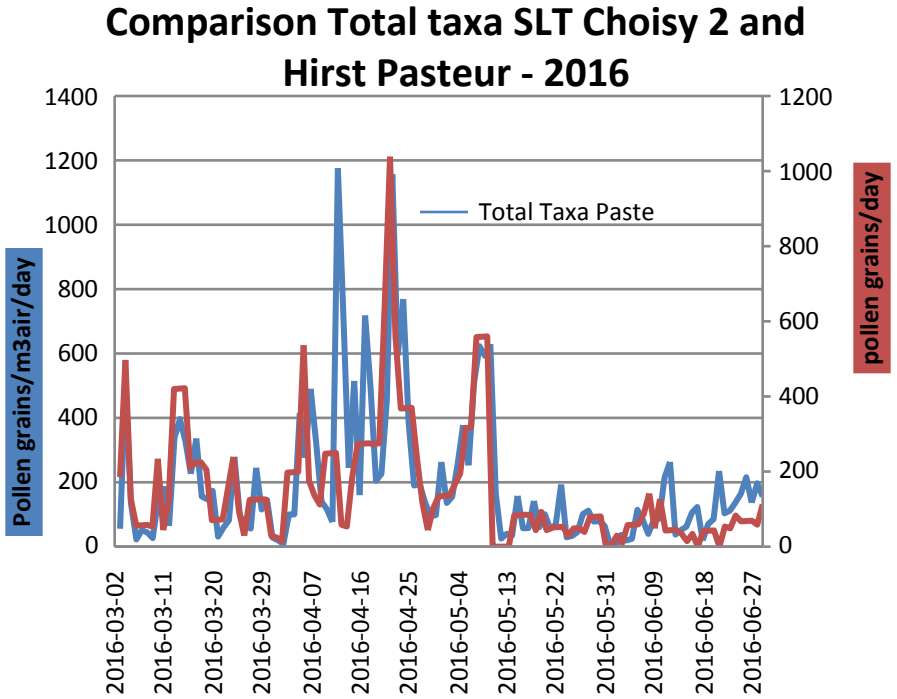


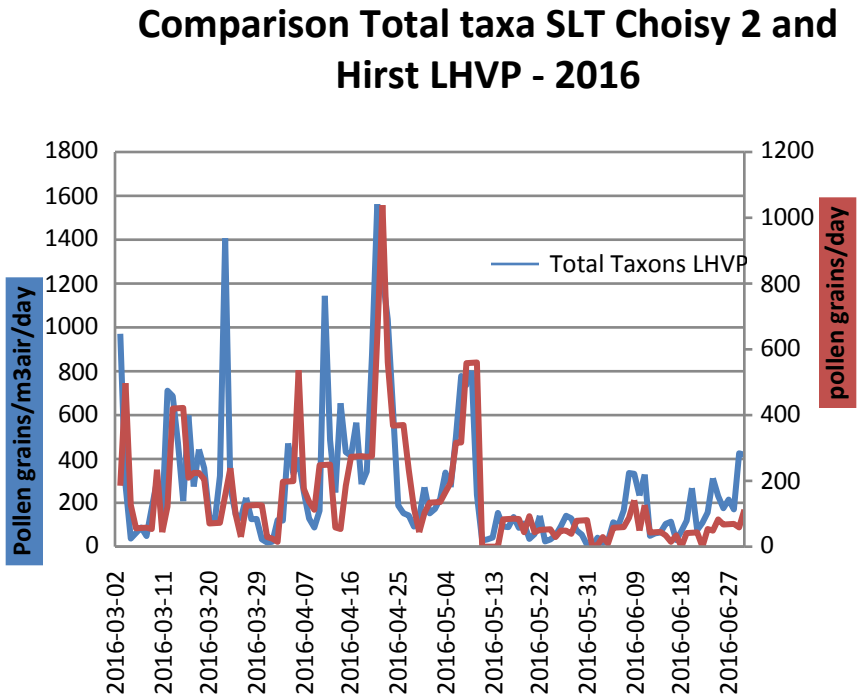


2016



Comparison Total taxa SLT and Total taxa HIRST





Exemple Index for Lyon bigest parc

Index of exposure: it takes into account the allergy potency of the species and the number of pollen grains.

$$Index\ of\ exposure = \frac{Allergy\ potency\ * Number\ of\ pollen\ grains}{1000}$$

Index of source: it takes into account the allergy potency and the number of species.

