Towards a monograph of Russula in the eastern USA



Bart Buyck

National Natural History Museum

Paris, France

osta Rica - Microsoft Internet Explorer

ffichage Favoris Outils ?

ante Arrêter Actualiser Démarrage Rechercher Favoris Média Historiqu

ww.nybg.org/bsci/res/hall/

Macrofungi of Costa Rica

About

Table of Contents

Family List

Identification Keys

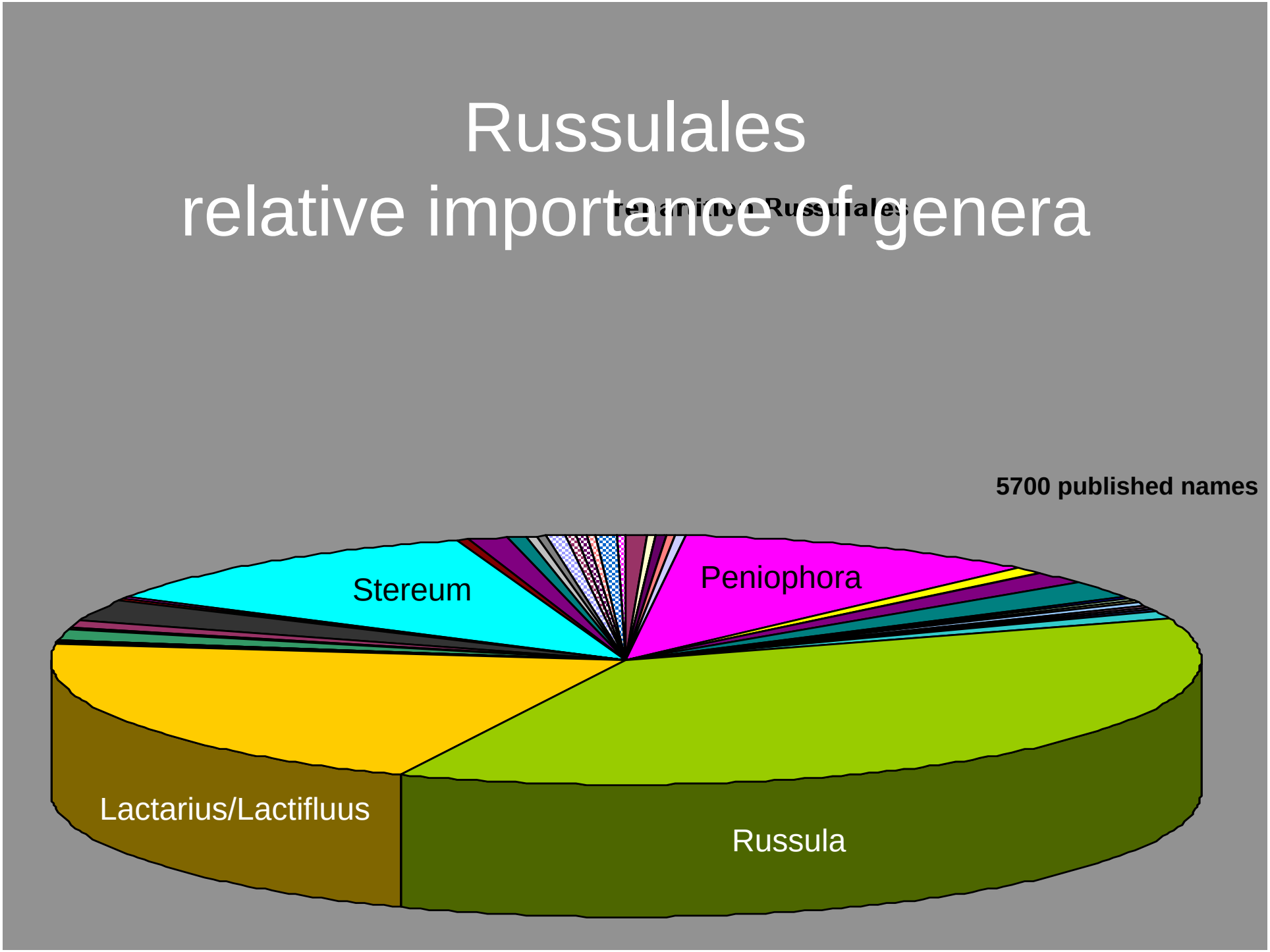
Interactive Keys

Species List

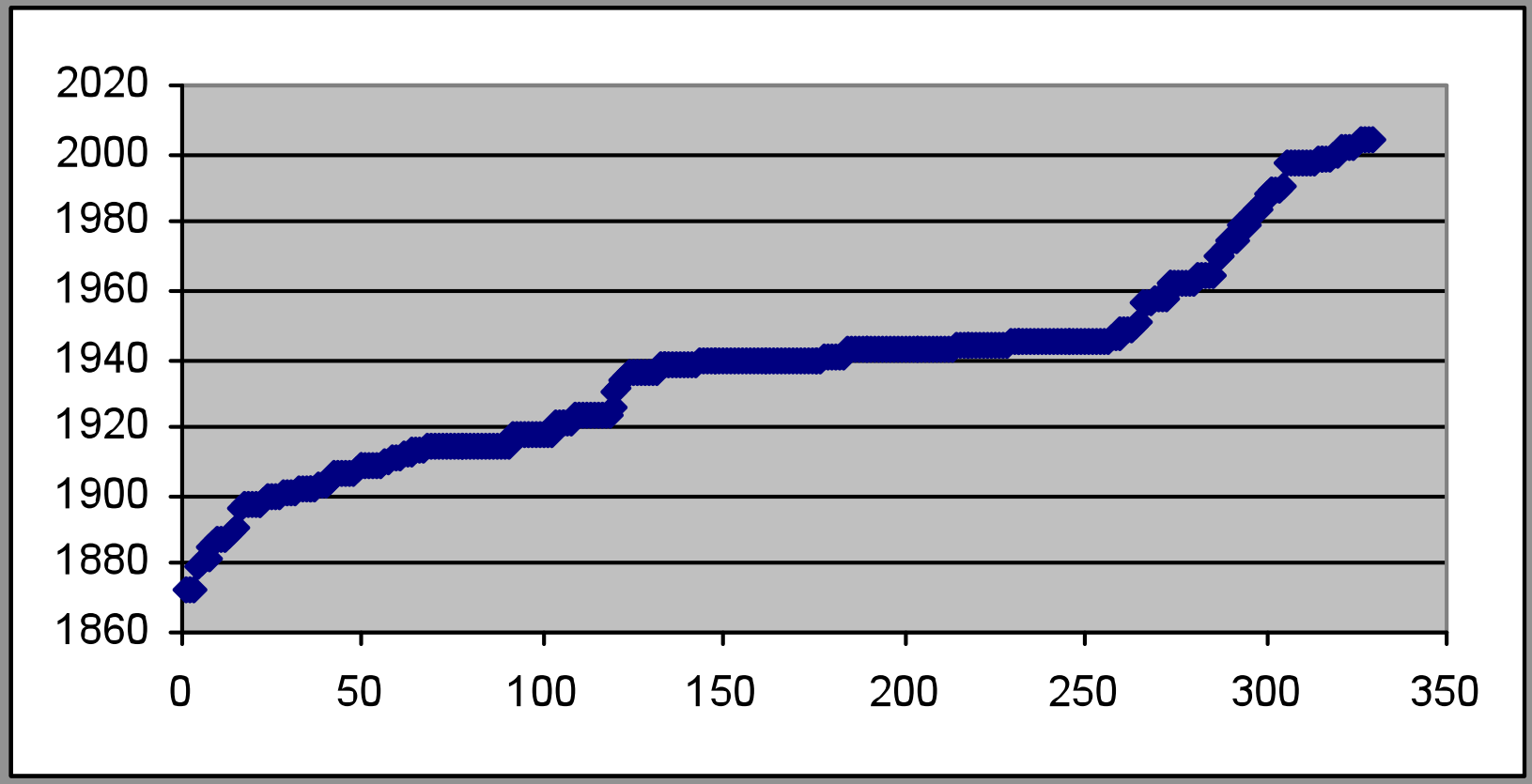
Home

135. *Rhodocybe mellea* Baroni & Ovrebo
136. *Rhodocybe umbrosa* Baroni & Halling
137. *Ripartitella alba* Halling & Franco-M.
138. *Rozites caperata* (Fr.) P. Karst.
139. *Rozites "chaconii"* Halling & Mueller, sp.
140. *Rozites colombiana* Halling & Ovrebo
141. *Rugosospora pseudorubiginosa* (Cifuentes
142. *Russula alnijorulensis* (Singer) Singer
143. *Russula "atromarginata"* nom. prov.
144. *Russula compacta* Frost in Peck
145. *Russula eccentrica* Peck
146. *Russula flavida* Frost
147. *Russula foetens* (Pers.:Fr.) Fr.
148. *Russula fuegiana* Singer
149. *Russula laurocerasi* Melzer
150. *Russula nigricans* (Bull.:Fr.) Fr.
151. *Russula nothofaginea* Singer
152. *Russula raoultii* Quélet
153. *Russula xerampelina* Schaeff.:Fr.
154. *Squamanita umbonata*(Sumstine) Bas
155. *Strobilomyces confusus* Singer
156. *Strobilomyces floccopus* (Vahl:Fr.) P. Kar
157. *Strobilurus conigenoides* (Ellis) Singer
158. *Tricholoma caligatum* (Viv.) Ricken
159. *Tricholoma saponaceum* (Fr.) Kummer
160. *Tricholoma palustre* A. H. Smith
161. *Tricholoma portentosum* (Fr.) Quélet
162. *Tricholomopsis humboldtii* Singer, Ovreb
163. *Tricholomopsis rutilans* (Scheff.:Fr.) Singe
164. *Tricholomopsis totilivida* (Murr.) Singer
165. *Tricholosporum violaceum* Halling & Frar
166. *Tylopilus alkalixanthus* Amtoft. in ed.

