

# Une petite et la grande histoire de la nigelle de Damas



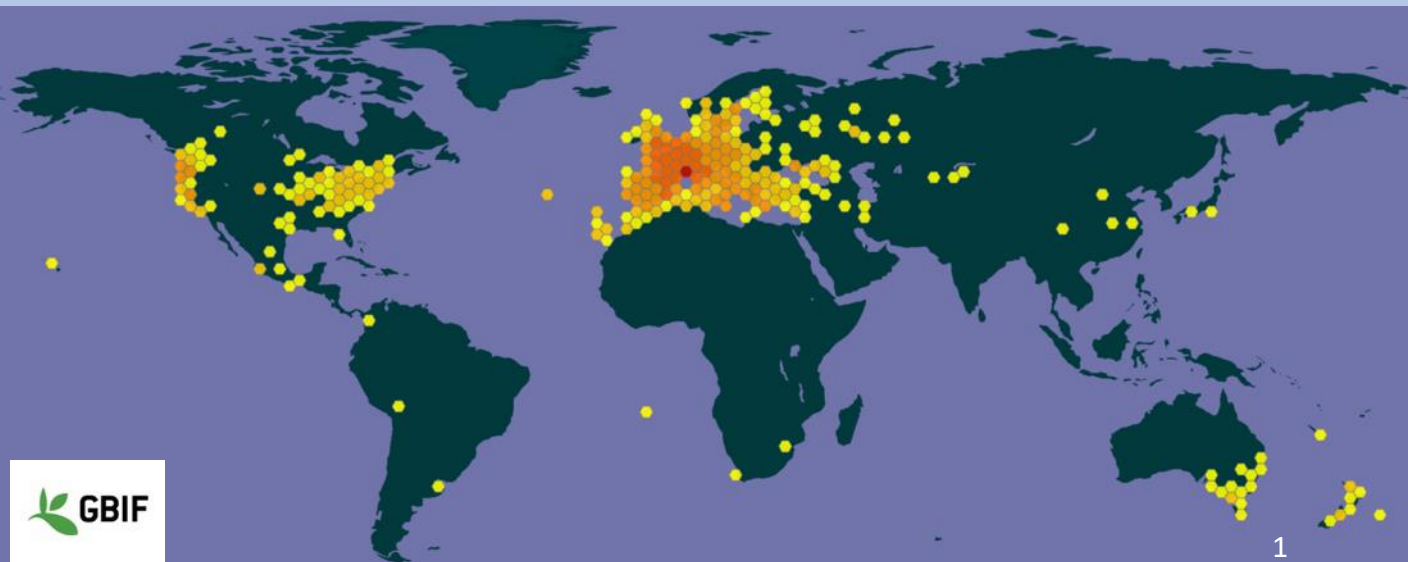
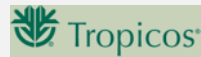
Florian Jabbour  
Institut de Systématique Evolution Biodiversité  
Rencontres annuelles Vigie-Flore, 1-2 octobre 2022  
[florian.jabbour@mnhn.fr](mailto:florian.jabbour@mnhn.fr)



# Nigella L. : la nigelle

*Nigella* (Ranunculaceae) : ca. 15 espèces (Zohary et al. 1983, Plant Syst. Evol.)


|                     |                        |                        |                        |
|---------------------|------------------------|------------------------|------------------------|
| <i>N. aristata</i>  | <i>N. deserti</i>      | <i>N. hispanica</i>    | <i>N. oxypetala</i>    |
| <i>N. arvensis</i>  | <i>N. divaricata</i>   | <i>N. indica</i>       | <i>N. papillosa</i>    |
| <i>N. assyriaca</i> | <i>N. doerfleri</i>    | <i>N. integrifolia</i> | <i>N. persica</i>      |
| <i>N. bucharica</i> | <i>N. elata</i>        | <i>N. intermeia</i>    | <i>N. sativa</i>       |
| <i>N. carpatha</i>  | <i>N. foeniculacea</i> | <i>N. koyuncui</i>     | <i>N. segetalis</i>    |
| <i>N. ciliaris</i>  | <i>N. fumariifolia</i> | <i>N. latisecta</i>    | <i>N. stricta</i>      |
| <i>N. cretica</i>   | <i>N. gallica</i>      | <i>N. media</i>        | <i>N. unguicularis</i> |
| <i>N. damascena</i> | <i>N. garidella</i>    | <i>N. nigellastrum</i> |                        |
| <i>N. degenii</i>   | <i>N. glandulifera</i> | <i>N. orientalis</i>   |                        |

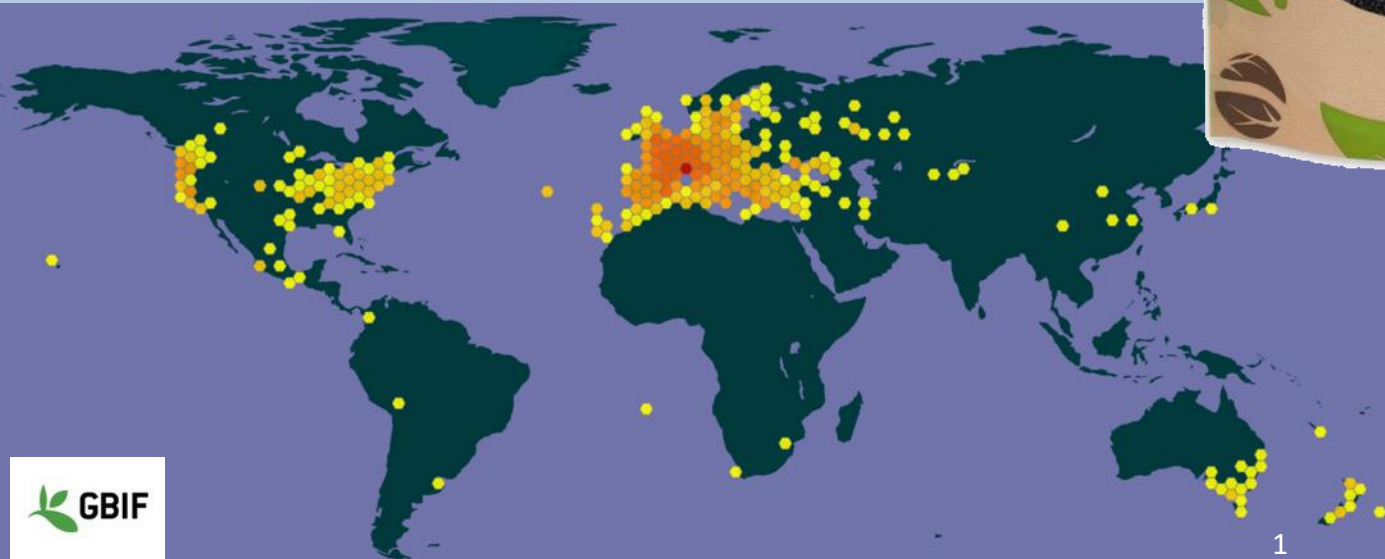


# Nigella L. : la nigelle

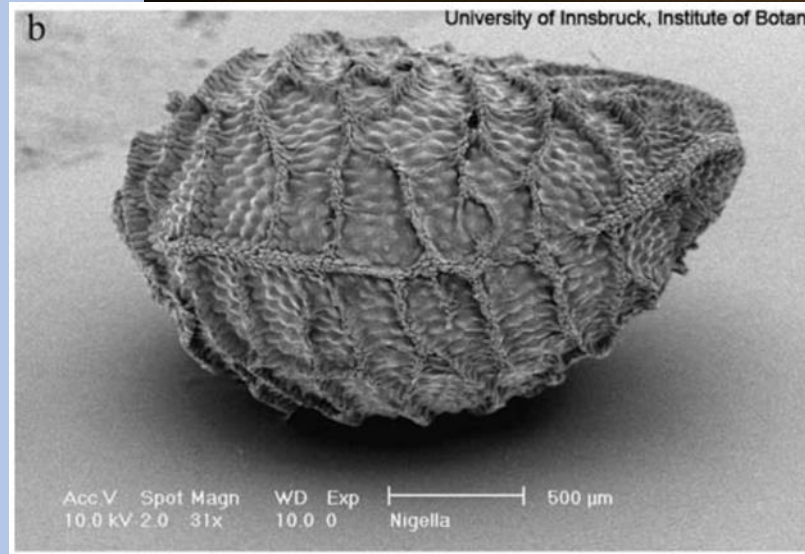
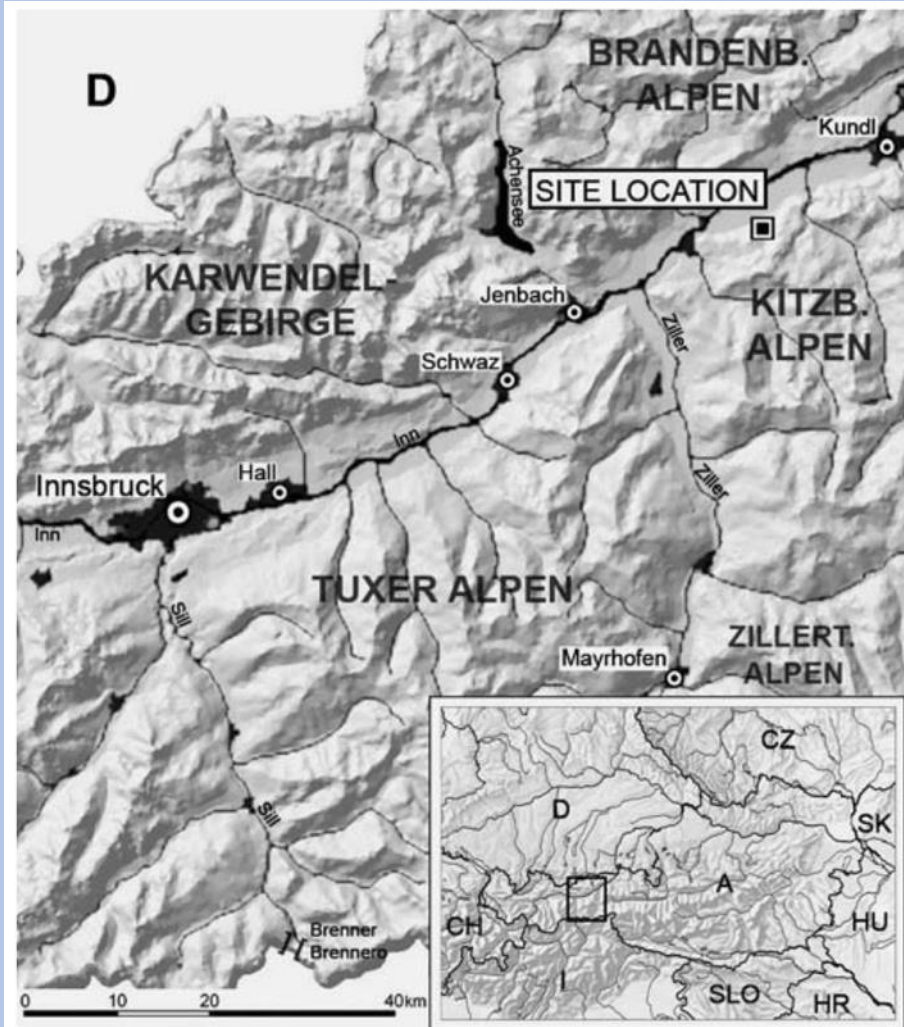
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| <i>N. assyriaca</i> | <i>N. doerfleri</i>    | <i>N. integrifolia</i> | <i>N. persica</i>      |
| <i>N. bucharica</i> | <i>N. elata</i>        | <i>N. intermeia</i>    | <i>N. sativa</i>       |
| <i>N. carpatha</i>  | <i>N. foeniculacea</i> | <i>N. koyuncui</i>     | <i>N. segetalis</i>    |
| <i>N. ciliaris</i>  | <i>N. fumariifolia</i> | <i>N. latisecta</i>    | <i>N. stricta</i>      |
| <i>N. cretica</i>   | <i>N. gallica</i>      | <i>N. media</i>        | <i>N. unguicularis</i> |
| <i>N. damascena</i> | <i>N. garidella</i>    | <i>N. nigellastrum</i> |                        |
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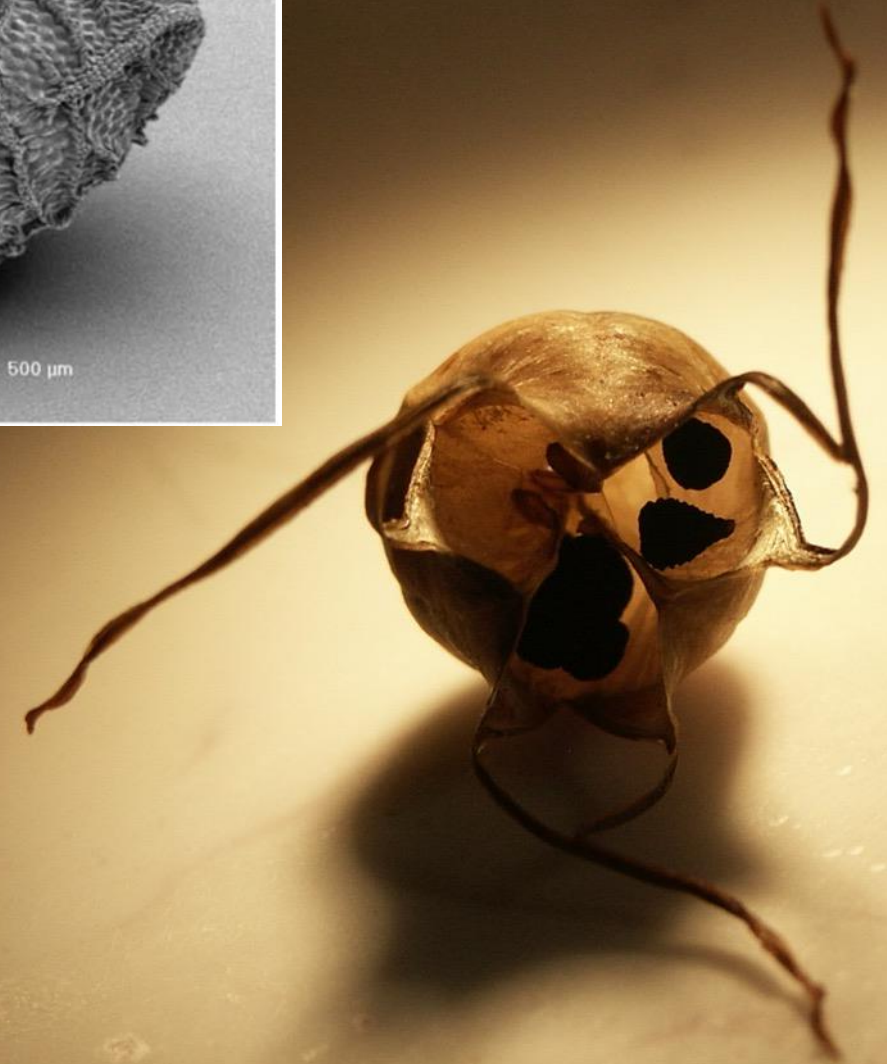




La plus ancienne trace de *N. damascena* :  
une graine de l'Âge du Bronze (1410–920  
cal B.C.) en Autriche

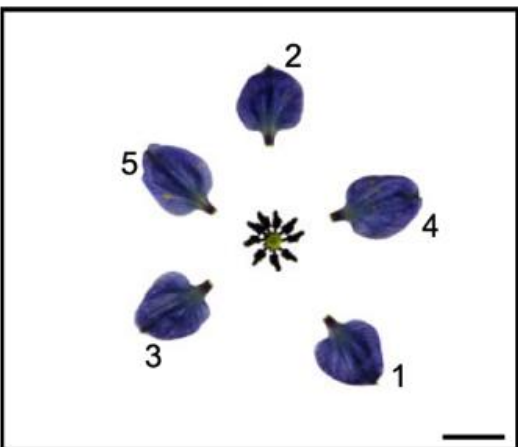
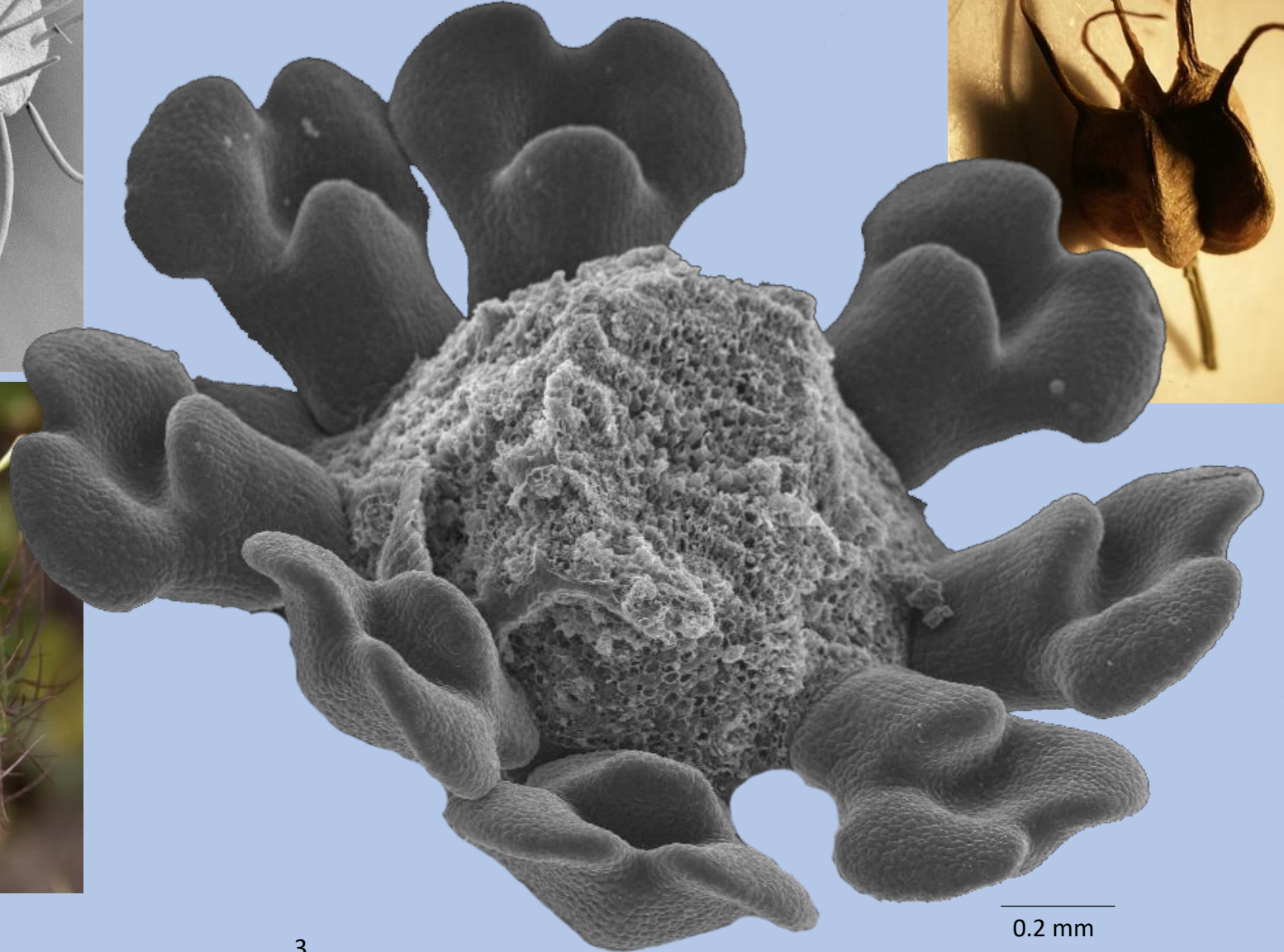
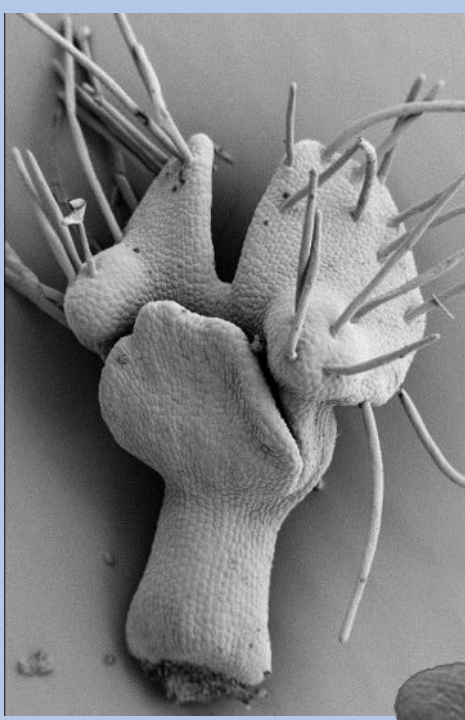