$$Index\ of\ source = \frac{Allergy\ potency\ * Number\ of\ species}{10}$$

Taxa \ Pollen trap	SLT Tête d'Or Index of source	SLT Tête d'Or Index of exposition	Recommendations
Betula (birch)	23	9	l
Carpinus (hornbeam)	38	6	l
Cupressus (cypress)	6	52	l
Quercus (oak)	65	17	n
Fraxinus (ash)	82	18	l
Populus (poplar)	10	3	n
Platanus (plane tree)	**83**	**87**	**r**
Salix (willow)	5	1	n

Legend :
n = nothing to do
l = limit the species
r = remove the species

Exemple Index for Paris Choisy Parc

Index of exposure: it takes into account the allergy potency of the species and the number of pollen grains.

$$Index\ of\ exposure = \frac{Allergy\ potency\ *\ Number\ of\ pollen\ grains}{1000}$$

Index of source: it takes into account the allergy potency and the number of species.

$$Index\ of\ source = \frac{Allergy\ potency\ *\ Number\ of\ species}{10}$$

Pollen trap / Taxa	SLT Choisy 1 Index of source	SLT Choisy 1 Index of exposition	SLT Choisy 2 Index of source	SLT Choisy 2 Index of exposition	Recommendations
Betula (birch)	0,3	18	0,3	14	l
Carpinus (hornbeam)	/	9	/	7	l
Cupressus (cypress)	/	69	/	41	l
Quercus (oak)	0,4	7	0,4	6	n
Fraxinus (ash)	4,8	9	4,8	6	l
Populus (poplar)	1,3	2	1,3	1	n
Platanus (plane tree)	1,6	8	1,6	7	l
Salix (willow)	/	1	/	1	n

Legend :
n = nothing to do
l = limit the species
r = remove the species

Conclusion 1/2

• The different results show that according to their locations, SLT pollen traps provide substantially similar results, despite some little differences for some taxa from one garden to another depending on the species locally present. The pollen seasons are the same on the Hirst and SLT pollen traps with often peaks at the same time.

•Some taxa highlighted on the proximity pollen traps seem to be related to the surrounding vegetation (Cupressaceae, Plantaginaceae, Platanus, Poaceae …)

•The exposure and source index calculated in this study in Paris and Lyon can be used as a tool to select the best and most appropriate plant species to include in new green spaces. These indices can also be applied to existing parks and gardens as a means of assessing current allergenicity and as a management tool for taking corrective action wherever risk situations are perceived.

Conclusion 2/2

- There are many allergenic species in the parc of the cities of Lyon and Paris like birch, cypress, plane tree .... We need to take into account the health impact in the choice of vegetal species to implant in green areas and avoid to plant allergenic species.
- With these results, a guide has been done with recommendations for species to avoid and species to plant in the green areas and parc in France available on the website:

http://www.vegetation-en-ville.org/que-faire/le-potentiel-allergisant/

www.vegetation-en-ville.org/que-faire/le-potentiel-allergisant/

Tilleuls*	Tilliacées	Modéré
Ormes*	Ulmacées	Faible/Négligeable

*plusieurs espèces
** le pollen de platane est faiblement allergisant. Par contre, les micro-aiguilles contenus dans les bourres provenant de la dégradation des capitules femelles de l'année précédente sont très irritantes.

Herbacées spontanées

Espèces	Familles	Potentiel allergisant
Chénopodes*	Chénopodiacées	Modéré
Soude brulée (Salsola kali)		Modéré
Ambroisies*	Composées	Fort
Armoises*		Fort
Marguerites*		Faible/Négligeable
Pissenlits*		Faible/Négligeable
Mercuriales*	Euphorbiacées	Modéré
Plantains*	Plantaginacées	Modéré
Graminées	Poacées	Fort
Oseilles* (Rumex)	Polygonacées	Modéré
Orties*	Urticacées	Faible/Négligeable
Pariétaires		Fort

*plusieurs espèces

Graminées Ornementales

Espèces	Familles	Potentiel allergisant
Baldingère	Poacées	Fort
Calamagrostis		Modéré
Canche sespiteuse		Fort
Elyme des sables		Modéré
Fétuques*		Fort
Fromental élevé		Fort
Queue de lièvre		Modéré
Stipe géante		Modéré

*nombreuses espèces

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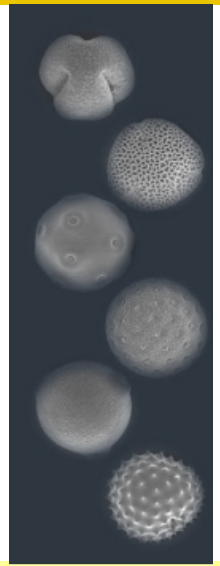

Thank you for your attention !