Russulales
relative importance of genera



How many taxa in the US ?



329 taxa described from USA

+ 87 additional European taxa reported

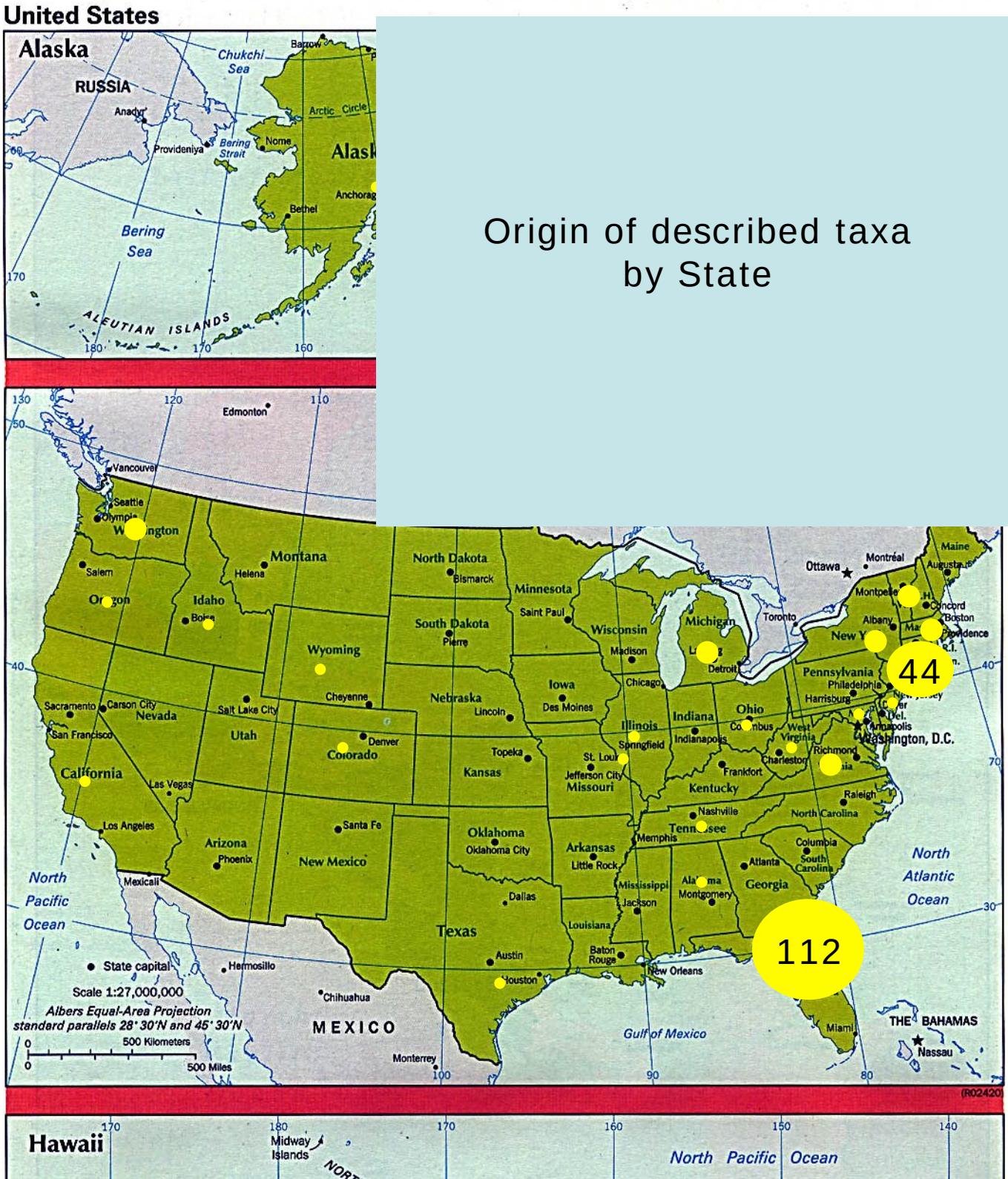
416 taxa total

(2005)

- 1 to a few collections
- 5 to 10 collections

Species by state

Origin of described taxa by State

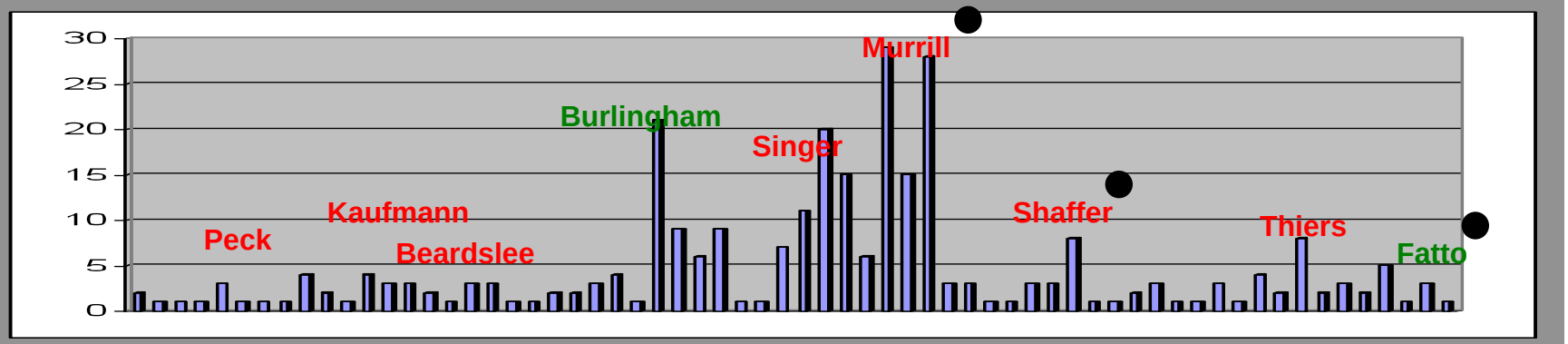


Identification….
easier said than done !

- Several problems :
  - Nearly all of the available species descriptions lack modern precision
  - European keys are used without critical observation
  - The majority of Russulas in USA is still undescribed
  - Local experts on American Russula are urgently needed, therefore amateur and professional mycologists need to interact and collaborate more