Graine de *N. damascena*



**Fig. 1** Location of the site in Tyrol (Skamen 2002 onwards, modified; small map from Spiess 2002, modified)

# La fleur et sa morphologie



Love-in-a-mist  
Devil-in-the-bush  
  
Cheveux de Vénus  
Barbe de Capucin

# Pollinisation entomophile

Visiteurs : *Apis*, *Bombus*, coléoptères, diptères, hyménoptères



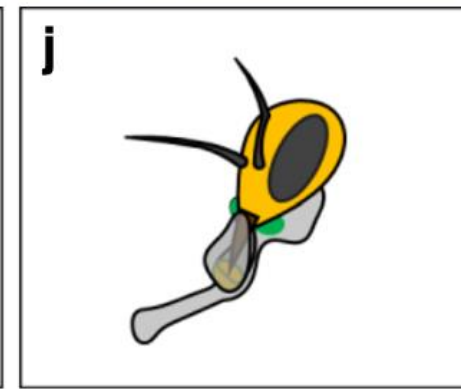
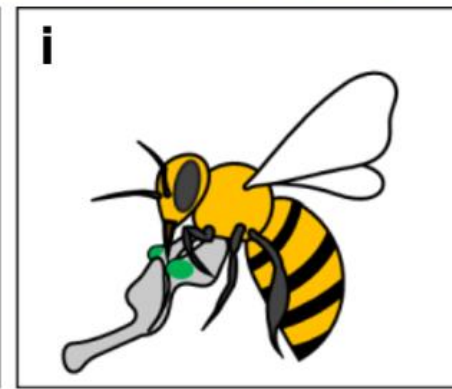
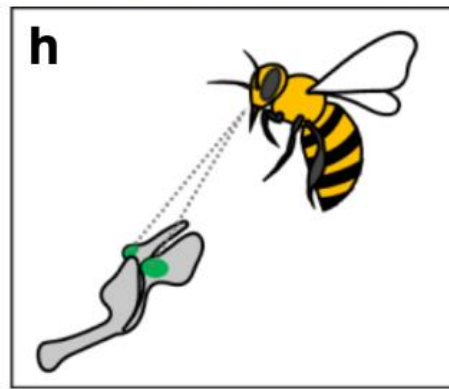
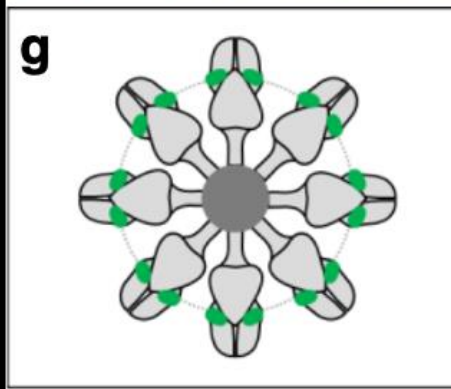
Beatriz Gonçalves, manuscrit de thèse, 2013 Zhang *et al.*, 2020, Plant Cell

# Pollinisation entomophile

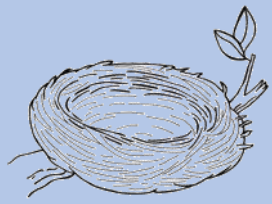
Visiteurs : *Apis*, *Bombus*, coléoptères, diptères, hyménoptères



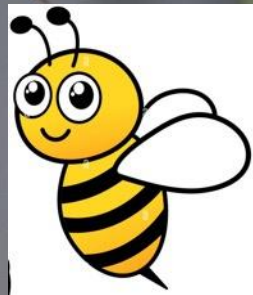
Zhang *et al.*, 2020, Plant Cell



Liao *et al.*, 2020, Nature Comm.



Cette espèce et cette fleur,  
qu'ont-elles de si spécial ?





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URBANA

# DIFFERENT FORMS OF FLOWERS

OR

PLANTS OF THE SAME SPECIES.

By CHARLES DARWIN, M.A., F.R.S.

WITH ILLUSTRATIONS.

NEW YORK:  
D. APPLETON AND COMPANY,  
549 AND 551 BROADWAY.  
1877.



# Hérédité mendélienne du trait



Morphe [P]  
Au locus  $P$  :  $PP$  ou  $Pp$



Morphe [T]  
Au locus  $P$  :  $pp$



FIG. 17. Einfache Blume.



FIG. 16. Doppelte Blume.

# Hérédité mendélienne du trait



Morphe [P]  
Au locus  $P$  :  $PP$  ou  $Pp$



Morphe [T]  
Au locus  $P$  :  $pp$

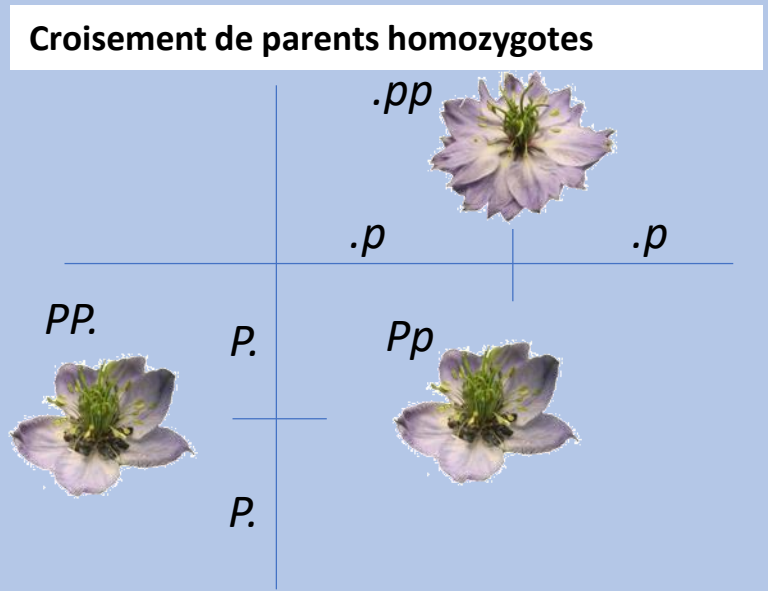


FIG. 17. Einfache Blume.



FIG. 16. Doppelte Blume.

# Hérédité mendélienne du trait



Morphe [P]  
 Au locus  $P$  :  $PP$  ou  $Pp$



Morphe [T]  
 Au locus  $P$  :  $pp$

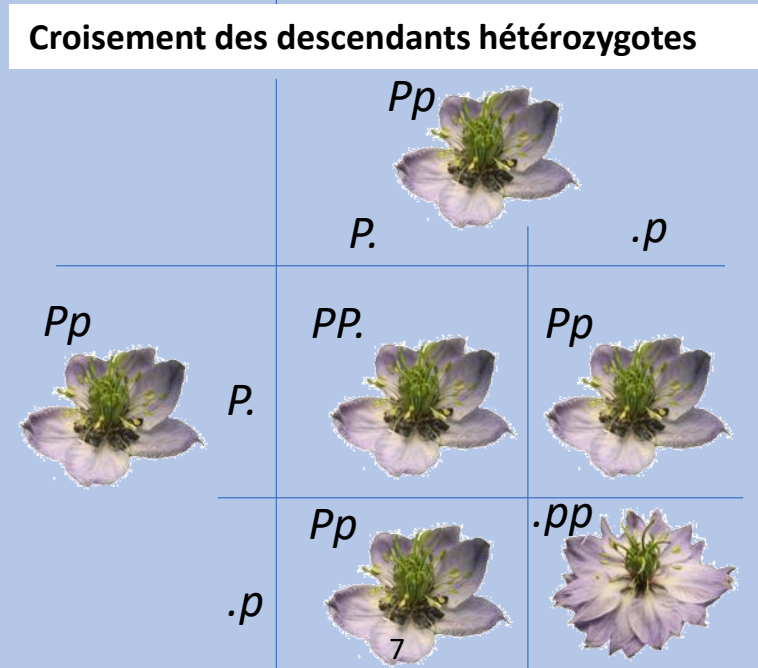
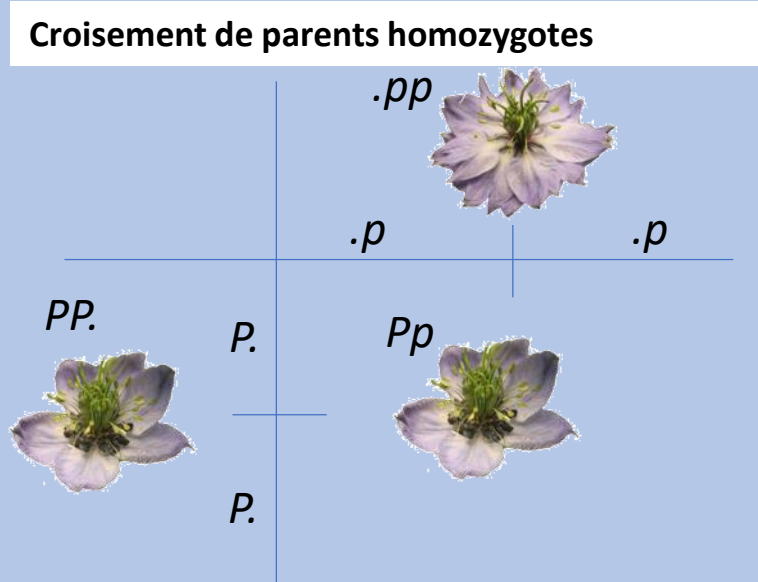
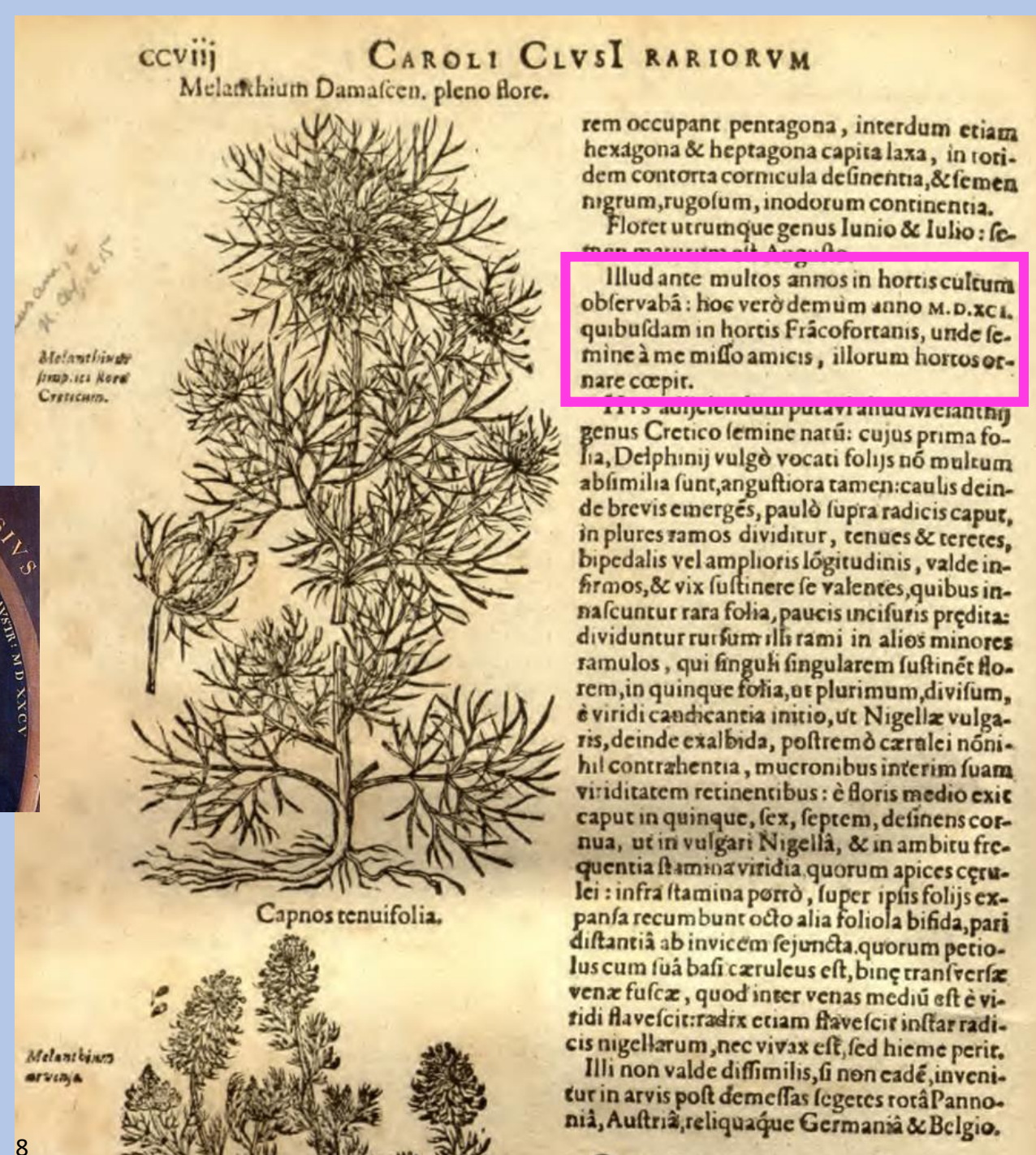
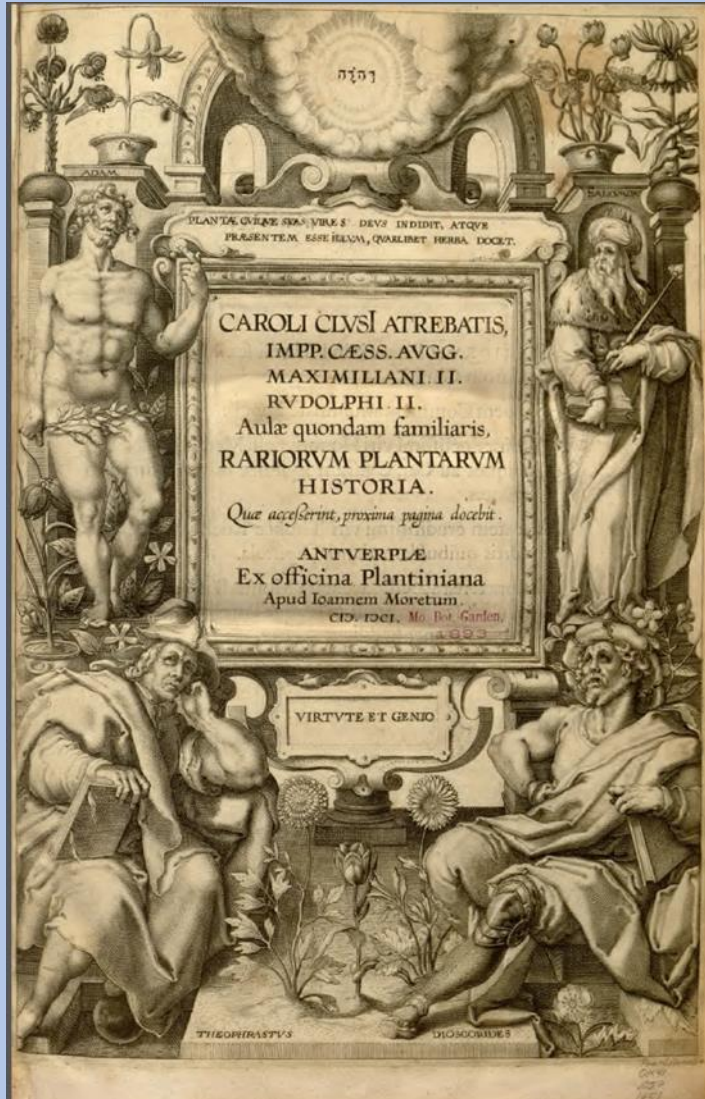


FIG. 17. Einfache Blume.

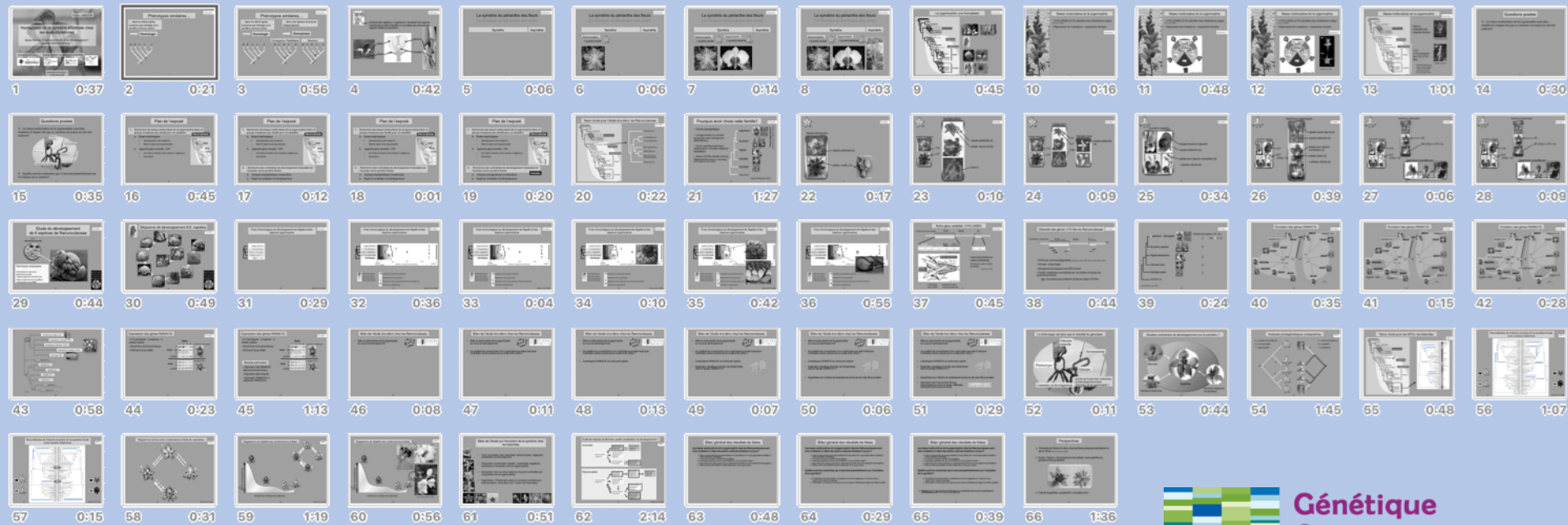


FIG. 16. Doppelte Blume.