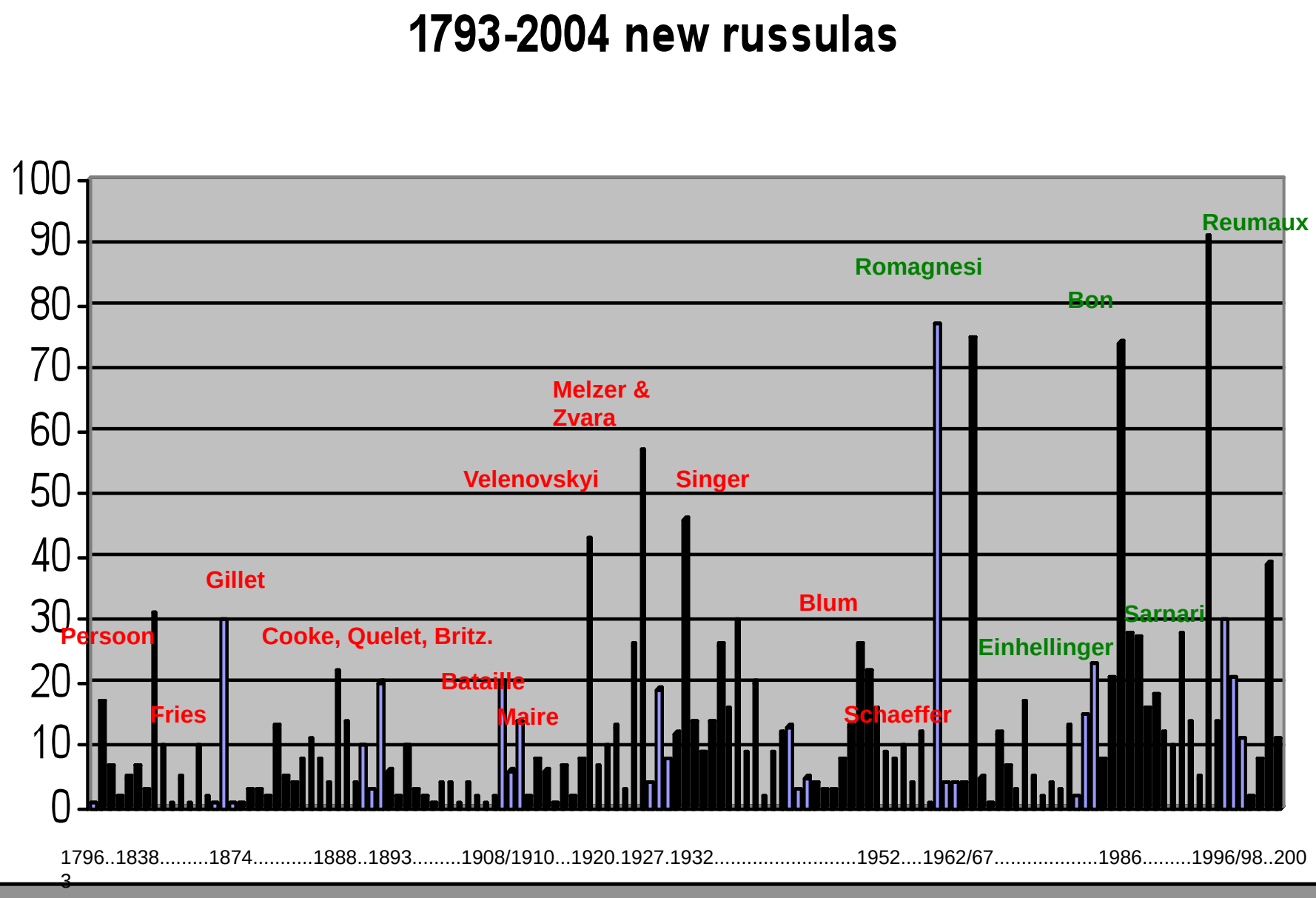
Russula description in the USA

- = no or very limited monograph



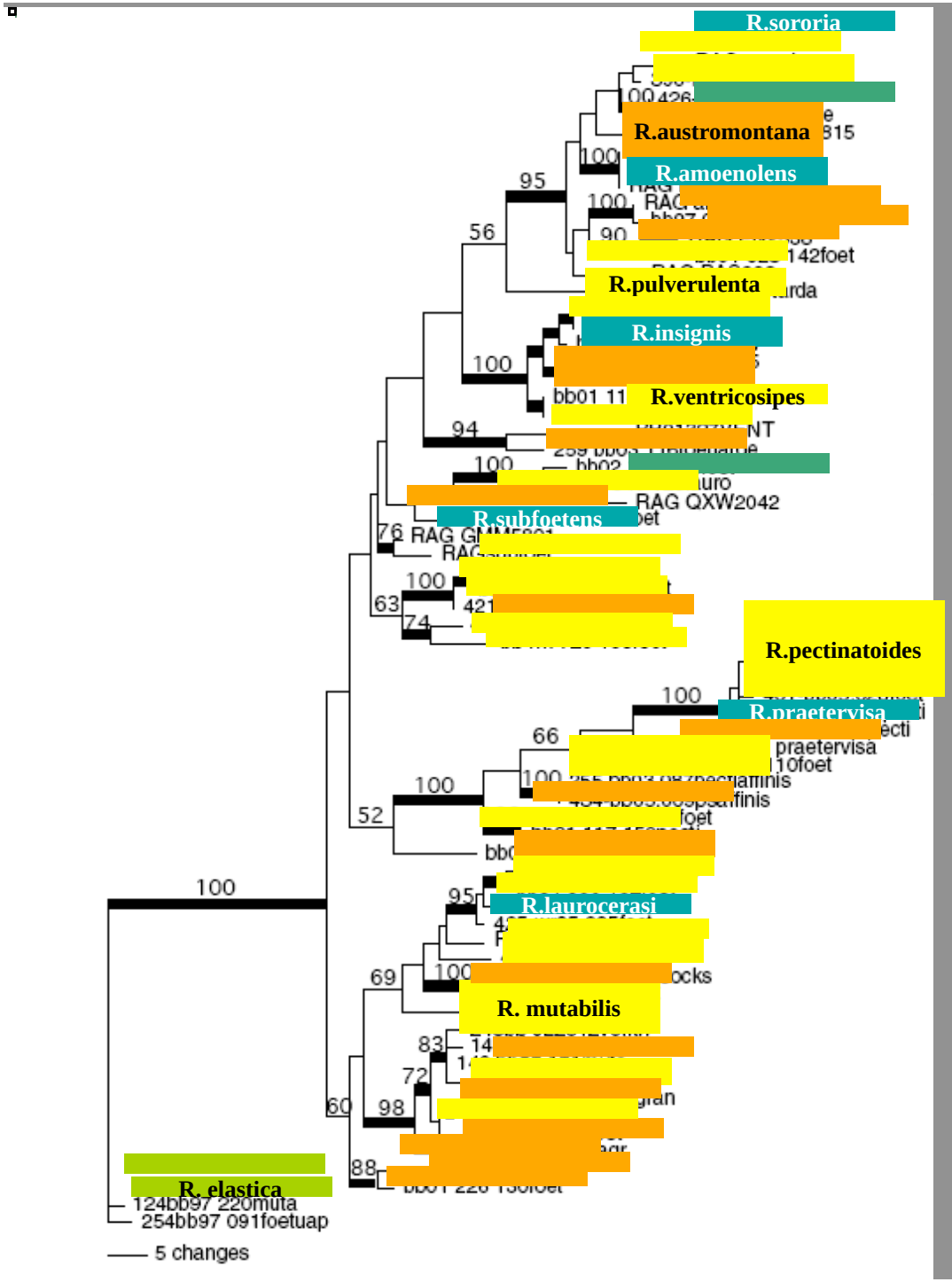
(1796 Europe.....)1872.....1915.....1939..1943/45.... .....1962.....1997.....2006

Europe


1793-2004 new russulas
100
90
80
70
60
50
40
30
20
10
0
Persoon
Fries
Gillet
Cooke, Quelet, Britz.
Bataille
Maire
Melzer &
Zvara
Velenovskyi
Singer
Blum
Schaeffer
Romagnesi
Bon
Einhellinger
Sarnari
Reumaux
1796..1838.....1874.....1888..1893.....1908/1910...1920.1927.1932.....1952....1962/67.....1986.....1996/98..2003

Ingratula

Ingratula	*Crassotunicatinae*	*crassotunicata/W*
	Farinipedes?	*polycystis*
	Felleinae	***fellea***
		primaverna
		simillima
	Foetentinae	*foetentula*
		fragrantissima
		granulata
		laurocerasi
		lilacipes
		mutabilis
		subfoetens
		ventricosipes
	Pectinatinae	***amoenolens***
		cerolens/W
		pectinatoides
	Subvelatae	*pulverulenta*
	Fistulosinae ?	*???*



Correspondence with the actual classification :

Subsect. Pectinatinae p.p.

Subsect. Subvelatae

Subsect. Foetentinae p.p.

Subsect. Pectinatinae p.p.

Subsect. Foetentinae p.p.

(Subsect. Elasticae subsect.nov.)

I N G R A T A E

Cryptogamie, Mycologie, 2011, 32 (3): 323-339

Type-studies in American *Russula* (Russulales, Basidiomycota): spe *Decolorantinae* described by H G.S. Burlingham and W.A

Slavomír ADAMČÍK[a] & Bart E

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ISSN (print) 0093-4666

[b]Muséum N UMR720

MYCOT

Volume 115, pp. 131–144

DOI: 10.5248/

Abstract – In t authors focus *R. subdensifolia* every single on Romagn. subse specimens, all *Decolorantinae* group of pale-s and related sp lectotypified.

***Russula magn* lectotypificatio**

Type studies of *Russula* s *R. roseiisabellina, R. seric*

BART BUYCK[1] & SLAVOMÍR A

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[2] *Institute of Botany, Slovak Academy Dúbravská cesta 9, Bratislava SK*

CORRESPONDENCE TO: [1]*buyck@mn*

ABSTRACT — The study of the North lack of sufficient microscopic detail contribution, microscopic features a type specimens. The authors reinte features supplied in the original d placement of the taxa: (i) *R. roseiisab* suggested in Murrill's protologue, nc as suggested by Hesler — it is a typi (ii) *R. sericella* is absolutely unrelate and probably fits within subgenus *I* to the recently described *R. texensi* needed to verify whether it possesse

KEY WORDS — Florida, micromorpl

Cryptogamie, Mycologie, 2011, 32 (2): 151-169

Type studies in *Russula* subgenus *Heterophyllidia* from the eastern United States

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Nova Hedwigia Vol. 94 issue 3–4, xxx–xxx
Stuttgart, May 2012

Article

ssula subgenus
culosa Murrill,
bed in detail.
iscussed. Both
ood species of
t to place with

Type-studies in American Russula (Russulales, Basidiomycota): in and out subsection Roseinae

Slavomír Adamčík[1]* and Bart Buyck[2]

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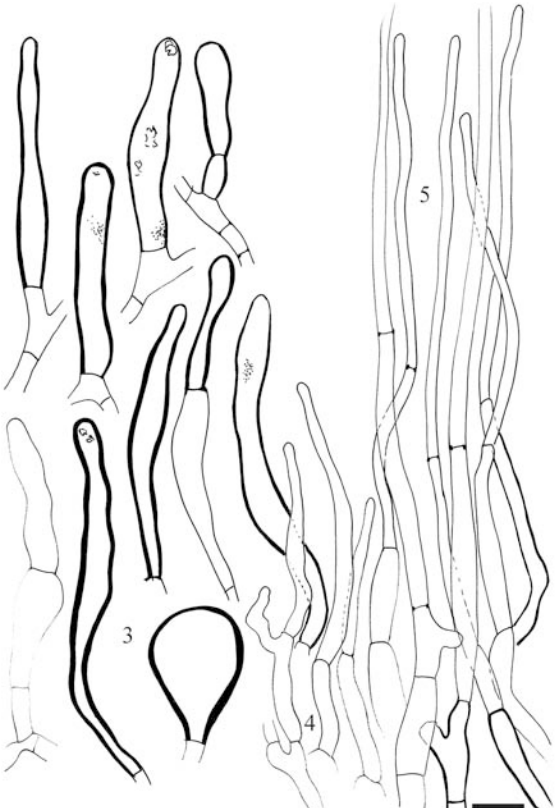
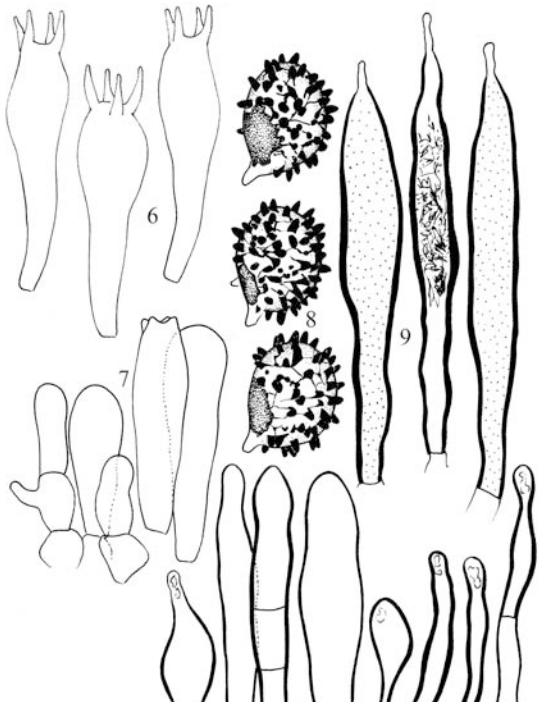
With 9 figures

Adamčík, S. & B. Buyck (2012): Type-studies in American *Russula* (Russulales, Basidiomycota): in and out subsection *Roseinae*. – Nova Hedwigia 94: xxx-xxx.

Abstract: As a result of modern type studies, four species in the genus *Russula* are here discussed:





Russula hixsonii Murrill

Bayesian phylogeny with indication of Bayesian post. prob.

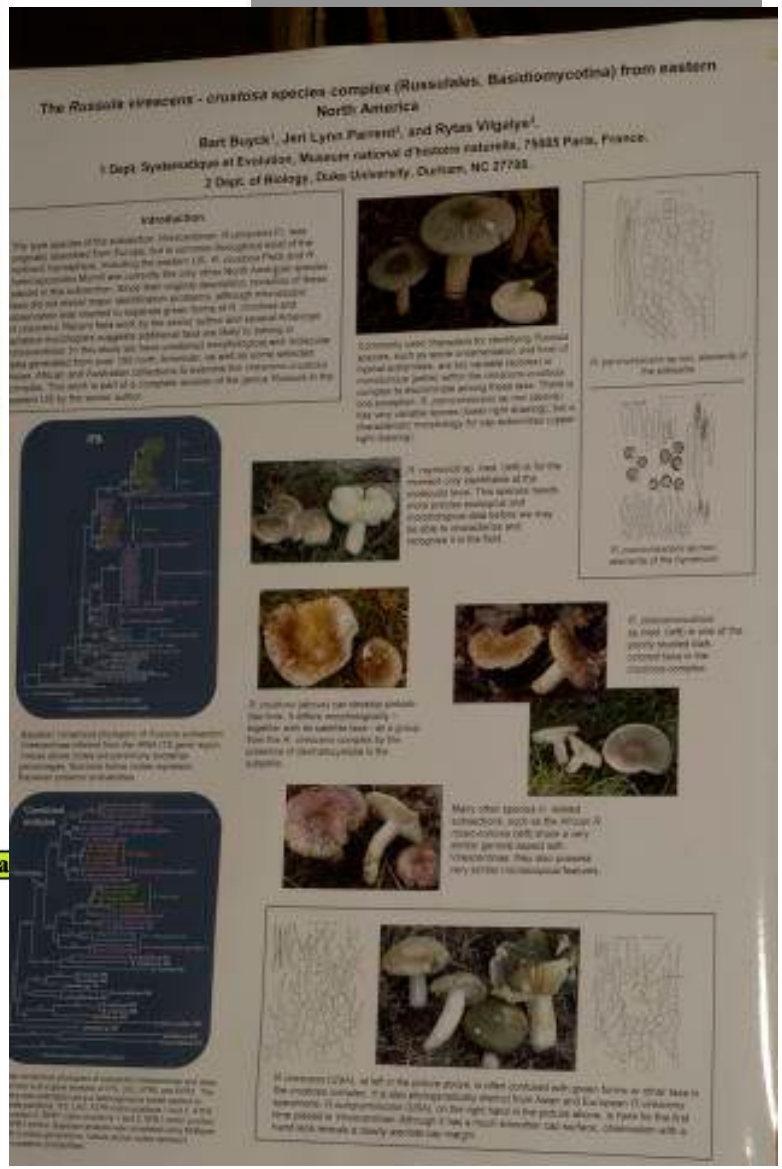
New taxon

R. parvovirescens sp.ined. 052
R. parvovirescens sp.ined. 053
R. parvovirescens sp.ined. 079
R. appendiculata sp.ined. 050.
R. raymondii sp.ined. 074
R. raymondii sp.ined. 077
R. cadaveriolens sp.ined. 029
R. crustosa 069
R. crustosa 098
R. crustosa 022
R. crustosa 006
R. obscurocrustosa sp.ined. 038
R. obscurocrustosa sp.ined. 047
R. brunneovelutina sp.ined. 060
R. virescens ssp. ined.012
R. virescens ssp.ined. 078
R. virescens ssp.ined. 057
R. virescens 041
R. virescens 066
R. viridirubrolimbata 168
R. pseudovirescens sp.ined. 161
R. pallidocrustosa sp.ined. 190
R. subgraminicolor ssp.ined. 032
R. subgraminicolor 035
R.brevicylindrata sp.ined. 062.
R.brevicylindrata sp.ined. 065.
R. roseoviolacea 181
R. albofloccosa 182
R. annula
R.modesta 158
R.modesta 165
griseinae sp. 189
R. cremeolilacina 156
R. cremeolilacina cf 167
R.ornaticeps 054.
R.ornaticeps 099.
griseinae sp. 162.
R. glaucescentipes 188