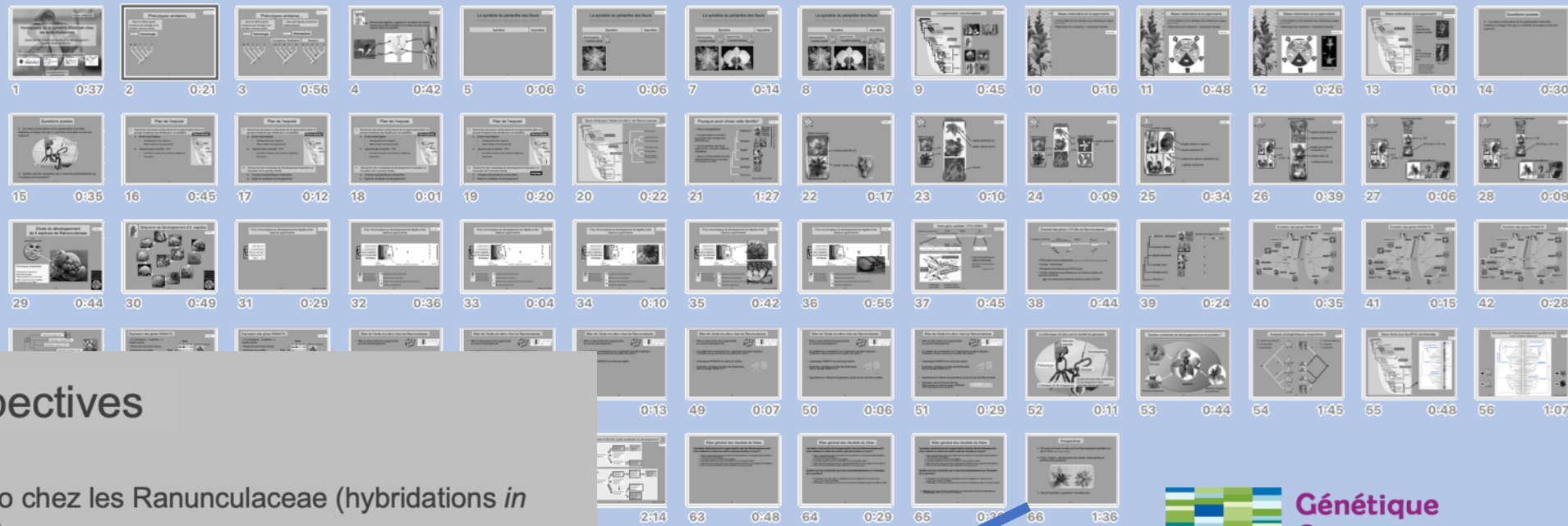
1591 : première trace écrite de ce dimorphisme du périanthe



# Thèse de doctorat 2006–2009

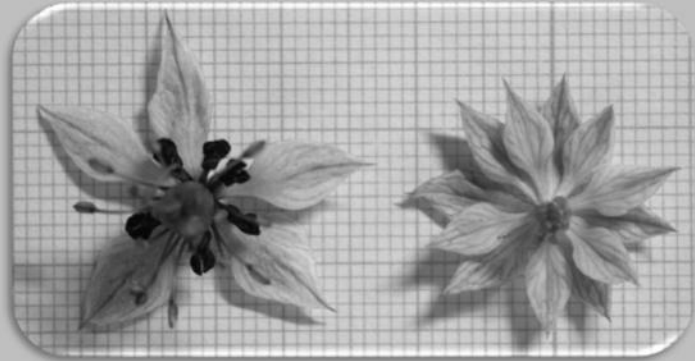


# Thèse de doctorat 2006–2009



## Perspectives

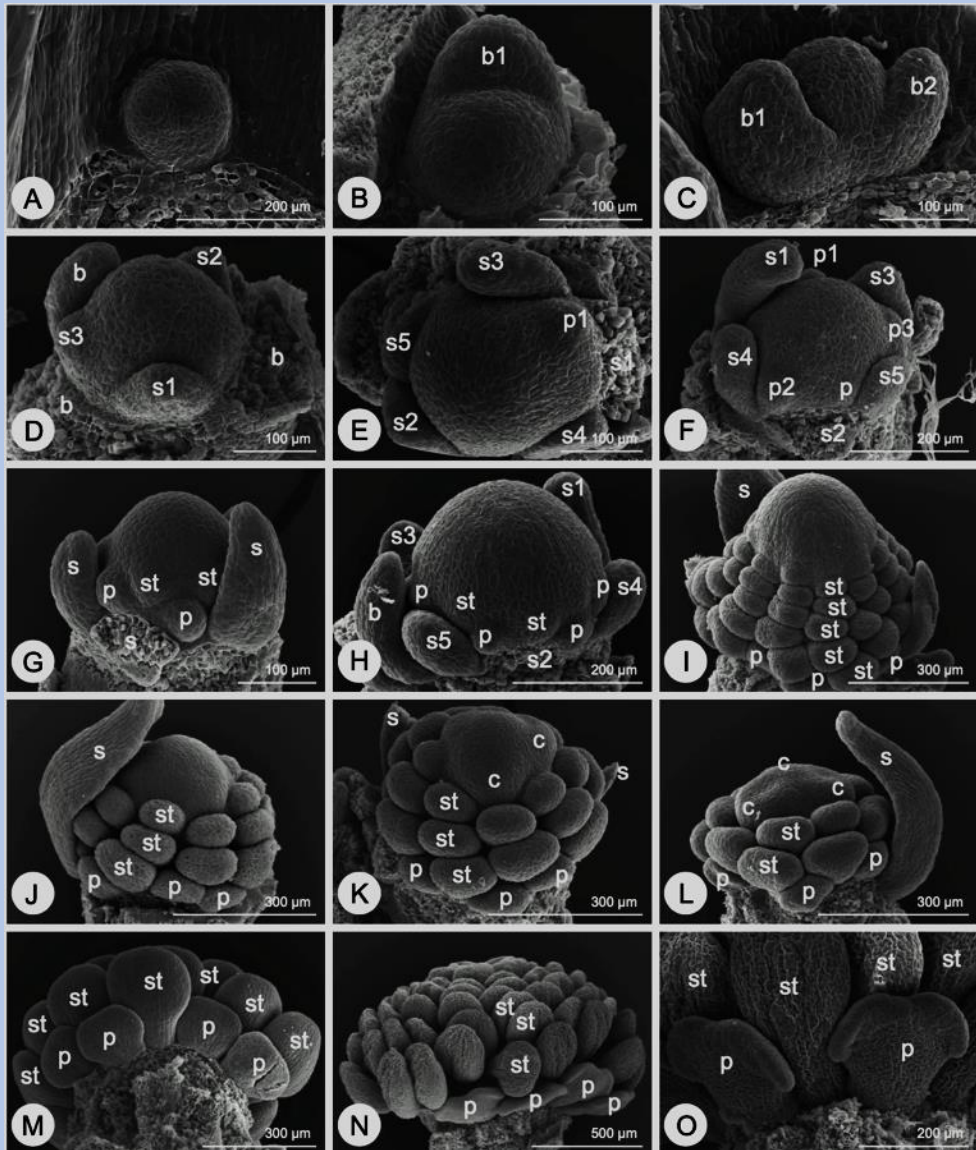
- Poursuite de l'étude évo-dévo chez les Ranunculaceae (hybridations *in situ* et VIGS (Gould et Kramer, 2007))
- Projet « Nigelle »: développement des pétales, bases génétiques, génétique des populations



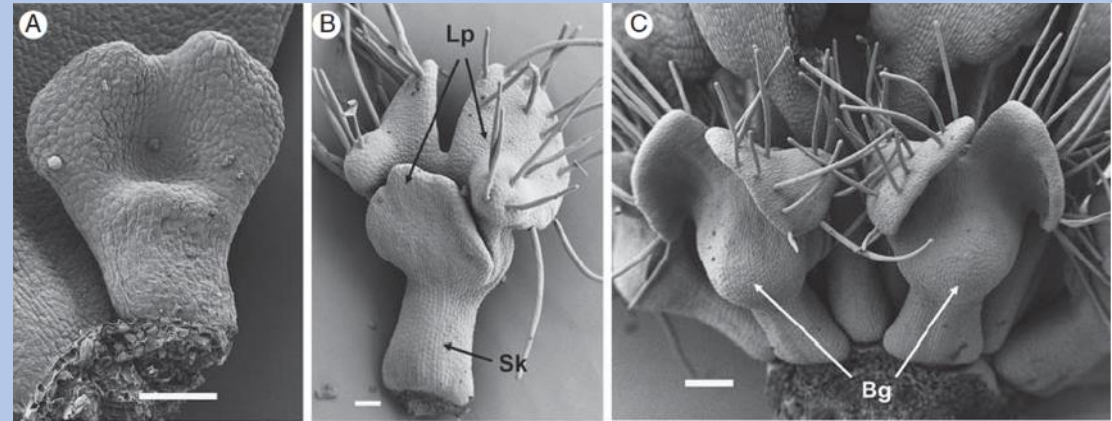
- Test de l'hypothèse « polyandrie = innovation-clé »



# Développement du pétale, et identités anatomiques des organes des 2 morphes



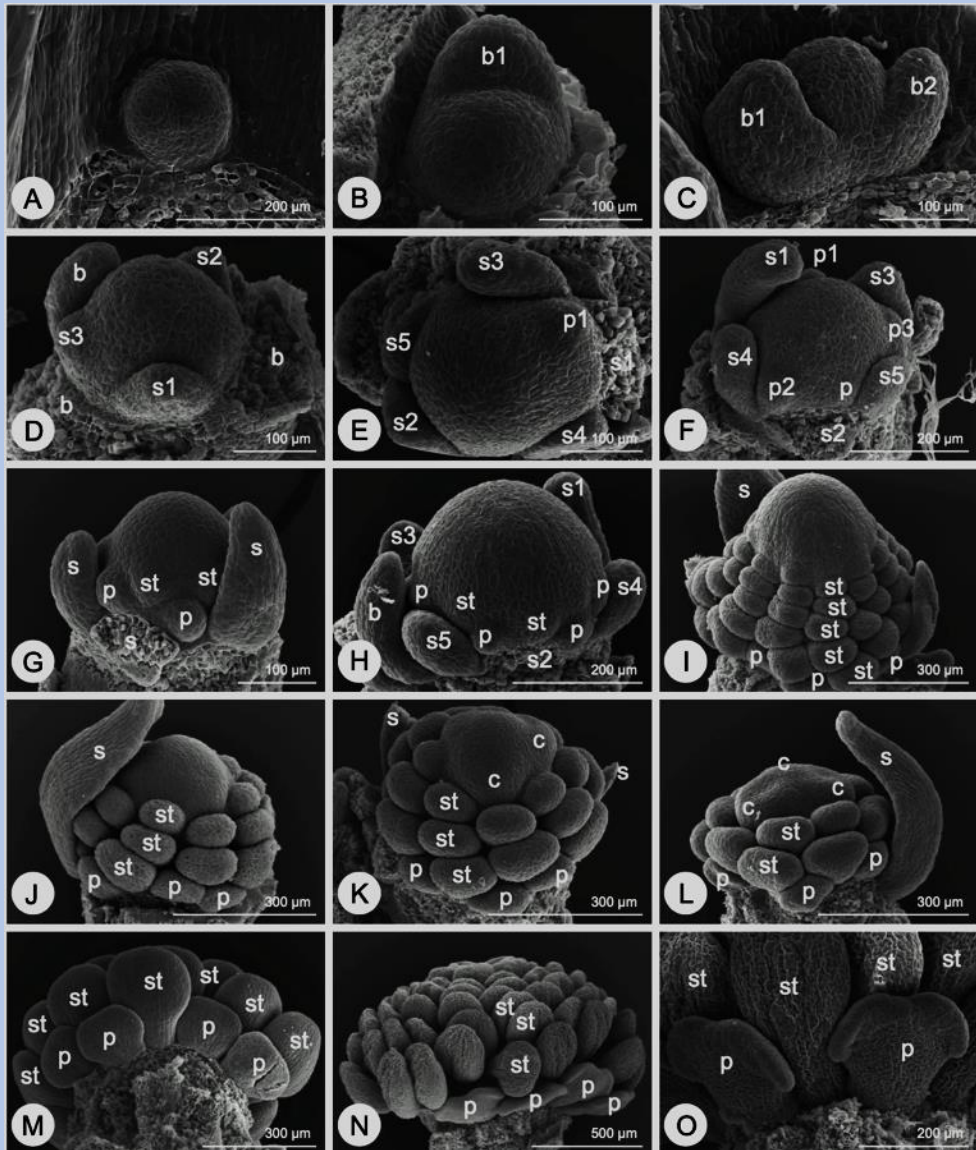
Jabbour *et al.* 2015, Bot. J. Linn. Soc.



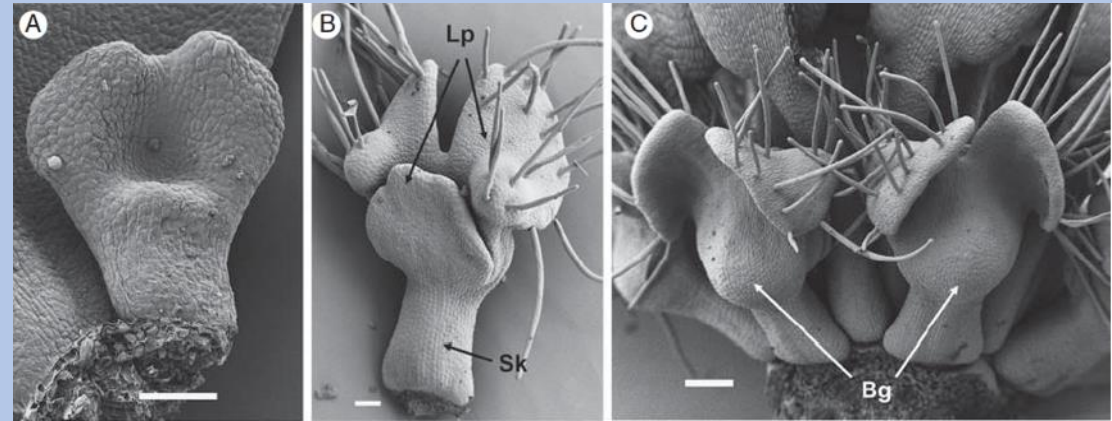
Jabbour *et al.* 2009, Ann. Bot.



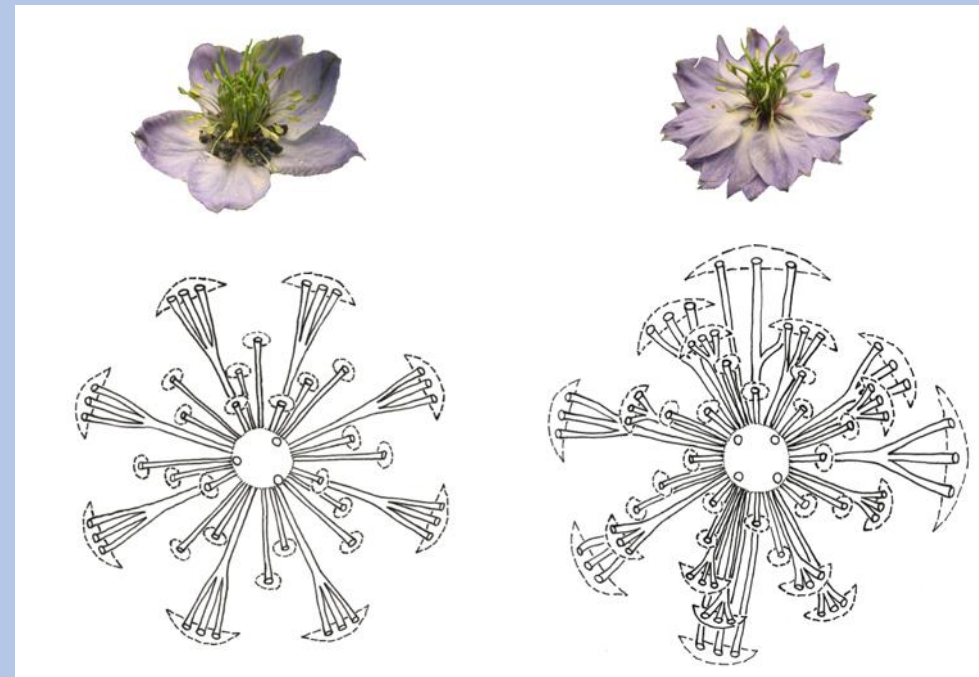
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Jabbour *et al.* 2015, Bot. J. Linn. Soc.

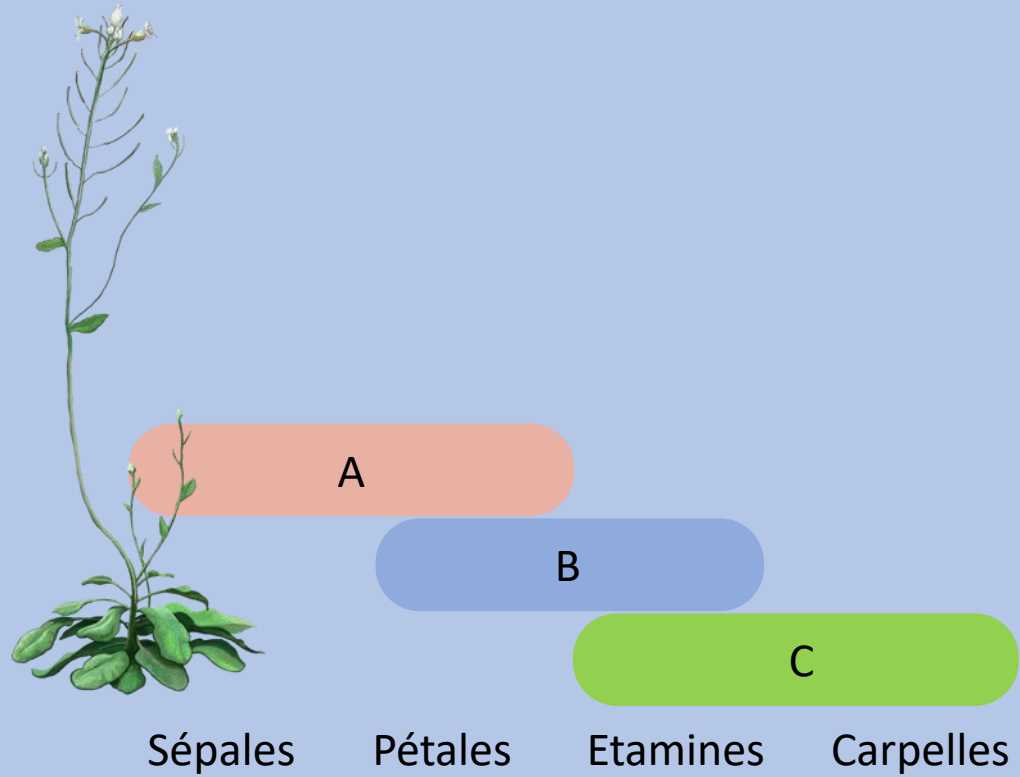


Jabbour *et al.* 2009, Ann. Bot.