USA
EUR
AFR
ASIE

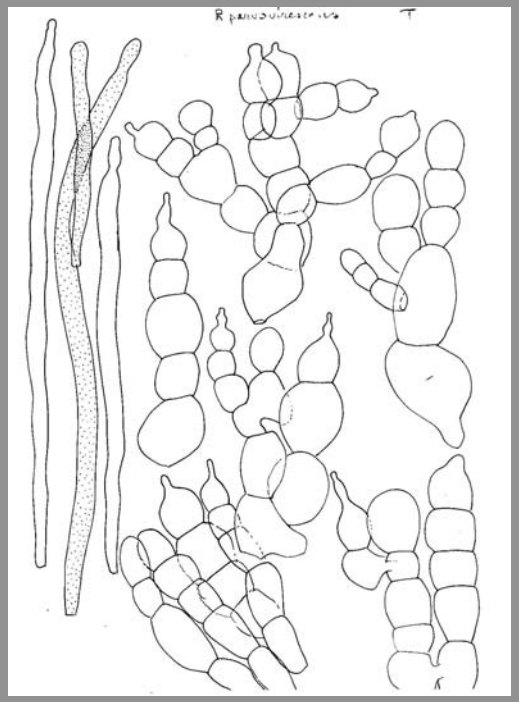
Virescentinae

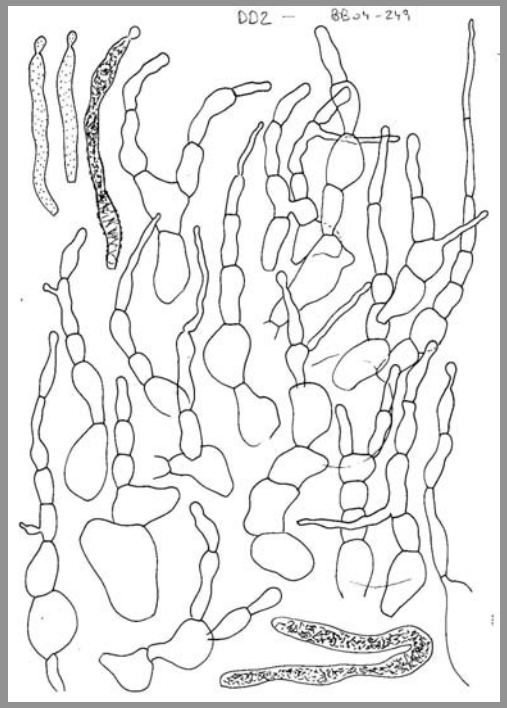
ITS, LSU
RPB1, ATP6

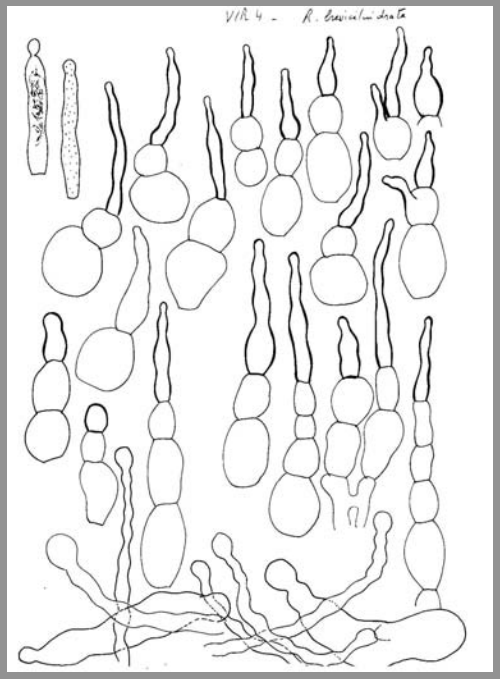

The Russula virescens - crustosa species complex (Russulales, Basidiomycotina) from eastern North America

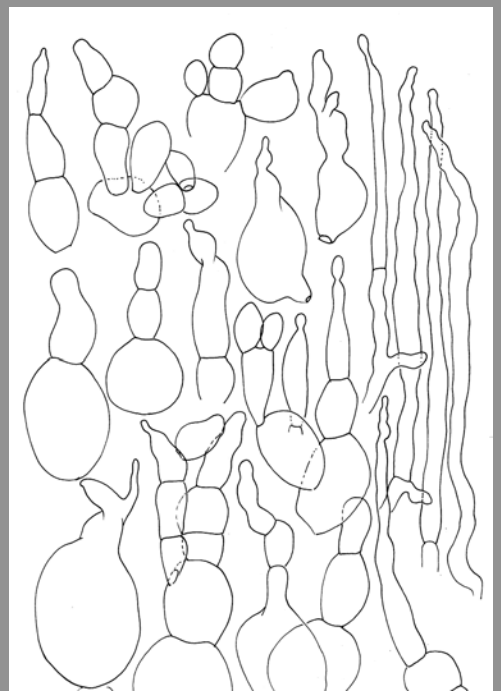
Bart Buyck[1], Jeri Lynn Parrent[2], and Rytas Vilgalys[2].

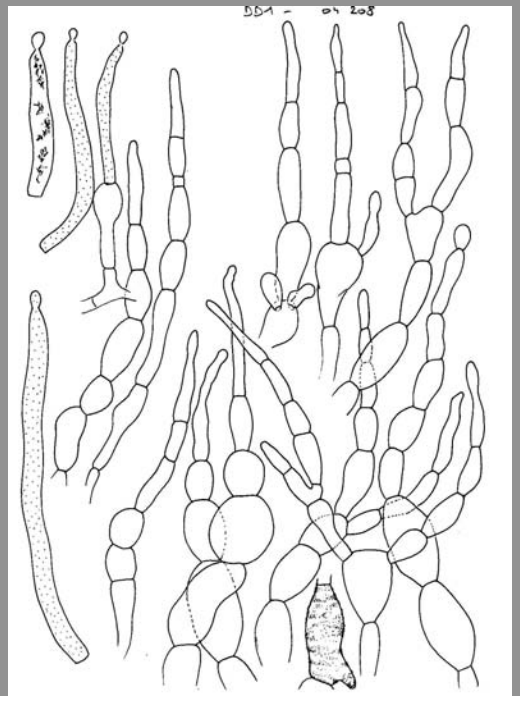
1 Dept. Systematique et Evolution, Museum national d'histoire naturelle, 75005 Paris, France.
2 Dept. of Biology, Duke University, Durham, NC 27708.

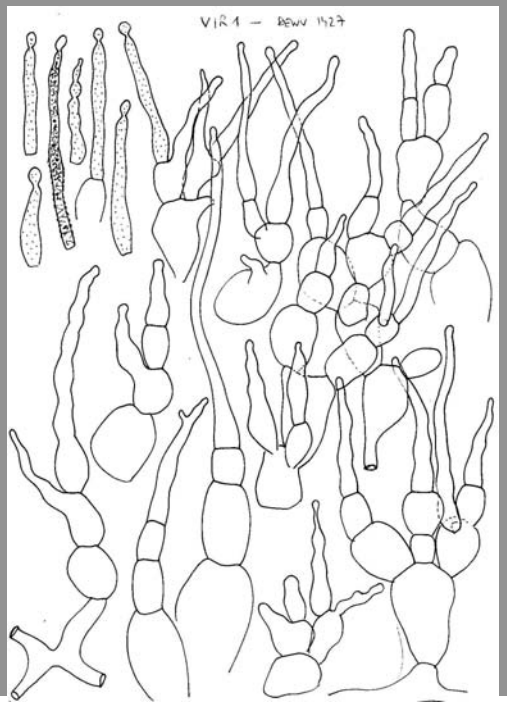












coding B. Buyck

Description Form
12 december 2003

Field characters

Russula Nr.: PHOTO ?

Locality :

D1 - Color of spore deposit:

Romagnesi	Dagron	Kibby & Fatto

Country : Date:

ARE THE SPECIMENS....

?	2	1	0	C1-1	growing single
?	2	1	0	C1-2	growing with 1-3 specimens
?	2	1	0	C1-3	growing with 3-10 specimens
?	2	1	0	C1-4	growing with > 10 specimens

supposedly number of specimens/mycelium

lower rare normally between upper rare
(.....) ..... X ..... (.....)

IS THE MARGIN..... MEASUREM

?	2	1	0	C2-0	smooth (not striate) ?
?	2	1	0	C2-1	very shortly or tardively a bit striate ?
?	2	1	0	C2-2	strongly striate-cannelate/tuberculate ?
?	2	1	0	T1	longtime strongly inrolled
?	2	1	0	T2	very (ir)regularly waving -si
?	2	1	0	T3	zonate ?
?	2	1	0	T4	pubescent (L.torminosus etc.

S1 - Cap diam

IS THE CAP SURFACE...