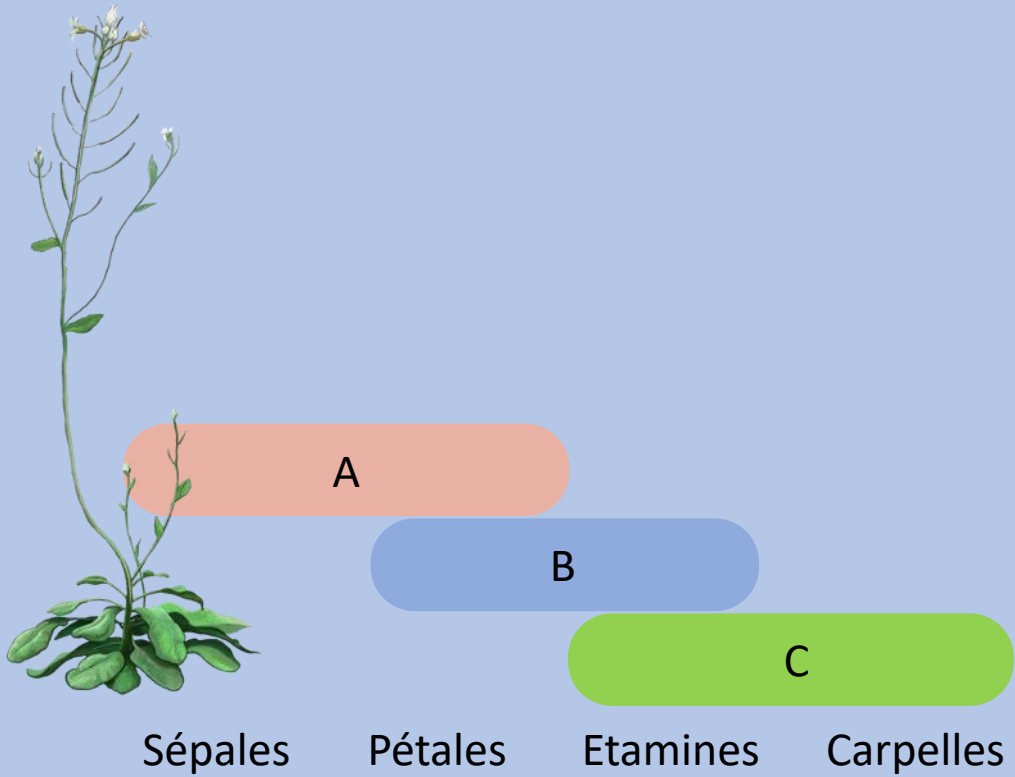
Deroin *et al.* 2015, Mod. Phytomorph.

# Origine génétique du dimorphisme floral

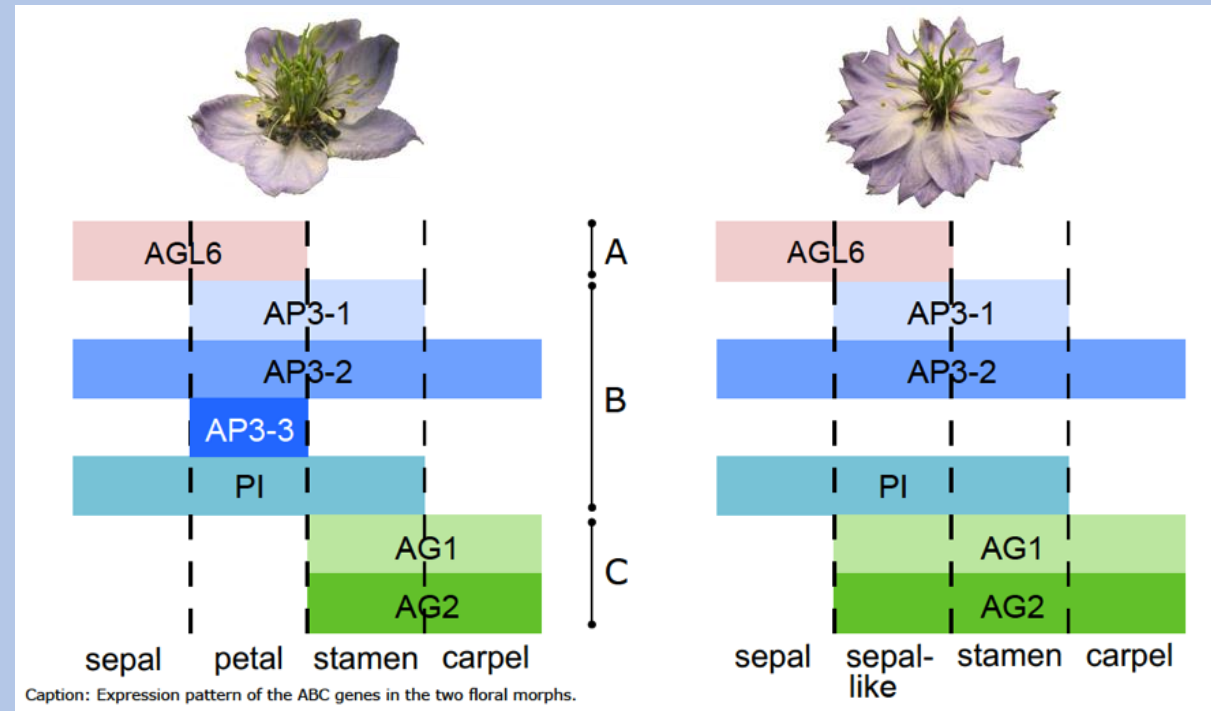


Coen & Meyerowitz 1991, Nature

# Origine génétique du dimorphisme floral

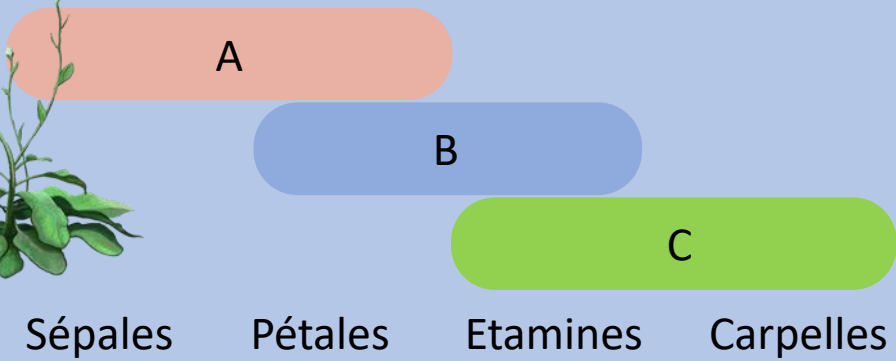
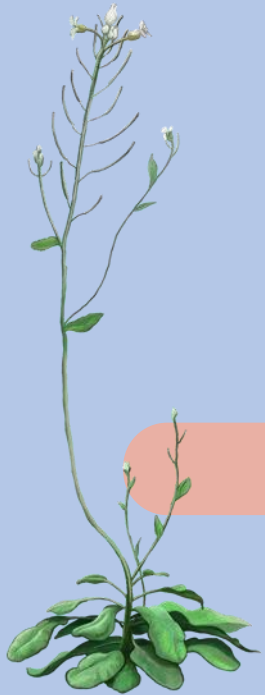
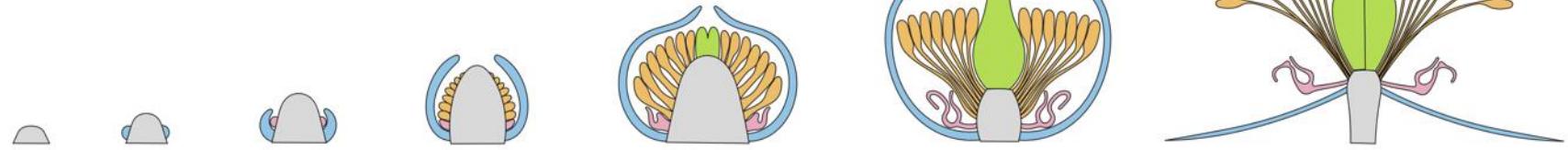


Coen & Meyerowitz 1991, Nature



# Origine génétique du dimorphisme floral

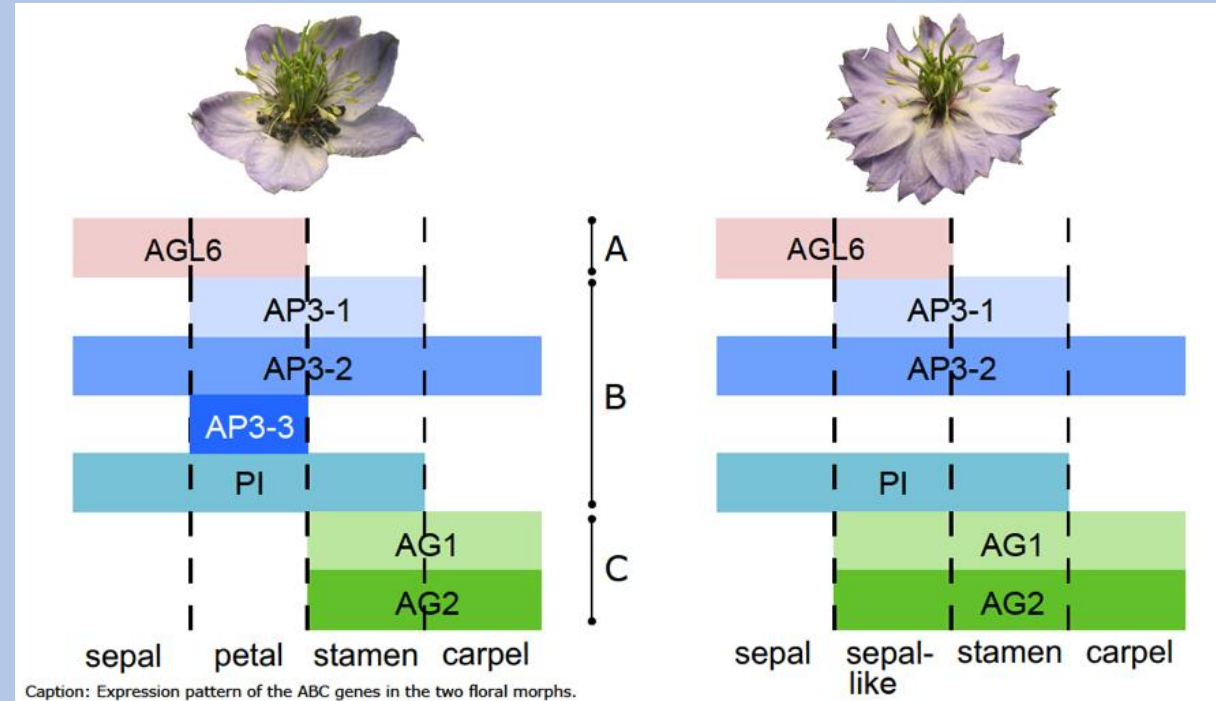
● Sepal ● Petal ● Stamen ● Carpel



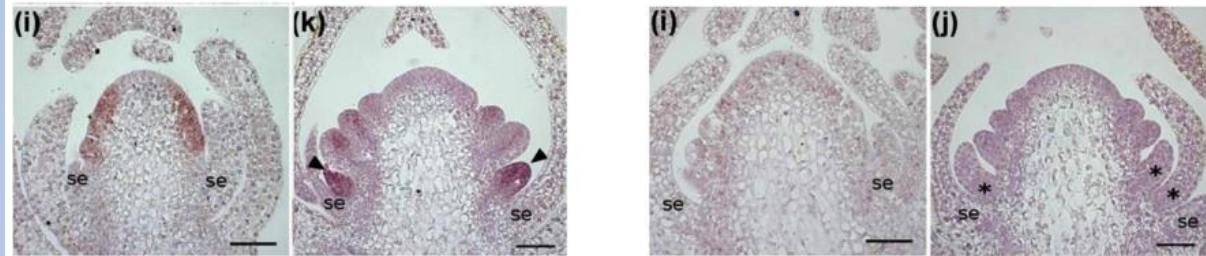
Coen & Meyerowitz 1991, Nature

Gonçalves *et al.*, 2013, Plant J.

Jabbour *et al.* 2015, Bot. J. Linn. Soc. 12



Caption: Expression pattern of the ABC genes in the two floral morphs.



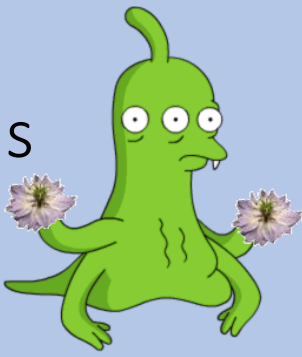
*Aquilegia præcox canadensis*, flore externe rubicundo; medio luteo. *Morif. hist.* 3. p. 457. f. 12. t. 2. f. 4.  
*Habitat in Virginia, Canada.* 2

## NIGELLA.

\* *Pentagynæ.*

- damascena.* 1. NIGELLA floribus involucri folioso cineris. *Hort. cliff.* 215. *Hort. upf.* 153. *Roy. lugdb.* 481.  
*Nigella angustifolia*, flore majore simplici cæruleo. *Baub. pin.* 145.  
*Melanthium sylvestre.* *Matth. diose.* 529.
- 2. NIGELLA flore majore pleno cæruleo. *Baub. pin.* 145.  
*Habitat inter segetes Europæ australis.* ☉
- fativa.* 2. NIGELLA petalis subtricuspidatis foliis subpilosis. *Hort. upf.* 154. *Mat. med.* 271. *Bæhm. lips.* 173.  
*Nigella flore minore simplici candido.* *Baub. pin.* 145.  
*Melanthium fativum.* *Cam. epit.* 551.  
*Nigella flore minore pleno & albo.* *Baub. pin.* 146.  
*Habitat in Ægypto, Creta.* ☉
- arvensis.* 3. NIGELLA pistillis quinis, petalis integris, capsulis turbinatis.  
*Nigella flore foliis nudo, pistillis corollam æquantibus.* *Hort. cliff.* 215. *Roy. lugdb.* 481. *Hall. helv.* 316.  
*Dalib. parif.* 160. *Bæhm. lips.* 174.  
*Nigella arvensis cornuta.* *Baub. pin.* 145.  
*Melanthium sylvestre alterum.* *Cam. epit.* 553.  
*Habitat in Germaniæ, Galliæ, Italiæ agris.* ☉  
*Hujus Capsula inferne angustior, præcedentis inferne ventricosior, superne utraque contra.*
- \* *Decagynæ.*
- hispanica.* 4. NIGELLA pistillis denis corollam æquantibus. *Hort. upf.* 154. *Sauv. mousp.* 253.  
*Nigella latifolia*, flore majore simplici cæruleo. *Baub. pin.* 145. *prodr.* 75. *Morif. hist.* 3. p. 516. f. 12. t. 18. f. 8.  
*Habitat in Hispania, Monspelii.* ☉
- orientalis.* 5. NIGELLA pistillis denis corolla longioribus. *Hort. cliff.* 215. \* *Hort. upf.* 153. *Roy. lugdb.* 481.  
*Nigella chalcopensis lutea, corniculis longioribus.* *Morif. hist.* 3. p. 516. f. 12. t. 18. f. 10. *Raj. app.* 525.  
*Habitat circum Alepum.* ☉

Le type nomenclatural de la nigelle de Damas est un mutant !



*Aquilegia præcox canadensis*, flore externe rubicundo; medio luteo. *Morif. hist.* 3. p. 457. f. 12. t. 2. f. 4. *Habitat in Virginia, Canada.* 2

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*Melanthium sylvestre.* *Matth. diose.* 529.

β. **Nigella** flore majore pleno cæruleo. *Baub. pin.* 145. *Habitat inter segetes Europæ australis.* ☉

*fativa.* 2. **NIGELLA** petalis subtricuspidatis foliis subpilosis. *Hort. upf.* 154. *Mat. med.* 271. *Bæhm. lipf.* 173. *Nigella* flore minore simplici candido. *Baub. pin.* 145.

*Melanthium fativum.* *Cam. epit.* 551.

*Nigella* flore minore pleno & albo. *Baub. pin.* 146. *Habitat in Ægypto, Creta.* ☉

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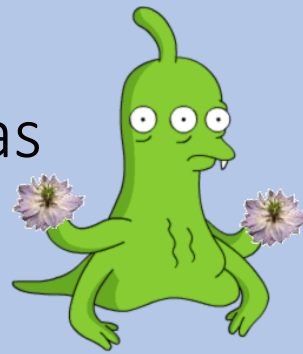
*Habitat in Hispania, Monspelii.* ☉

*orientalis.* 5. **NIGELLA** pistillis denis corolla longioribus. *Hort. cliff.* 215. \* *Hort. upf.* 153. *Roy. lugdb.* 481.

*Nigella chalapensis lutea*, corniculis longioribus. *Morif. hist.* 3. p. 516. f. 12. t. 18. f. 10. *Raj. app.* 525.

*Habitat circum Alepum.* ☉

Le type nomenclatural de la nigelle de Damas est un mutant !



Lectotype à l'herbier LINN



*Pl. Syst. Evol.* 142, 71—107 (1983)

**Plant Systematics and Evolution**  
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**The Genus *Nigella* (*Ranunculaceae*) — a Taxonomic Revision**

By

Michael Zohary, Jerusalem

10) *Nigella damascena* L., *Sp. Pl.* 534 (1753); *Boiss., Fl. Or.* 1, 68 (1867).

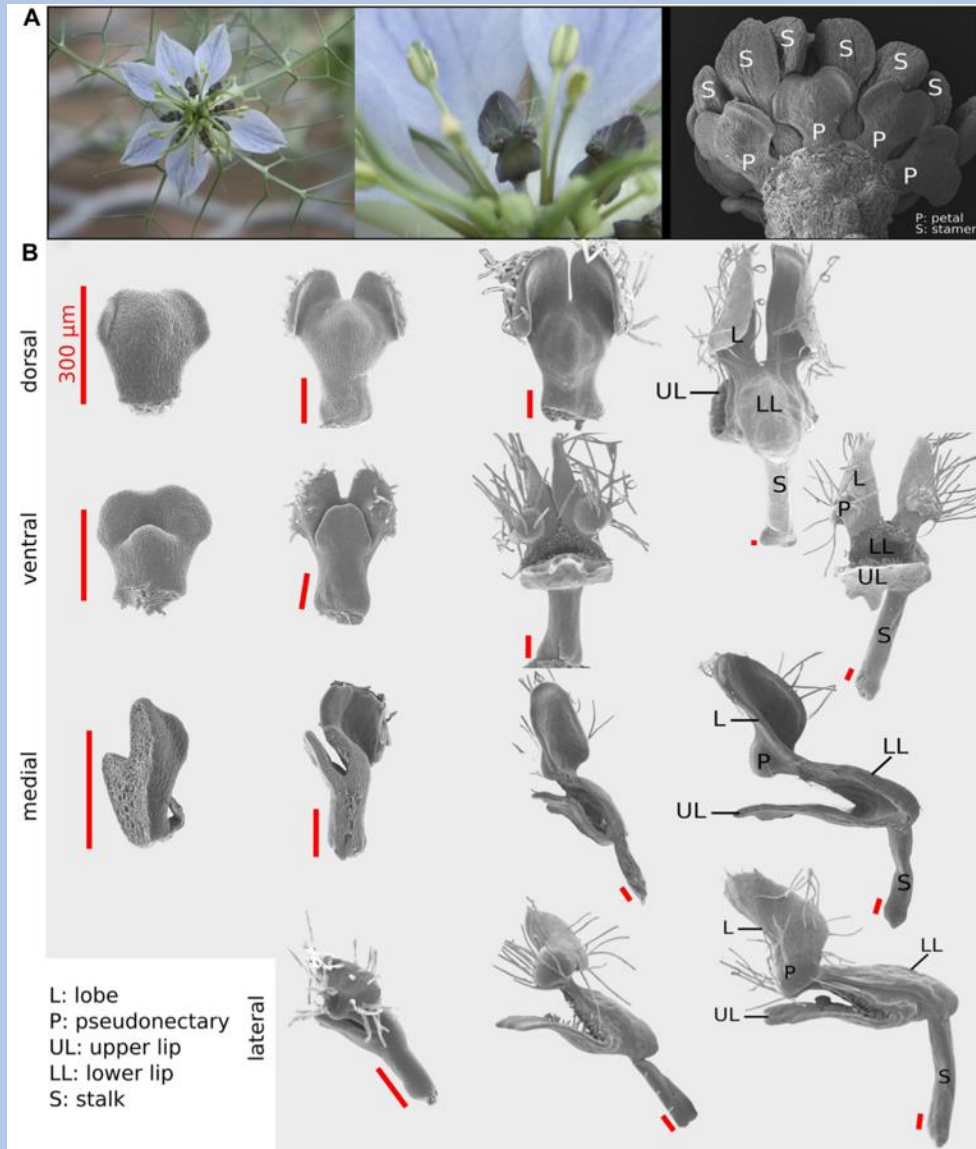
Type: "inter segetes Europæ australis" (*Hb. Linn.* 700/1).

Syn.: *N. multifida* GATERAU, *Fl. Montaub.* 100 (1789).—*N. coerulea* LAM., *Fl. Fr.* 3, 312 (1793).—*N. involucreta* MOENCH, *Method. Pl.* 314 (1794).—*N. elegans* SALISB., *Prodr.* 374 (1796).—*N. pygmaea* PERSOON, *Ench.* 2, 85 (1807).—*N. coarctata* GMEL. ex DC., *Regn. Syst. Veg.* 1, 331 (1817).—*N. bourgaei* JORDAN, *Pug.* 2 (1852).—*N. damascena* var. *minor* BOISS., *Voy. Bot.* 1, 11 (1839).—*N. damascena* β [subsp.] *minor* (BOISS.) TERRACC., *Boll. Ort. Bot. Palermo* 1, 149 (1897).—*N. damascena* α [subsp.] *normalis* TERRACC., 1897, p. 149.—*Erobathos damascenum* SPACH, *Hist. Veg. Phan.* 7, 302 (1839).—*Erobathos coarctatus* (GMEL.) SPACH, *op. cit.* 7, 304 (1839).

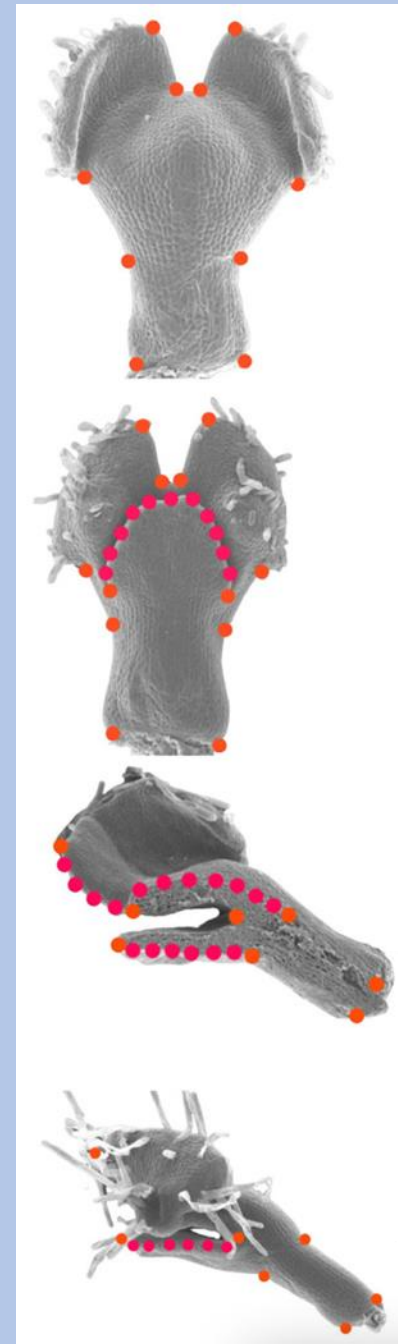
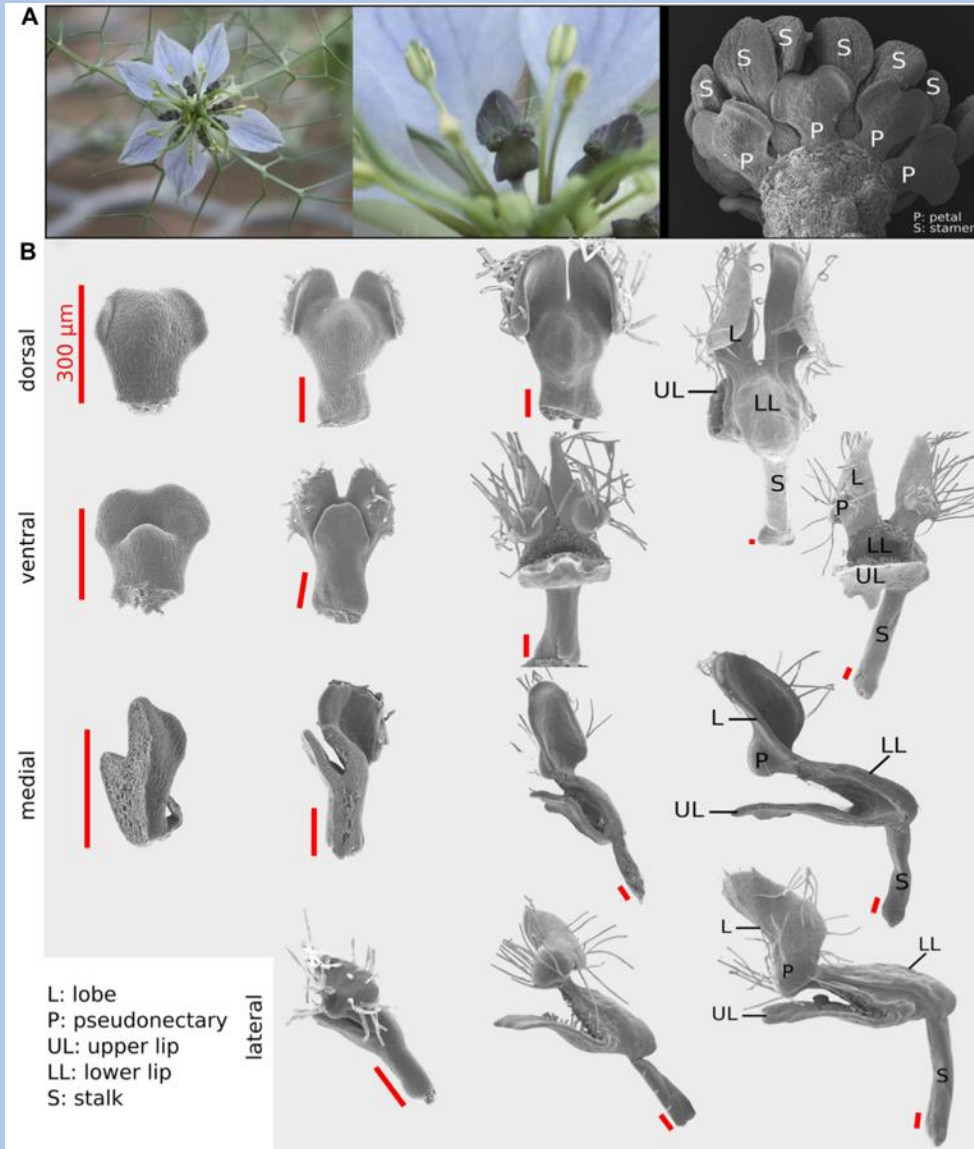
Icon.: REICHENB.,  *Ic. Fl. Germ.* 4, 120, f. 4737 (1840); LAM., *Tabl. Encycl.* 4, t. 488 (1798); *Bot. Mag.* t. 22.—Fig. 8.

Distr.: Widely cultivated as an ornamental, but probably spontaneous in Turkey and Crete.—Area: Mediterranean.

# Micromorphologie du pétale en développement

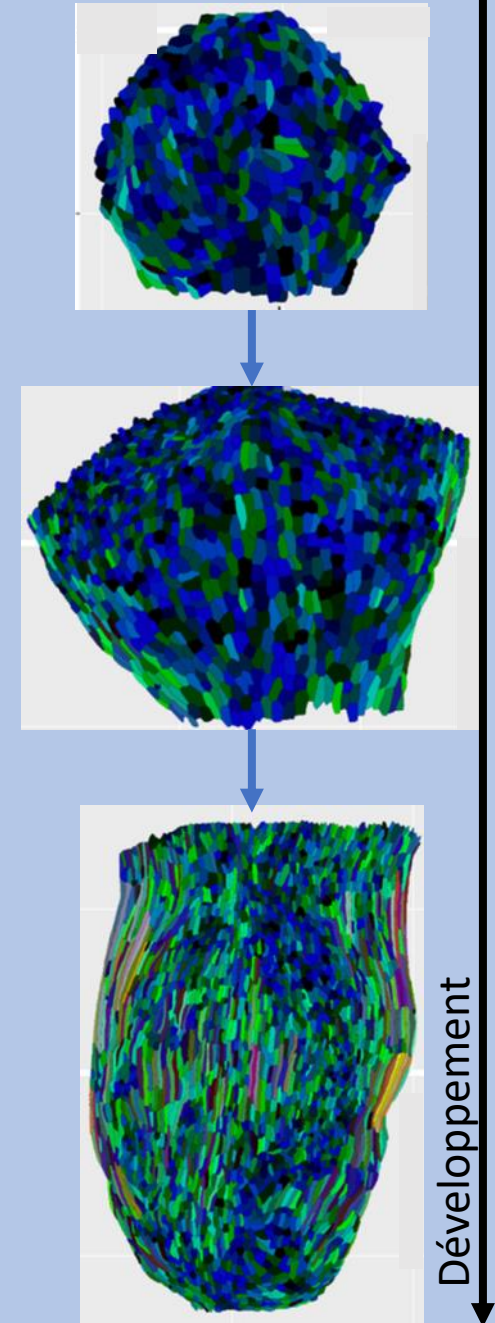
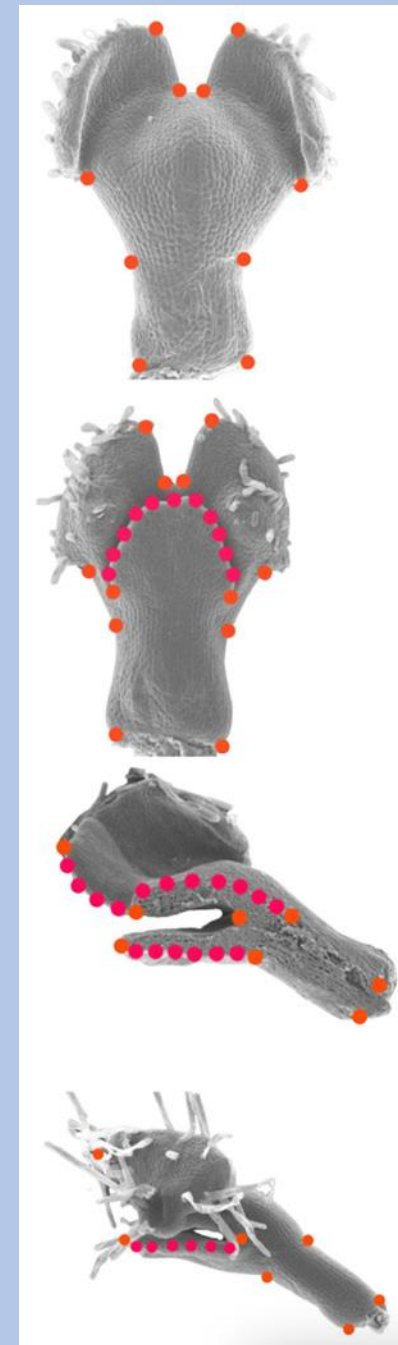
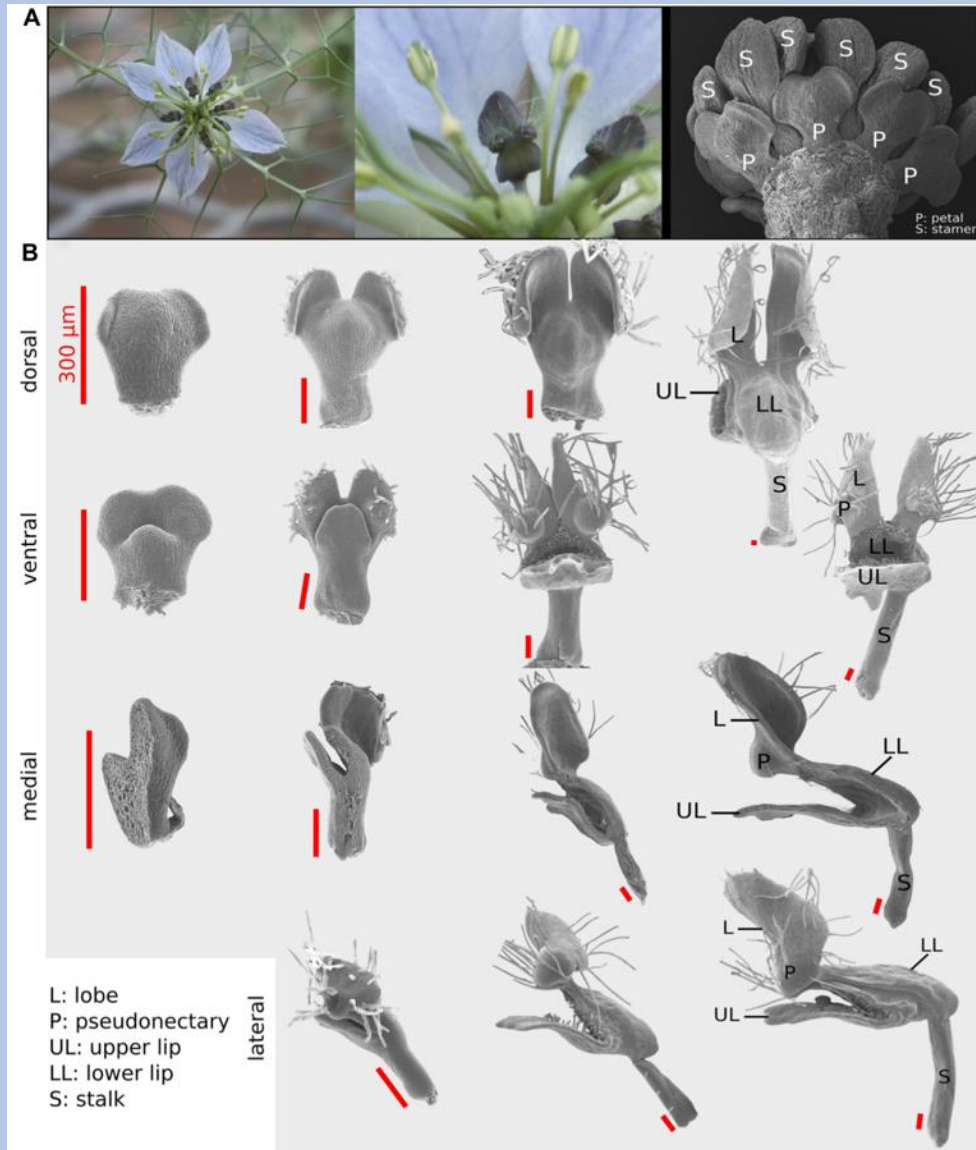


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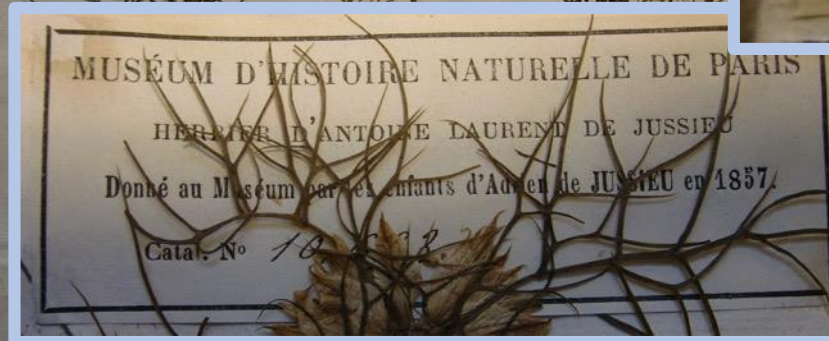
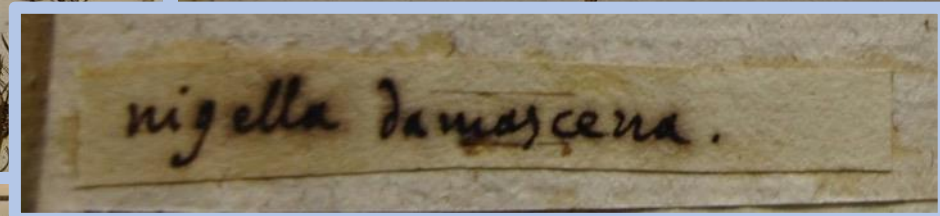
# Matériel d'étude

Disponibilité, quantité, biais



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Disponibilité, quantité, biais



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Disponibilité, quantité, biais

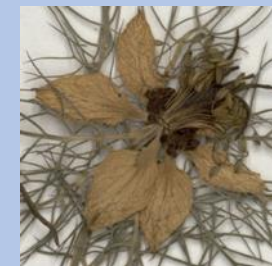
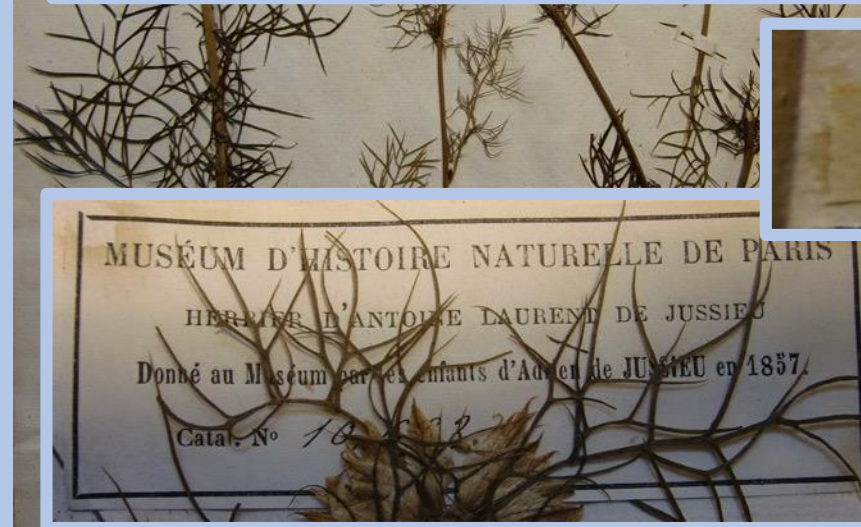
Effectifs : des dizaines *versus* des milliers

Génétiquement contrôlés/identifiés

Représentatifs de la diversité biologique au sein de l'espèce,  
à travers l'espace et le temps



*nigella damascena.*







*Nigella damascena*

Herbier alph. Meyer (Plantes d'Algérie)  
Fam. des Ranunculacées  
n° 721 - *Nigella damascena* L.  
En arabe. — —  
récolté par Alph. Meyer  
à Casouliers (Sôim)  
le 28 mai 1874

Herbier FI

ГЕРБАРИЙ БОТАНИЧЕСКОГО ИНСТИТУТА  
АКАДЕМИИ НАУК СССР  
*Nigella damascena* L. Дублет  
Киевская губ., близ г. Умани.  
Разводится в Царицыном саду.  
VII.10.fl. Собр. В. Тирановец  
1906. №  
VIII.30.fr. Опр.  
Herbarium Institutii Botanici Academiae Sc. URSS

V. Tiranovec s.n., 1906  
10 juillet fl. / 30 août fr.  
Province de Kiev, près de la ville d'Ouman  
Cultivée dans le jardin de l'épouse du Tsar