?	2	1	0	C3-0	glabrous ?
?	2	1	0	C3-1	felty-velutinous ?
?	2	1	0	C3-2	granular-squamulose ?
?	2	1	0	T5	in the center getting paler th
?	2	1	0	C4-0	never viscose, even when we
?	2	1	0	C4-1	greasy- viscose when wet ?
?	2	1	0	C4-2	pileus slimy-glutinous when
?	2	1	0	C5-0	depressed in the extreme cen
?	2	1	0	C5-1	flat in the extreme center ?
?	2	1	0	C5-2	convex in the extreme center
?	2	1	0	C6-0	not or hardly peeling near th
?	2	1	0	C6-1	separable except in center (2
?	2	1	0	C6-2	**completely** separable ?
?	2	1	0	T6	shiny, even when dry ?
?	2	1	0	T7	having a whitish pruina whe
?	2	1	0	T8	hygrophanous ?
?	2	1	0	C7-1	smooth and continuous (as i
?	2	1	0	C7-2	with minute veins or ridges (
?	2	1	0	C7-3	with strong venation (cf. L. l
?	2	1	0	C7-4	roughened/ cottony (R.gossy
?	2	1	0	C7-5	finely cracked (ex. some Gri
?	2	1	0	C7-6	coarsely cracked (R.virescen
?	2	1	0	C7-7	deeply fissured exposing cap

IS THE STIPE ...

?	2	1	0	T9	radicant ?
?	2	1	0	C8-0	conical (broader below)
?	2	1	0	C8-1	cilindrical ?
?	2	1	0	C8-2	clavate (narrowing downwar
?	2	1	0	C9-1	Quickly completely hollow ?
?	2	1	0	C9-2	With 6 to 10 or more cavitie
?	2	1	0	C9-3	With few (2-5) cavities:
?	2	1	0	C9-4	no cavities no hard cortical z
?	2	1	0	C9-5	no cavities but soft/spongy u
?	2	1	0	C10-0	extremely fragile
?	2	1	0	C10-1	neither extremely fragile nor
?	2	1	0	C10-2	very hard (lepida, camarophy
?	2	1	0	C11-0	central
?	2	1	0	C11-1	excentric
?	2	1	0	C11-2	lateral

2=positive answer 1= yes, but...n

coding B. Buyck

MAIN COLOUR (generally dominan

	C28 pileus	C29 gill
Grey		
Black		
Pale brown:		
Dark brown:		
white:		
cream:		
warm yellow/ochre :		
lemon :		
orange:		
pink:		
Blood red		
wine/purple/lila		
green		
bleu		

ARE THE GILLS ...

?	2	1	0	T14	much lower t
?	2	1	0	T15	attenuate tow
?	2	1	0	C15-1	less than 3 L/
?	2	1	0	C15-2	4 - 7 L/cm
?	2	1	0	C15-3	8 - 13 L/cm
?	2	1	0	C15-4	14 - 17 L/cm
?	2	1	0	C15-5	> 18 L/cm
?	2	1	0	C16-0	not anastomo
?	2	1	0	C16-1	strongly anas
?	2	1	0	C16-2	gleboid - alve
?	2	1	0	T16	largely outmu
?	2	1	0	T16bis	shorter lamell
?	2	1	0	C17-0	not anastomo
?	2	1	0	C17-1	locally anaste
?	2	1	0	C17-2	strongly so, fi
?	2	1	0	C18-0	not or excepti
?	2	1	0	C18-1	quite often fo
?	2	1	0	C18-2	almost regula
?	2	1	0	C19-0	having edge a
?	2	1	0	C19-1	having colou
?	2	1	0	C19-2	having entire
?	2	1	0	C20-0	decurrent ?
?	2	1	0	C20-1	adnate ?
?	2	1	0	C20-2	free ?
?	2	1	0	C21-0	brittle / fragil
?	2	1	0	C21-1	elastic ?
?	2	1	0	C21-2	elastic and gr

IS A VEIL

?	2	1	0	C22-0	absent
?	2	1	0	C22-1	present in fra
?	2	1	0	C22-2	as a ring arou

MACROCHEMICAL REACTIONS

?	2	1	0	T23	Sulfo-vanillin t
?	2	1	0	C26-0	FeSO4 test on
?	2	1	0	C26-1	FeSO4 test on
?	2	1	0	C26-2	FeSO4 test on
?	2	1	0	C27-0	FeSO4 test or
?	2	1	0	C27-1	FeSO4 test or
?	2	1	0	C27-2	FeSO4 test or

2=positive answer

Coding B.Buyck

ssula

?	2	1	0	C28 – Cli	Equatorial (no dry season)
?	2	1	0	C28 – Cli	tropical (dry season)
?	2	1	0	C28 - Cli	Warm temperate - dry summer:
?	2	1	0	C28 - Cli	Warm temperate - humid
?	2	1	0	C28 - Cli	Cold temperate:
?	2	1	0	C28 - Cli	(sub)alpine/(sub)arctic:
?	2	1	0	C29 - Soi	Africa:
?	2	1	0	C29 - Soi	North America:
?	2	1	0	C29 - Soi	S. and C. America:
?	2	1	0	C29 - Soi	Asia:
?	2	1	0	C29 - Soi	Australia:
?	2	1	0	C29 - Soi	Europe:
?	2	1	0	C23 - Sut	on soil
?	2	1	0	C23 - Sut	in litter
?	2	1	0	C23 - Sut	on wood
?					
?	2	1	0	T	Obligatory symbiont ?
?	2	1	0	T	Parasitic ?
?	2	1	0	T	Hygrophilous vegetation (sphagnum, bogs, swamp etc..)
?	2	1	0	C9 - Basi	Hypogeous?
?	2	1	0	C9 - Basi	Half-burried?
?	2	1	0	C9 - Basi	Always stipe out of soil ?
?					
?	2	1	0	C25 - Ve	Tree likely host ?
?	2	1	0	C25 - Ve	Shrub likely host ?
?	2	1	0	C25 - Ve	Herb likely host ?
?					
?	2	1	0	C26 - Tre	dense tree coverage, no herb layer
?	2	1	0	C26 - Tre	sparse tree coverage, herbaceous lay
?	2	1	0	C26 - Tre	no trees nearby
?					
?	2	1	0	C29 - Soil	texture Sand:
?	2	1	0	C29 - Soil	texture Loam:
?	2	1	0	C29 - Soil	texture Clay:
?					
?	2	1	0	C30 - Soil	acidity Alcaline:
?	2	1	0	C30 - Soil	acidity Neutral:
?	2	1	0	C30 - Soil	acidity Acid:

E5 - Host(s) list and reference

when certain, write here the full scientific name of the host tree as one single word (ex. Fagusylvatica, piceaexcelsa)

26/03/02

Russulales encode form for Russula .....

source : .....

0	/ 1 / 2 / ?	C35/37		hardly visible rugosities	
0	/ 1 / 2 / ?	C35/37		blunt ornaments	
0	/ 1 / 2 / ?	C35/37		pointed ornaments	
0	/ 1 / 2 / ?	C35/37		crests	
0	/ 1 / 2 / ?	C35/37		connectifs	
0	/ 1 / 2 / ?	C36		<0,5 µm high	
0	/ 1 / 2 / ?	C36		< 1 µm high	
0	/ 1 / 2 / ?	C36		< 1,5 µm high	
0	/ 1 / 2 / ?	C36		< 2 um high	

0	/ 1 / 2 / ?	C36/38		too low	
0	/ 1 / 2 / ?	C36/38		no lines, regular isolated	
0	/ 1 / 2 / ?	C36/38		no lines irregular isolated	
0	/ 1 / 2 / ?	C36/38		very fragmentory isolated	
0	/ 1 / 2 / ?	C36/38		incompletely reticulate	
0	/ 1 / 2 / ?	C36/38		completely reticulate	
0	/ 1 / 2 / ?	C36/38		too low	

0	/ 1 / 2 / ?	T		pileo in supra	
0	/ 1 / 2 / ?	T		pileo in sub	
0	/ 1 / 2 / ?	T		pileo in trama	

microscopy

MEASUREMENTS EXTR. MIN MOY MAX EXTR.