HERBARIUM MUSEI PARISIENSIS (P)  
**FRANCE**  
RANUNCULACEAE  
*Nigella damascena* L.  
det: F. Jabbour, 06-03-2015  
Moyhe [?] . Sob plante : 376a  
Cultivé à : UMR 0320/8120, Génétique Quantitative et Evolution, Le Moulon, 91190 Gif-sur-Yvette  
Les croisements à l'origine de la lignée sont détaillés dans l'article suivant : Jabbour et al. 2015 (Bot. J. Linn. Soc.). Plante cultivée en chambre de culture dans les conditions suivantes : durée du jour = 18h, durée de la nuit = 6h, température jour/nuit = 25°C/16°C, 60% d'humidité relative.  
Nom vernaculaire : Nigelle de Damas  
Récolté le 6 / 3 / 2015  
F. Jabbour 8  
avec : M. Le Guilloux, C. Damerval  
P00836296

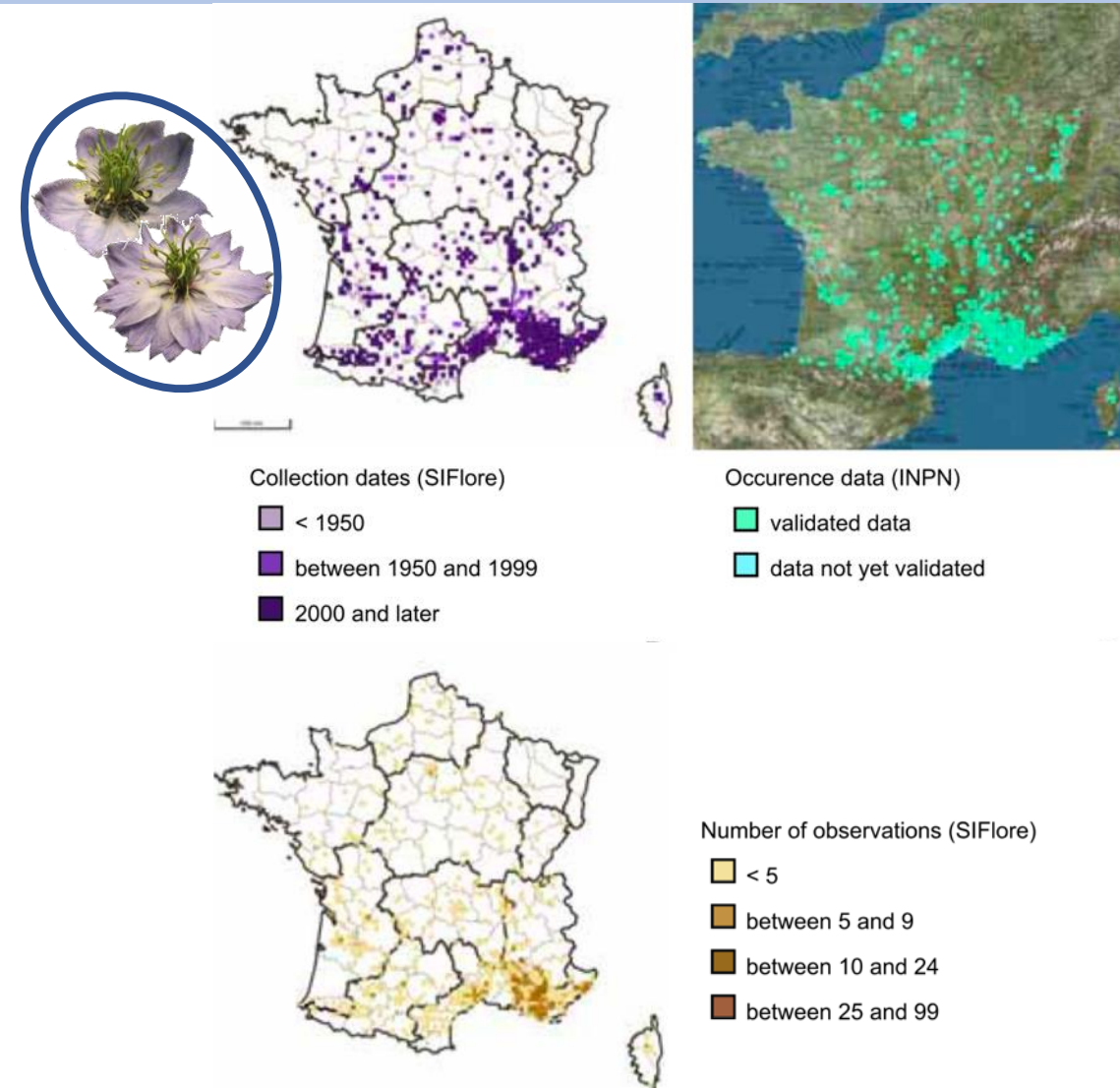


MUSEI PARISIENSIS (P)  
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P00836296

HERBARIUM MUSEI PARISIENSIS  
Herbarium Museum Paris  
P00836296

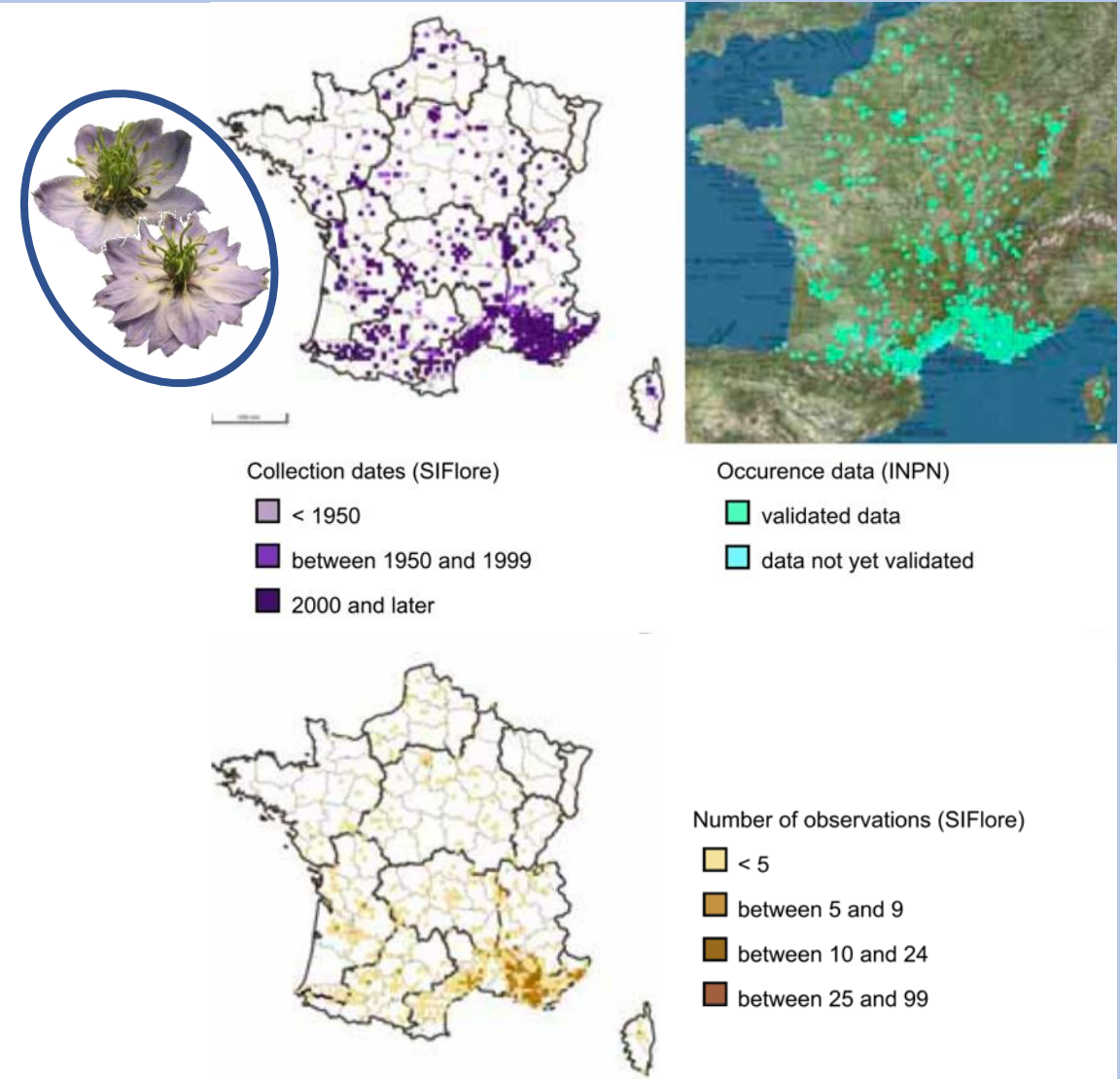
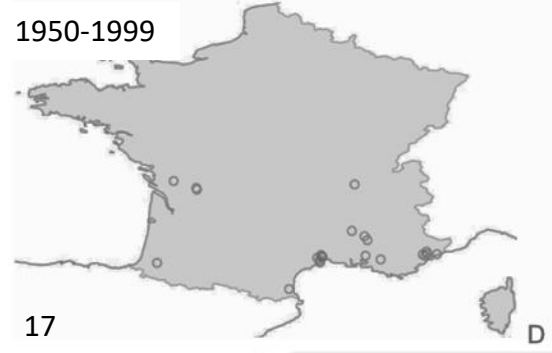
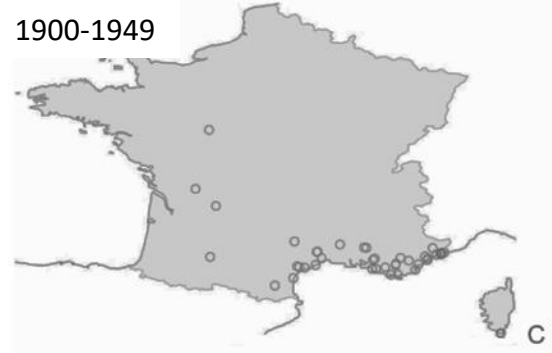
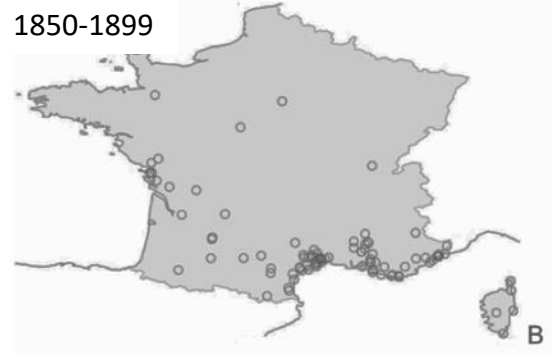
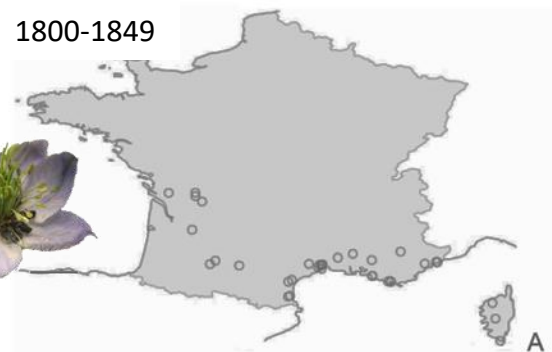
Jabbour et al. 2015, Bot. J. Linn. Soc.

# Comparaison de l'évolution de l'aire de répartition des 2 morphes en France





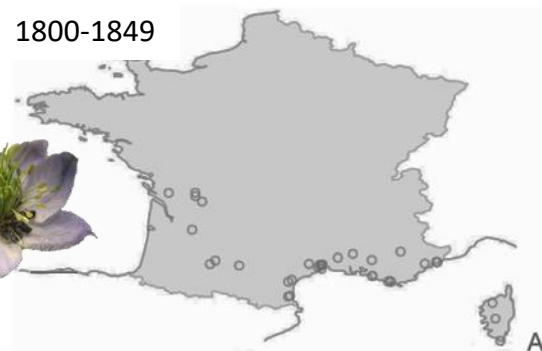
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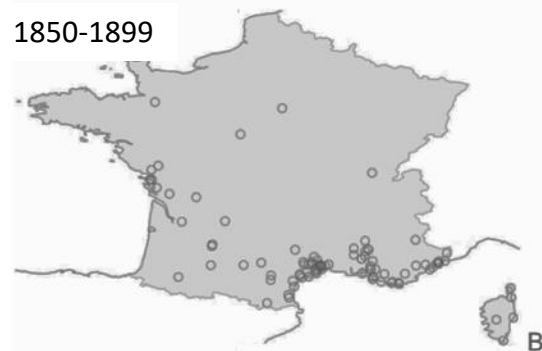
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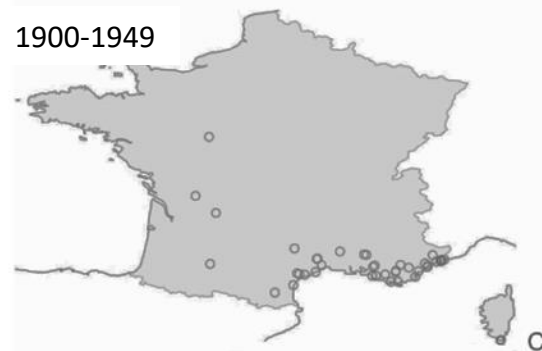
1800-1849



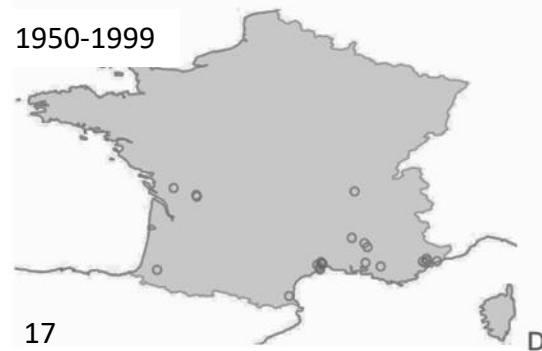
1850-1899



1900-1949

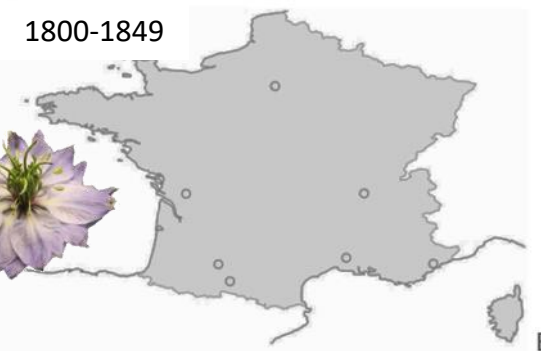


1950-1999

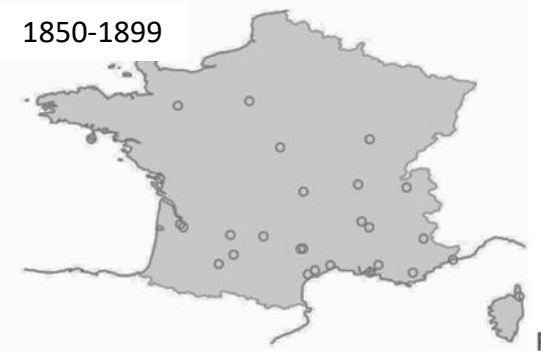


17

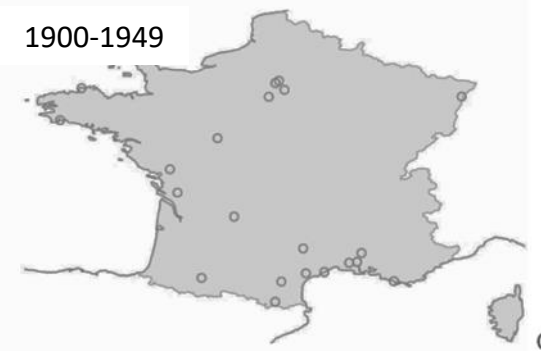
1800-1849



1850-1899



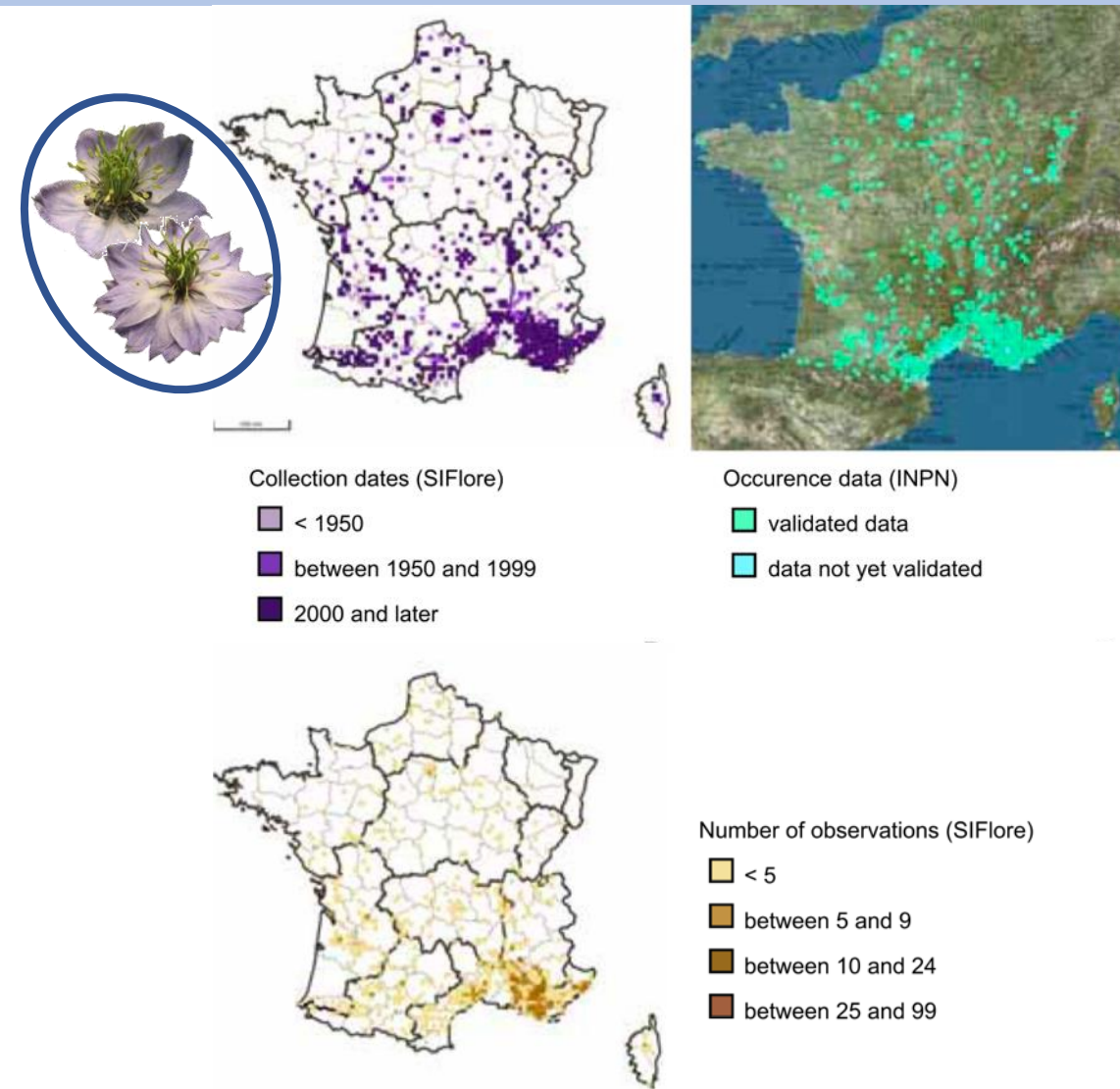
1900-1949



1950-1999



17



# Comparaison de l'évolution de l'aire de répartition des 2 morphes dans le monde

- 3294 spécimens couvrant 4 siècles de récoltes
- 2009 géoréférencés
- 42 herbiers  
(ex: ATHU, BC, BEI, BUC, E, FR, G, HUH, HUJ, K, LISU, MA, MPU, PAL, UPS, VAL, W, ZA)