S6 - Length of spores:
S7 - Width of spores:
S8 - Spore (Q)
S9 - Length of basidia
S10 - Width of basidia:
S11 - Length of sterigmata:
S12 - Width of sterigmata:

underline the specific list (E1)

r=I don't know

13/04/02

Russulales encode form for Russula .....

source : .....

microscopy

PILEOCYSTIDIA

0	/ 1 / 2 / ?	C	0de1	11-celled, clavato-pedicellate	
0	/ 1 / 2 / ?	C	0de1	1-celled, clavate	
0	/ 1 / 2 / ?	C	0de1	1-celled, fusiformoun	
0	/ 1 / 2 / ?	C	0de1	11-celled, ellipsoid	
0	/ 1 / 2 / ?	C	0de1	11-celled, cilindrical	
0	/ 1 / 2 / ?	C	0de1	11-celled, subulate	
0	/ 1 / 2 / ?	C	0de1	11-celled, conical	
0	/ 1 / 2 / ?	C	0de1	12-3 celled	
0	/ 1 / 2 / ?	C	0de1	14-5 celled	
0	/ 1 / 2 / ?	C	0de1	1multicelled	

0	/ 1 / 2 / ?	C	0de3		coarsely crystalline
0	/ 1 / 2 / ?	C	0de3		finely crystalline-granular, abundant
0	/ 1 / 2 / ?	C	0de3		finely crystalline-granular, locally confined
0	/ 1 / 2 / ?	C	0de3		refringent in bunds
0	/ 1 / 2 / ?	C	0de3		refringent -guttulate
0	/ 1 / 2 / ?	C	0de4		absent
0	/ 1 / 2 / ?	C	0de4		rare, very dispersed
0	/ 1 / 2 / ?	C	0de4		rnumerous, evident everywhere

EXTREMITIES

0	/ 1 / 2 / ?	T			ex filamentous, thickwalled
0	/ 1 / 2 / ?	T			ex filamentous, thin-walled
0	/ 1 / 2 / ?	T			ex septate 'hairs'
0	/ 1 / 2 / ?	T			**primordial hyphae present ?**
0	/ 1 / 2 / ?	T			**very strong incrusted non primordial ?**

0	/ 1 / 2 / ?	Cp	2		crins
0	/ 1 / 2 / ?	Cp	2		diverticules
0	/ 1 / 2 / ?	Cp	2		arbuscules
0	/ 1 / 2 / ?	Cp	2		subseptal budding

0	/ 1 / 2 / ?	Cp	3		cilindrical
0	/ 1 / 2 / ?	Cp	3		sinuous
0	/ 1 / 2 / ?	Cp	3		tortuous

0	/ 1 / 2 / ?	Cp	4		t1-3 celled
0	/ 1 / 2 / ?	Cp	4		t4-5 celled
0	/ 1 / 2 / ?	Cp	4		t6-7 celled
0	/ 1 / 2 / ?	Cp	4		t multicellol

0	/ 1 / 2 / ?	Cp	5		t base diam < terminal
0	/ 1 / 2 / ?	Cp	5		t base diam = terminal
0	/ 1 / 2 / ?	Cp	5		t base > terminal (2x, 3x)
0	/ 1 / 2 / ?	Cp	5		t base>> terminal (4X, ...)

0	/ 1 / 2 / ?	Cp	6		t length = width or less
0	/ 1 / 2 / ?	Cp	6		t length = width x 2
0	/ 1 / 2 / ?	Cp	6		t length = width x 3
0	/ 1 / 2 / ?	Cp	6		t length = width x 4
0	/ 1 / 2 / ?	Cp	6		t length = width x 5
0	/ 1 / 2 / ?	Cp	6		t length = width x 6 or more

STIPE

0	/ 1 / 2 / ?	T			**cauliocystidia present ?**

PELLIS

?				2	1	0	T46	- Good ifferentiation of supra and subpellis ?
?			6	2	1	0	T48	- Gelification of subpellis
?	7	6	4	3	2	1	0 T49	- Location of pileocystidia
?		6		2	1	0	T52	- Sulfo-vanillin test on pileocystidia
?		6		2	1	0	T53	- Cresyl blue metachromatic pileocystidia
?		6		2	1	0	T54	- Aggregation of hyphal ends of pileus
?				2	1	0	T55	- diffuse pigments in cells
?				2	1	0	T55	- granular endogenae pigments in cells
?				2	1	0	T55	- microgranular heterophyllae pigments in cells
?				2	1	0	T55	- Coloured wall of extremities of pileus
?				2	1	0	T55	- encrusting parietal pigment (coloured !)
?				2	1	0	T55	- encrusting parietal pigment (**not** coloured !)

0	/ 1 / 2 / ?	C	0de1	11-celled, clavato-pedicellate				
0	/ 1 / 2 / ?	C	0de1	1-celled, clavate				
0	/ 1 / 2 / ?	C	0de1	1-celled, fusiformoun				
0	/ 1 / 2 / ?	C	0de1	11-celled, ellipsoid				
0	/ 1 / 2 / ?	C	0de1	11-celled, cilindrical				
0	/ 1 / 2 / ?	C	0de1	11-celled, subulate				
0	/ 1 / 2 / ?	C	0de1	11-celled, conical				
0	/ 1 / 2 / ?	C	0de1	12-3 celled				
0	/ 1 / 2 / ?	C	0de1	14-5 celled				
0	/ 1 / 2 / ?	C	0de1	1multicelled				
0	/ 1 / 2 / ?	C	basidium (parvulospora)					
0	/ 1 / 2 / ?	C	basidium (tigrina)					
0	/ 1 / 2 / ?	C	basidium (gallidospora)					
0	/ 1 / 2 / ?	C	basidium (alboporus)					
0	/ 1 / 2 / ?	C	basidium (aeolula)					
0	/ 1 / 2 / ?	C	basidium (biguttata)					
0	/ 1 / 2 / ?	C	basidium (roseoviolacea)					
0	/ 1 / 2 / ?	C	basidium (afrodelica)					
0	/ 1 / 2 / ?	C	basidium (atrovirens)					
0	/ 1 / 2 / ?	C	basidium (parvorosea)					
0	/ 1 / 2 / ?	C	basidium (sinochroa)					
0	/ 1 / 2 / ?	C	basidium (annulata)	0	/ 1 / 2 / ?	C	0de2	robtuse-rounded
0	/ 1 / 2 / ?	C	basidium (testacea)	0	/ 1 / 2 / ?	C	0de2	tattenuate, irregular
0	/ 1 / 2 / ?	C	basidium (uncarrum)	0	/ 1 / 2 / ?	C	0de2	t subcapitate
0	/ 1 / 2 / ?	C	basidium (crassotunicata)	0	/ 1 / 2 / ?	C	0de2	tmoniliformous
0	/ 1 / 2 / ?	C	basidium (brunneorigida)	0	/ 1 / 2 / ?	C	0de2	tbroadly capitate
0	/ 1 / 2 / ?	C	basidium (discopus)	0	/ 1 / 2 / ?	C	0de2	tminutely capitate
				0	/ 1 / 2 / ?	C	0de2	tmucronate
				0	/ 1 / 2 / ?	C	0de2	tnigricans-type
				0	/ 1 / 2 / ?	C	0de2	tappendiculate

0	/ 1 / 2 / ?	C	0de3		coarsely crystalline
0	/ 1 / 2 / ?	C	0de3		finely crystalline-granular, abundant
0	/ 1 / 2 / ?	C	0de3		finely crystalline-granular, locally confined
0	/ 1 / 2 / ?	C	0de3		refringent in bunds
0	/ 1 / 2 / ?	C	0de3		refringent -guttulate
0	/ 1 / 2 / ?	C	0de4		absent
0	/ 1 / 2 / ?	C	0de4		rare, very dispersed
0	/ 1 / 2 / ?	C	0de4		rnumerous, evident everywhere

0	/ 1 / 2 / ?	T			ex filamentous, thickwalled
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0	/ 1 / 2 / ?	T			**primordial hyphae present ?**
0	/ 1 / 2 / ?	T			**very strong incrusted non primordial ?**

0	/ 1 / 2 / ?	Cp	2		crins
0	/ 1 / 2 / ?	Cp	2		diverticules
0	/ 1 / 2 / ?	Cp	2		arbuscules
0	/ 1 / 2 / ?	Cp	2		subseptal budding

0	/ 1 / 2 / ?	Cp	3		cilindrical
0	/ 1 / 2 / ?	Cp	3		sinuous
0	/ 1 / 2 / ?	Cp	3		tortuous

0	/ 1 / 2 / ?	Cp	4		t1-3 celled
0	/ 1 / 2 / ?	Cp	4		t4-5 celled
0	/ 1 / 2 / ?	Cp	4		t6-7 celled
0	/ 1 / 2 / ?	Cp	4		t multicellol

0	/ 1 / 2 / ?	Cp	5		t base diam < terminal
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0	/ 1 / 2 / ?	Cp	6		t length = width or less
0	/ 1 / 2 / ?	Cp	6		t length = width x 2
0	/ 1 / 2 / ?	Cp	6		t length = width x 3
0	/ 1 / 2 / ?	Cp	6		t length = width x 4
0	/ 1 / 2 / ?	Cp	6		t length = width x 5
0	/ 1 / 2 / ?	Cp	6		t length = width x 6 or more

STIPE

0	/ 1 / 2 / ?	T			**cauliocystidia present ?**

absent
dispersed)
ersed
ter abundant
undant
ndant

pleurocystidia ?
es of pleurocystidia
n +
ic in CB
cheilocystidia ?
n cellular large
nlinant sphaerocytes ?