# Comparaison de l'évolution de l'aire de répartition des 2 morphes dans le monde

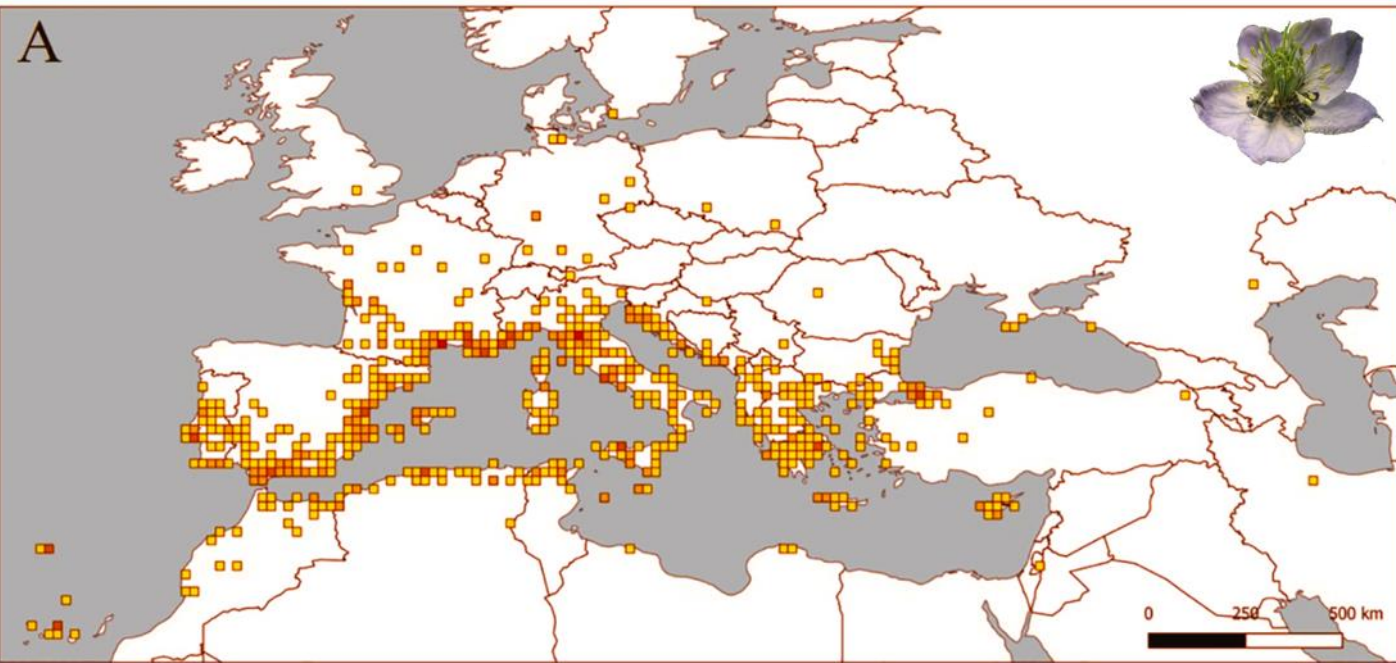
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- + récents : *Jabbour, Le Guilloux et Damerval 1–9*, 2015, cult., 2 morphes
- + ancien spécimen géoréférencé : *leg. ign. s.n.*, 1794, TO



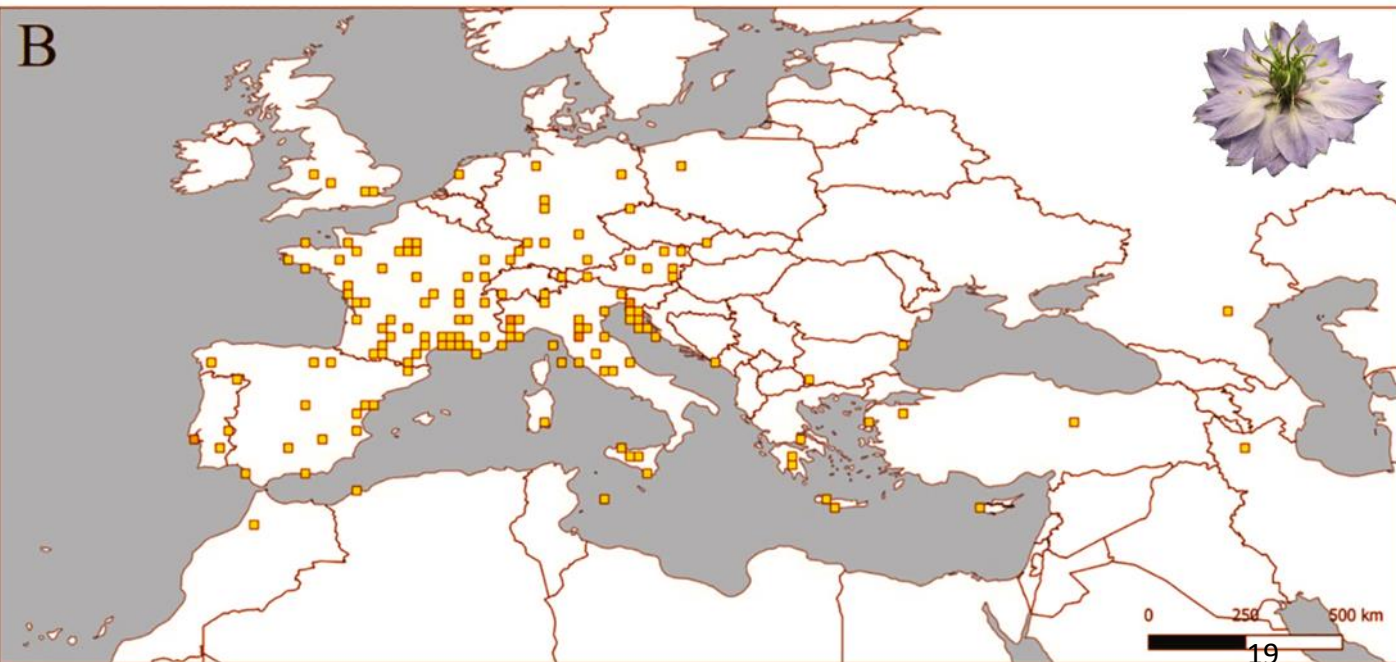
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- Top 3 herbiers contributeurs : P (613 spéc.), FI (390) et BM (230)
- Pays contributeurs : France > Italie > Espagne > Grèce > Portugal > Croatie > Turquie > Algérie
- Effort de collecte maximal entre 1850 et 1899
- Top 3 récolteurs :
  - Carlo Sommier (1848–1922; Italien; 28 récoltes)
  - Eugène Bourgeau (1813–1877; Français; 19)
  - Elisée Reverchon (1835–1914; Français; 13)

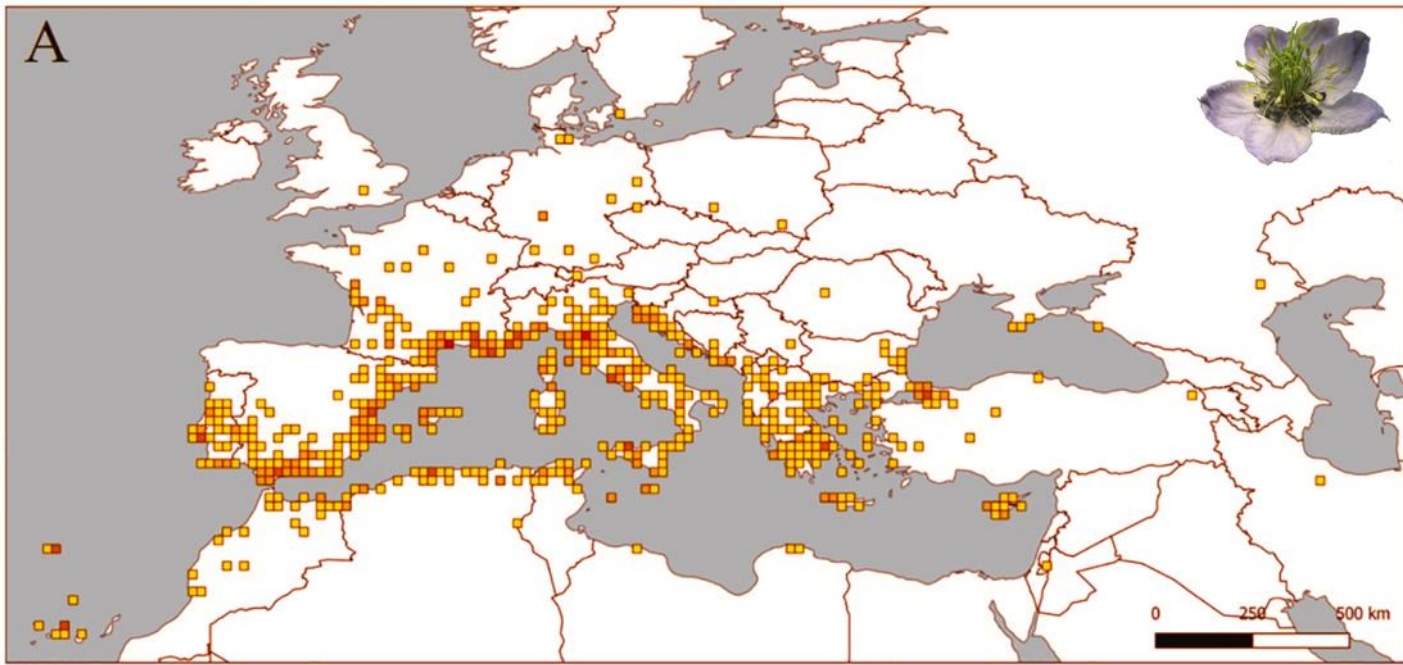


**A**

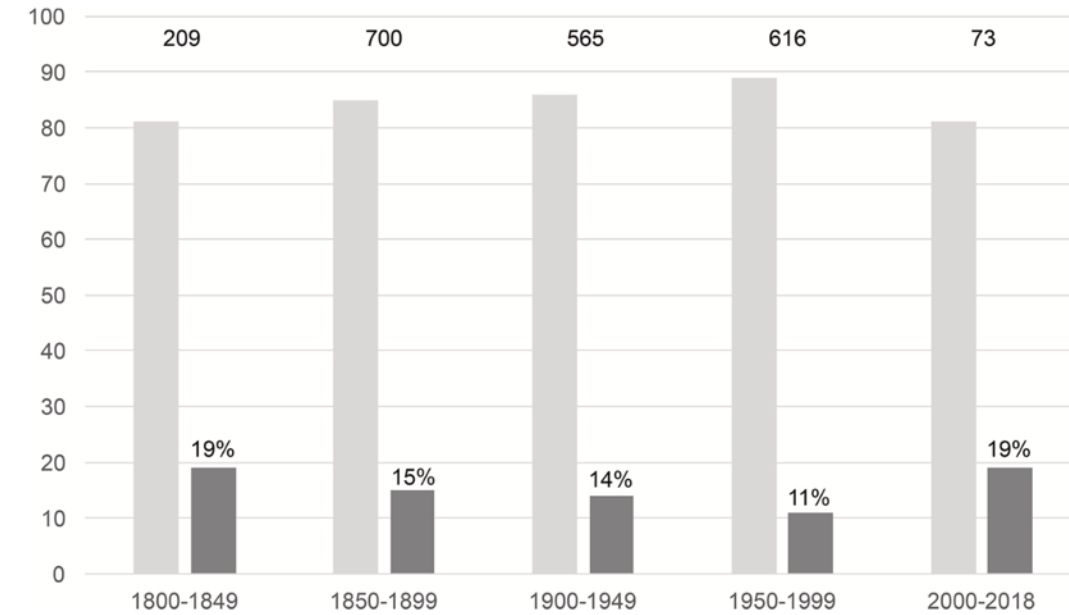
Aire de répartition de *N. damascena*  
2009 spécimens d'herbier géoréférencés, non cult.,  
récoltés après 1793.

**B**

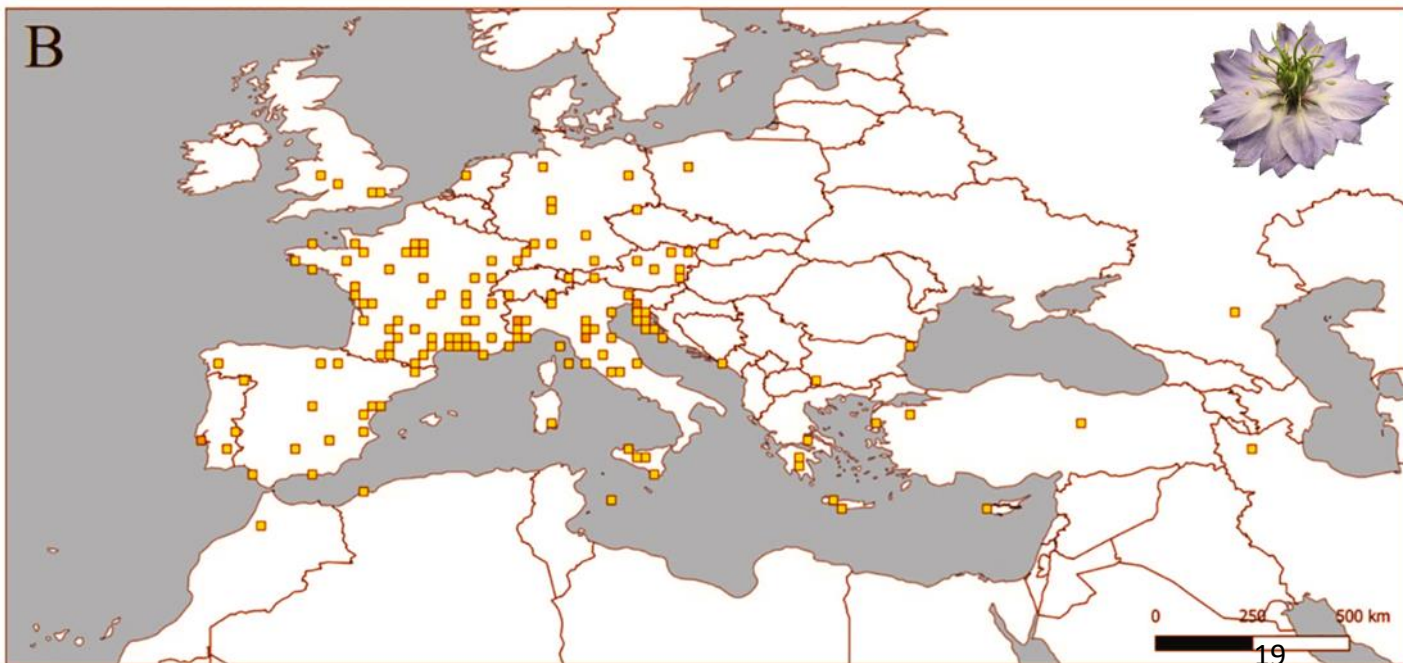
A

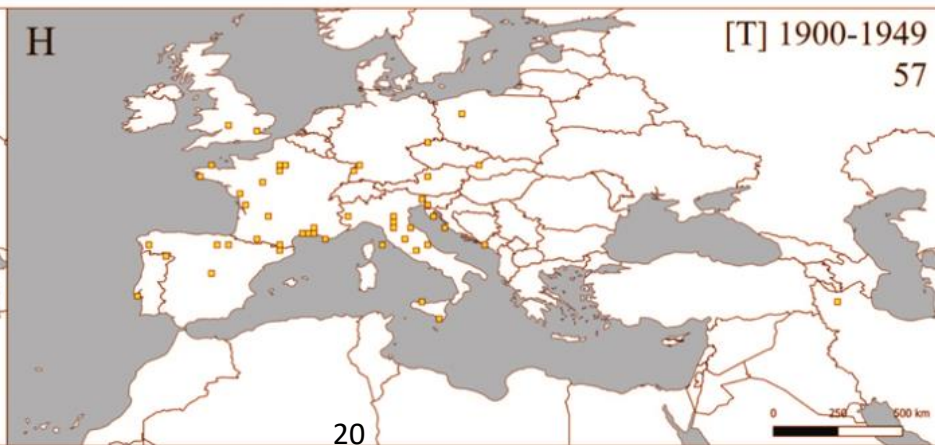
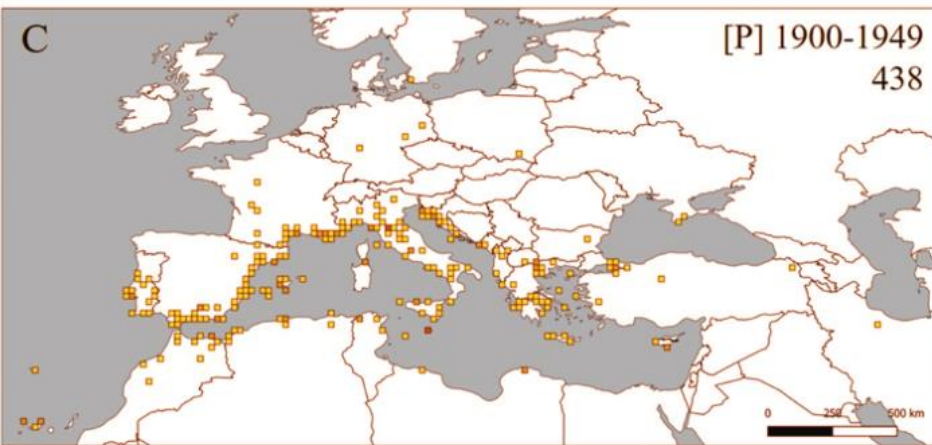
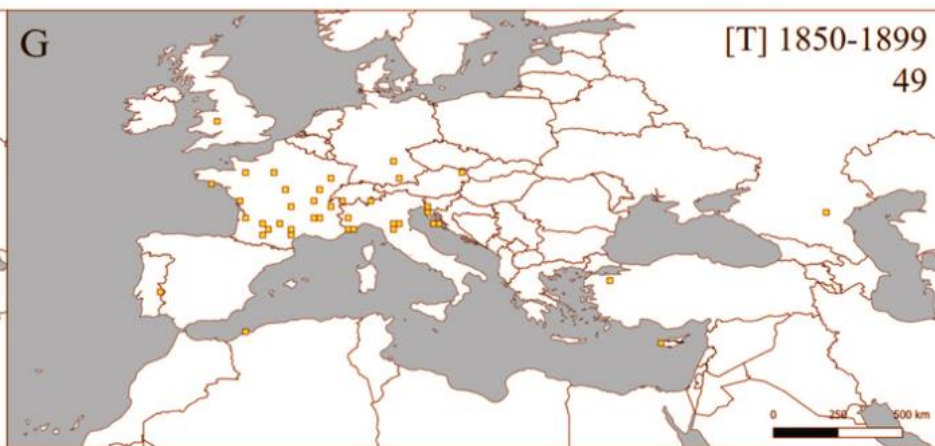
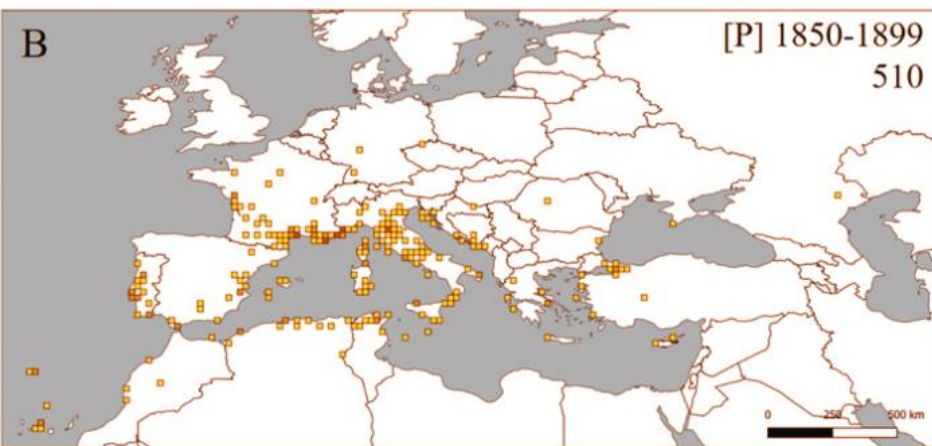
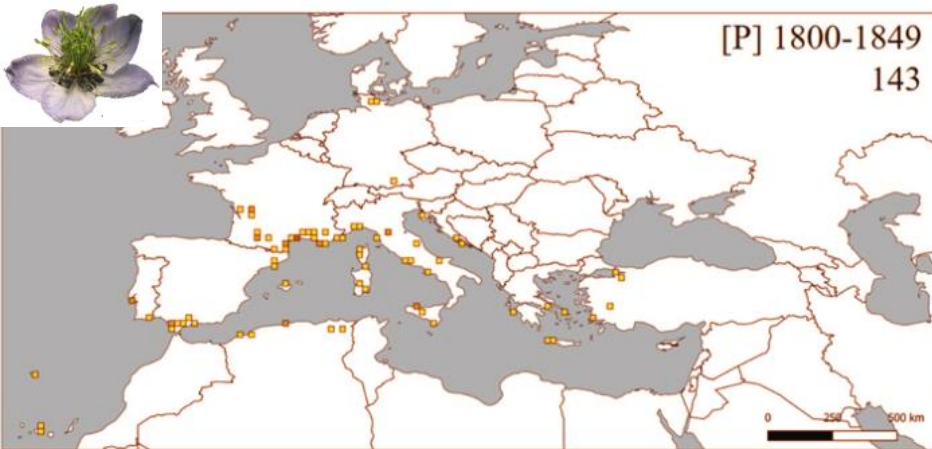


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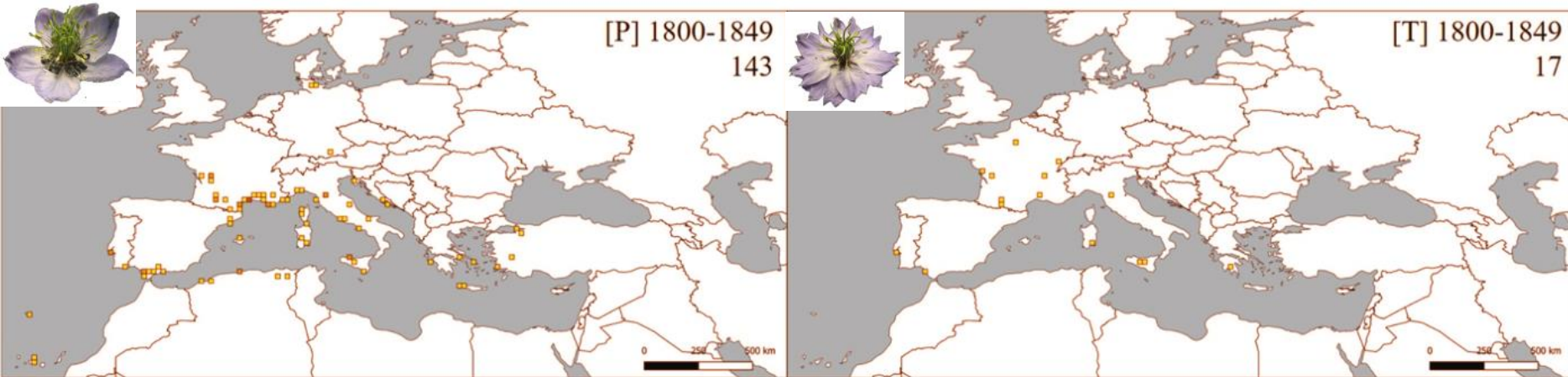
B



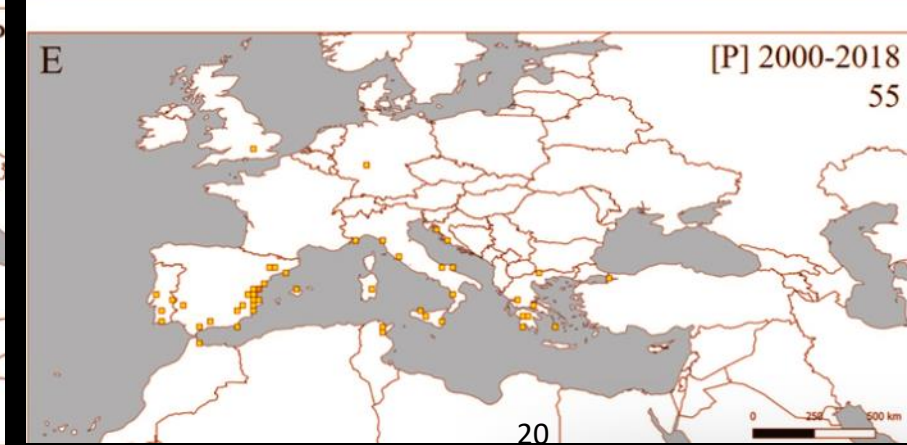
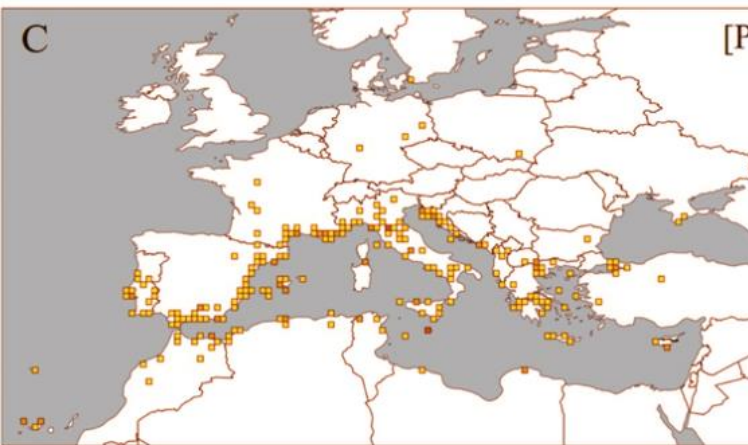
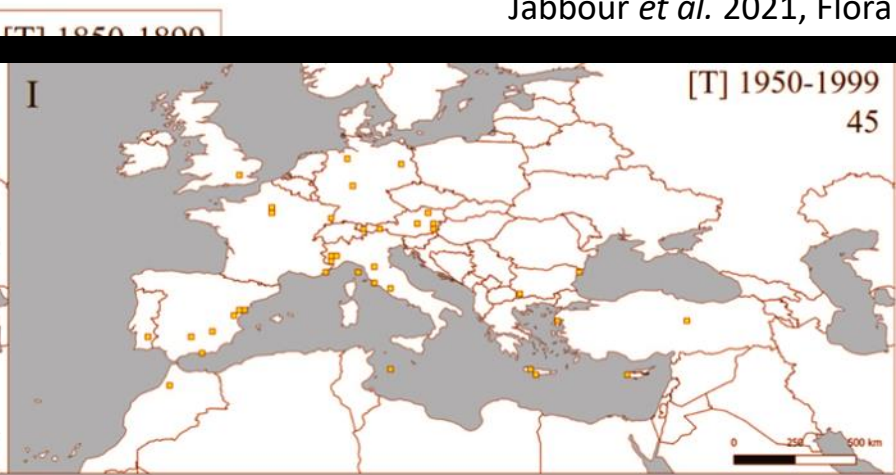
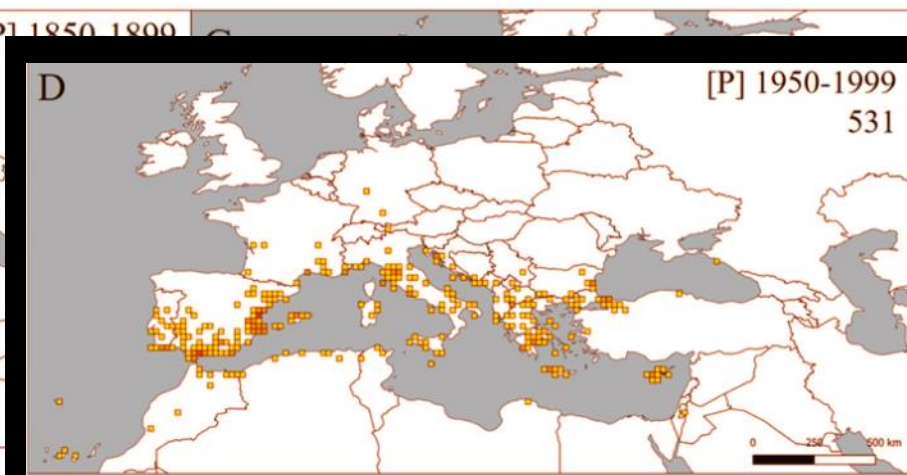
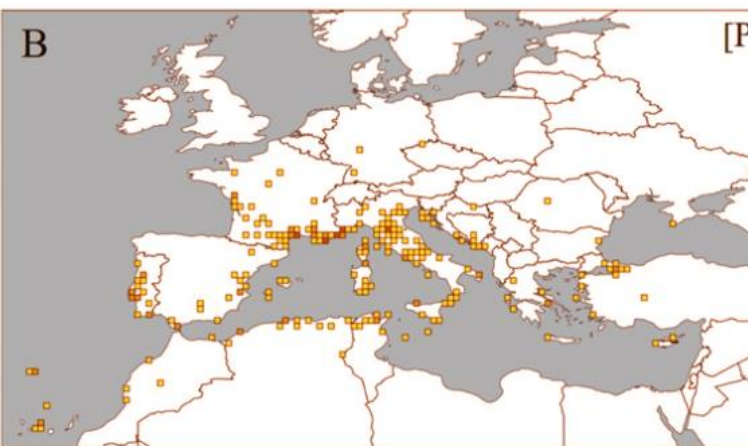


Jabbour *et al.* 2021, Flora





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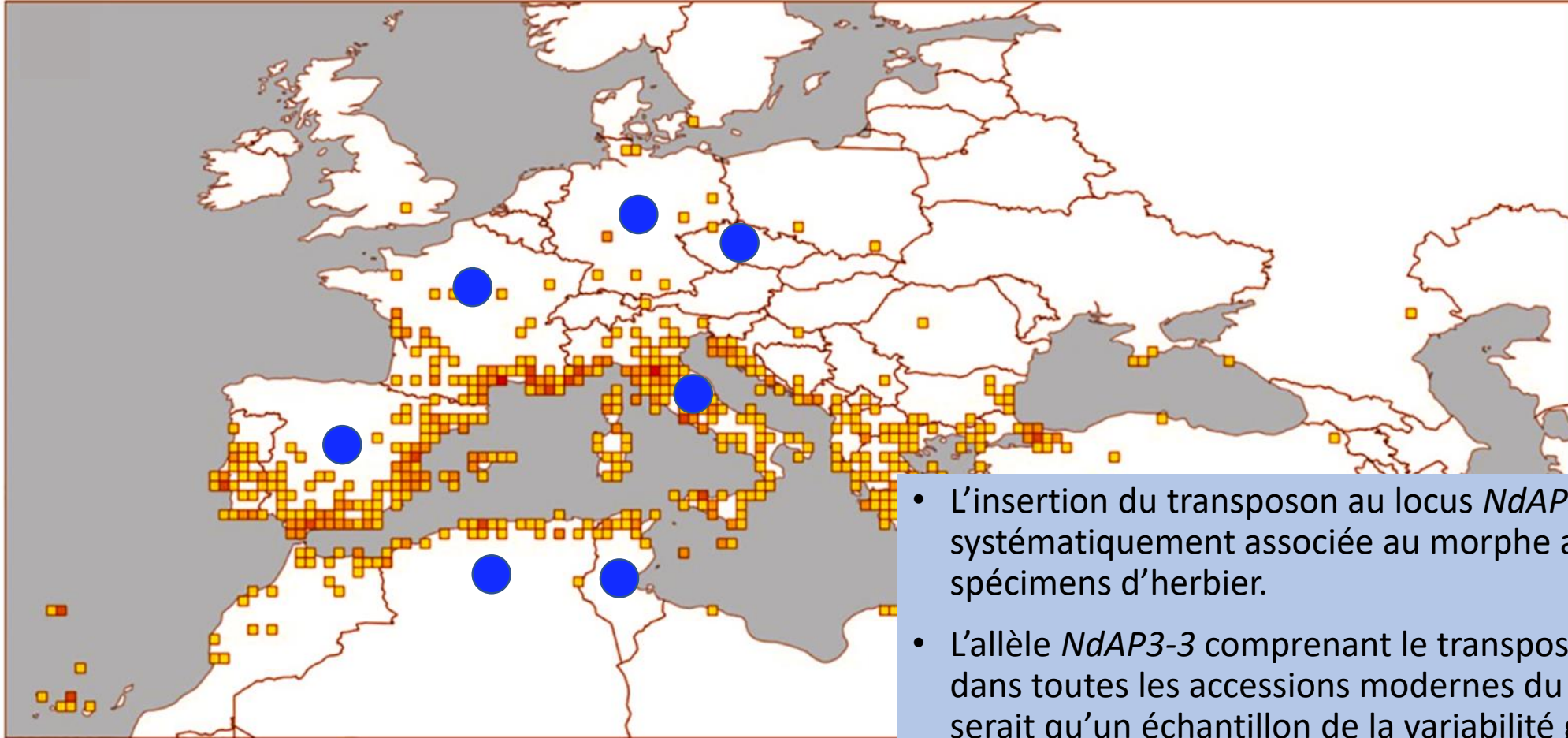


## Hypothèse : le phénotype apétale est dû au même allèle mutant dans tout le bassin méditerranéen

Génotypage de 14 individus récoltés entre 1847 et 1993

→ Individus de morphe sauvage (7) : tous homozygotes *PP*

→ Individus de morphe mutant (7) : 2 *pp*, 4 *Pp*, 1 *PP*



- L'insertion du transposon au locus *NdAP3-3* n'est pas systématiquement associée au morphe apétale, dans les spécimens d'herbier.
- L'allèle *NdAP3-3* comprenant le transposon, tel que séquencé dans toutes les accessions modernes du morphe apétale, ne serait qu'un échantillon de la variabilité génétique susceptible d'empêcher le développement des pétales dans cette espèce.

# Perspectives

- Ecologie de la pollinisation
- Un dimorphisme floral similaire chez d'autres espèces du genre ?

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- Un dimorphisme floral similaire chez d'autres espèces du genre ?

possibly be a variety of *N. Hispanica*.

4. *Nigella arvensis*, or field fennel-flower: pistils five, petals entire, capsules turbinate. This rises with slender stalks near a foot high, either single or branching out at the bottom, and having a few very-fine-cut leaves, somewhat like those of dill. Each branch is terminated by one star-pointed flower, of a pale blue colour, without any leafy involucre. They are succeeded by capsules, having five short horns, inclining different ways at the top, and are filled with rough black seeds. There is a variety with white flowers; and another with double flowers. The seeds are sometimes used instead of those of *N. fativa*; but they are not so aromatic, nor have they the same pleasant smell. Native of Germany, France, Italy, and Switzerland. Cultivated here in 1713. It flowers from June to September.

## II. With ten styles.

5. *Nigella Hispanica*, or Spanish fennel-flower: pistils ten, equalling the corolla. This rises near a foot and a half high. The lower leaves are finely cut; but those on the stalks are cut into broader segments. The flowers are larger than those of the other species, and of a fine blue colour, with green veins at the back; nectaries of a sea-green colour. The pistils are of equal length with the petals; they, with the stamens, are of a deep purple or puce colour. It grows naturally in Spain and the South of France: and there is a variety of it with double flowers. It appears from Parkinson, that it was cultivated here in 1629. It flowers from June to September.

*Nigella arvensis*, *Nigella hispanica*  
Wilkes 1820, Encyclopaedia Londinensis

*Nigella sativa*  
Clusius 1601

MELANTHIUM PLENO FLORE.

CAP. XXIX.



DUO Melanthij genera jamdudum in hortis culta fuerunt: De his agere non est necesse, sed binis alijs non vulgaribus hoc capite agenda mihi esse, operæ precium duxi, quæ paucis in hortis obvia esse solebant, temporis successu tamen, satis facili negotio illis inquilina facta.

PRIMUM, virgis folijsq; à sativo, cujus semen odoratum, flòsque è viridi candicat, nihil vel quàm minimùm differt: flores tamen, qui in sativo simplices sunt, in hoc, triplici aut quadruplici novem aut decem foliorum serie constant, exurgètib; in medio staminulis & pètagono hexagonòve capite in totidè cornicula inflexa supernè diviso, quod, intercursatibus internè mèbranis, plenum est semine rotundo, nigro, odorato, ut vulgaris.

ALTERVM cauliculos, & folia valde tenuiter dissecta habet, instar illius silvestris quod Damascenum cognominatur, ampliores autem superiore flores, plurimis laciniatis, & eleganti cæruleo colore præditis folijs constantes, qui quadruplici aut frequentiore serie sunt dispositi eleganti spectaculo, nullius tamen, quemadmodùm nec simplex, odoris, plura longioraq; in medio habètes stamina.

*Melanthij duo genera.*

*Melanthium odoratum pleno flore.*

*Melanthium Damascenum pleno flore.*

# Perspectives

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- Un dimorphisme floral similaire chez d'autres espèces du genre ?

possibly be a variety of *N. Hispanica*.

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*Melanthij duo genera.*

*Melanthium odoratum pleno flore.*

Aucune fleur apétale dans aucune de ces 3 espèces, à l'herbier de Paris (991 spécimens au total)

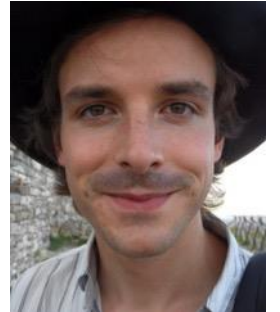


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*Melanthium Damascenũ pleno flore.*

# L'équipe



|                       |                            |
|-----------------------|----------------------------|
| Catherine Damerval    | Yves Deveaux               |
| Sophie Nadot          | Pauline Delpéuch           |
| Pierre Galipot        | Sylvain Gerber             |
| Beatriz Gonçalves     | Thierry Deroin             |
| Domenica Manicacci    | Pierre-Emmanuel DuPasquier |
| Natalia Conde e Silva | Léa Chazalviel             |

Plateau Technique de Microscopie MNHN





ADHÉREZ ! 

## SOCIÉTÉ BOTANIQUE DE FRANCE

CONCOURIR AU PROGRÈS DES DISCIPLINES DE LA BOTANIQUE FONDAMENTALE ET DE TERRAIN

Société botanique de France

## L'introduction d'essences exotiques en forêt

LIVRE BLANC

Novembre 2021

JB  
N° 101  
2022

Le  
Journal  
de  
Botanique

Dans ce numéro :  
Histoire du genre *Viola*  
Biographie de botaniste français



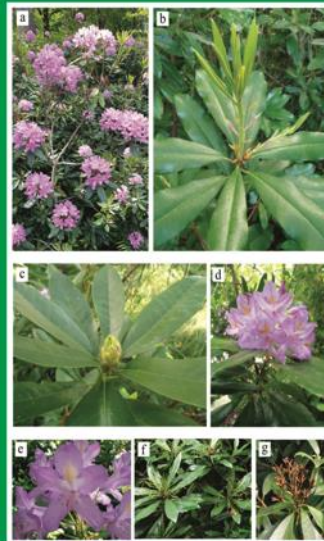
Mai-Juin 2022



ISSN 2381-8107

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Volume 169 - Number 2 - June 2022



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