Cmargin 6
Cmargin 7
Cmargin 8
Cmargin 9
Cmargin 10

ENGLISH
European Russula phylogeny project

For molecular research in mycology, tissues that have been conserved in CTAB buffer are the best solution for successful extraction of good quality DNA (allowing for instance to amplify and sequence in particular single copy genes that are now more and more used for phylogenetic purposes). For this purpose I send you 1.5 ml eppendorf tubes, filled with 0.5 ml CTAB 2x buffer

There are however a few important points to remember :

A. Sampling protocol

1. Sample the tissues **as soon as possible** after collecting the fungus (you can even do it in the field if there is time for it)
2. Use **a clean pincet** (with tips not necessarily sterilized, but at least well cleaned with soft paper tissue drenched in alcohol 70% or higher)
3. Choose parts of the gills that look **perfectly clean**, that are not parasitized by molds and not attacked by animals or other microorganisms (insect larvae, collembolla, mites, etc…). If gills seem not very clean, you can also cut the mushroom lengthwise and take tissue sample from the firm parts of the flesh inside cap or stipe.
4. Take about the quantity of gill or flesh **tissue that corresponds to ½ of the amount of CTAB** liquid in the tube….not more.
5. Close the eppendorf **very tightly** when finished.
6. Write the **collection number on the side** of the tube, and **also on top** of the lid, using a fine permanent marker.
7. Repeat step 3 to 6 for **a second tube** (I need 2 tubes for every specimen, 3-4 for very rare species).
8. Note essential features of the collection : smell, taste of gills, macrochemical reactions, color changes, take pictures for color, form etc….
9. having **vouchers is very important** ! therefore dry at least ½ of the mushroom and conserve it in a plastic bag with the same number to be sent to me later for deposit at PC herbarium.

B. Keep a list of the tissue samples and vouchers :

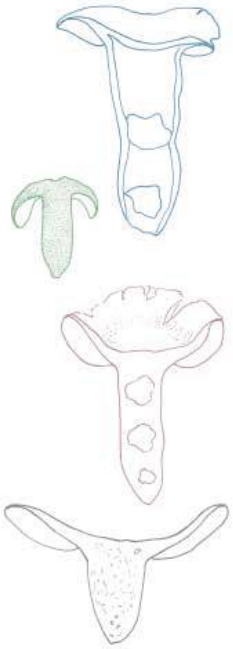
Tube nr./ your collection nr./species epithet/ eventual remarks
Below an example of part of such a file from last year (by JM Trendel) :

JMT-58	JMT-08092807	badia	
JMT-59	JMT-08092804	xerampelina cf	
JMT-60	JMT-08092806	nauseosa ?	
JMT-61	JMT-08092802D	atrorubens	ex. petit à droite
JMT-62	JMT-08092801G	sardonia	ex. au 1er plan à gauche

Recommendations for the data file :

- since you are quite a number of people collecting Russula samples, it is recommended to **put always your initials** before your numbers !
- use expressions such as “cf”, “aff.”, “group”, “?” etc…. **after** the species name…not before (in view of sorting by name later)
- you can add notes or remarks about photos etc….any info you like

Techniques



Although Russula, Lactarius and the other russuloid fungi show many affinities with other macromycetes, their study and description requires the use of some techniques which are not always well-known by everyone. In this section of the web-site we are therefore providing extensive notes on this subject, suggesting how any collection of Russulales should be observed.

What to observe and how to do it?

What to illustrate and how to do it?

russulales news
Introduction | Taxa DB | Literature | Identification | Techniques | People

Tools for identification of Russulales

The European Russula and Lactarius-flora is well covered by a good number of monographs and field-guides, which provide tools for the identification of these fungi both to the beginner and the professional mycologist.

The situation is much different in other continents, where such tools are seriously lacking. One of the aims of Russulales News is to make available on-line some new tools, keys and so on which can aid you in naming your collections.

Should you want to contact us, e-mail us at russulales_news@yahoo.fr.

Geoffrey Kibby and **Raymond Fatto**
On-line synoptic key to North-American Russulas

This on-line tool represents an updated version of the synoptic keys published by Kibby and Fatto some years ago, and allows to quickly check the characters of your collections to see which species match the chosen criteria.

Bart Buyck
Provisional key to subsection Virescentinae in the U.S. **(new!)**

This provisional key will help Russula amateurs to identify the species of subsection Virescentinae in North America, including several new taxa which are in the process of being described.

Jorinde Nuytinck & Annemieke Verbeken
Key to the European species of Lactarius sect. Deliciosi **(new!)**

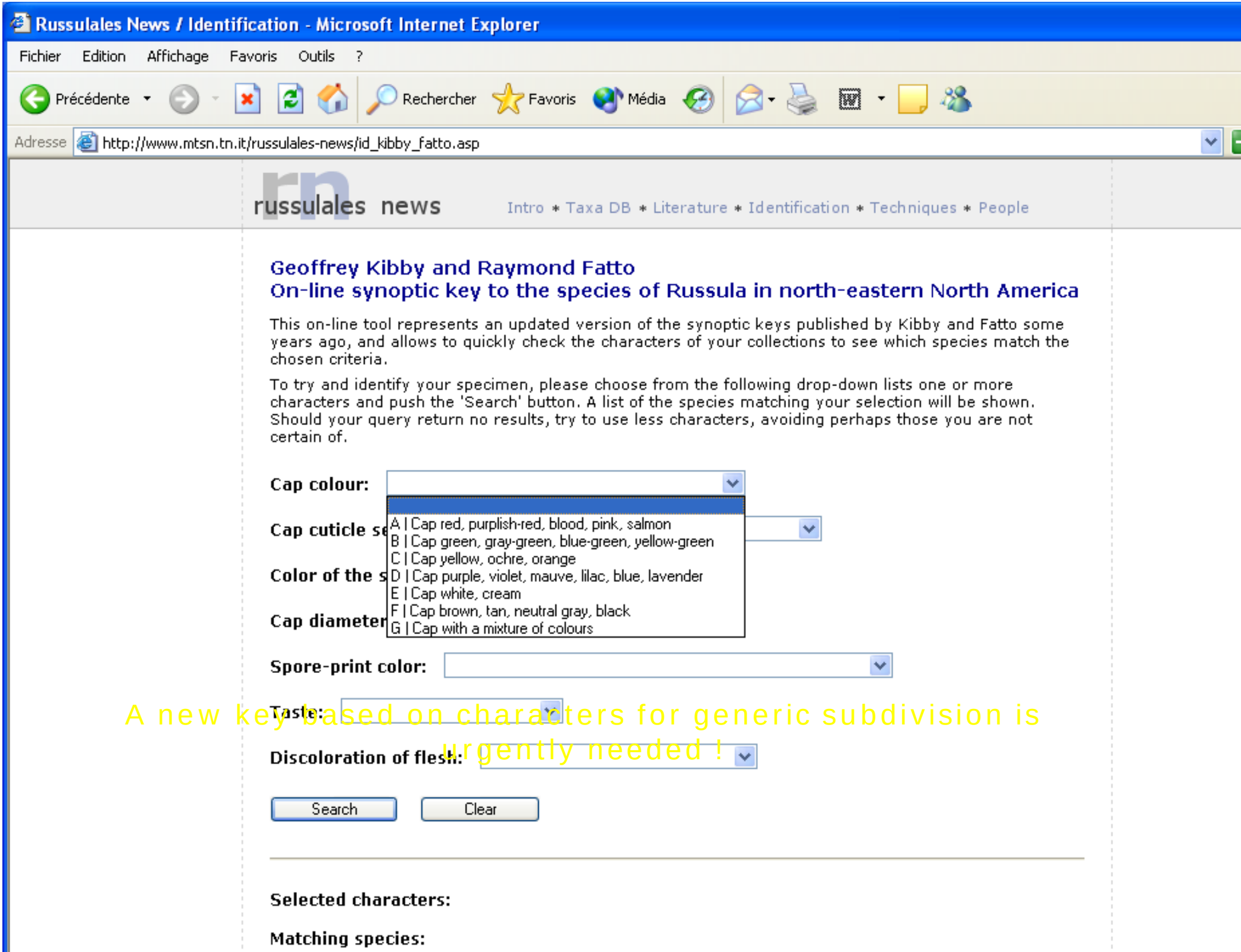
A useful key to distinguish the European milk-caps belonging to sect. Deliciosi (mostly with orange or red milk). This key is one of the results of the thourough study of this group made by the two authors.

Bart Buyck
On-line key to the European species of Russula (soon to come...)

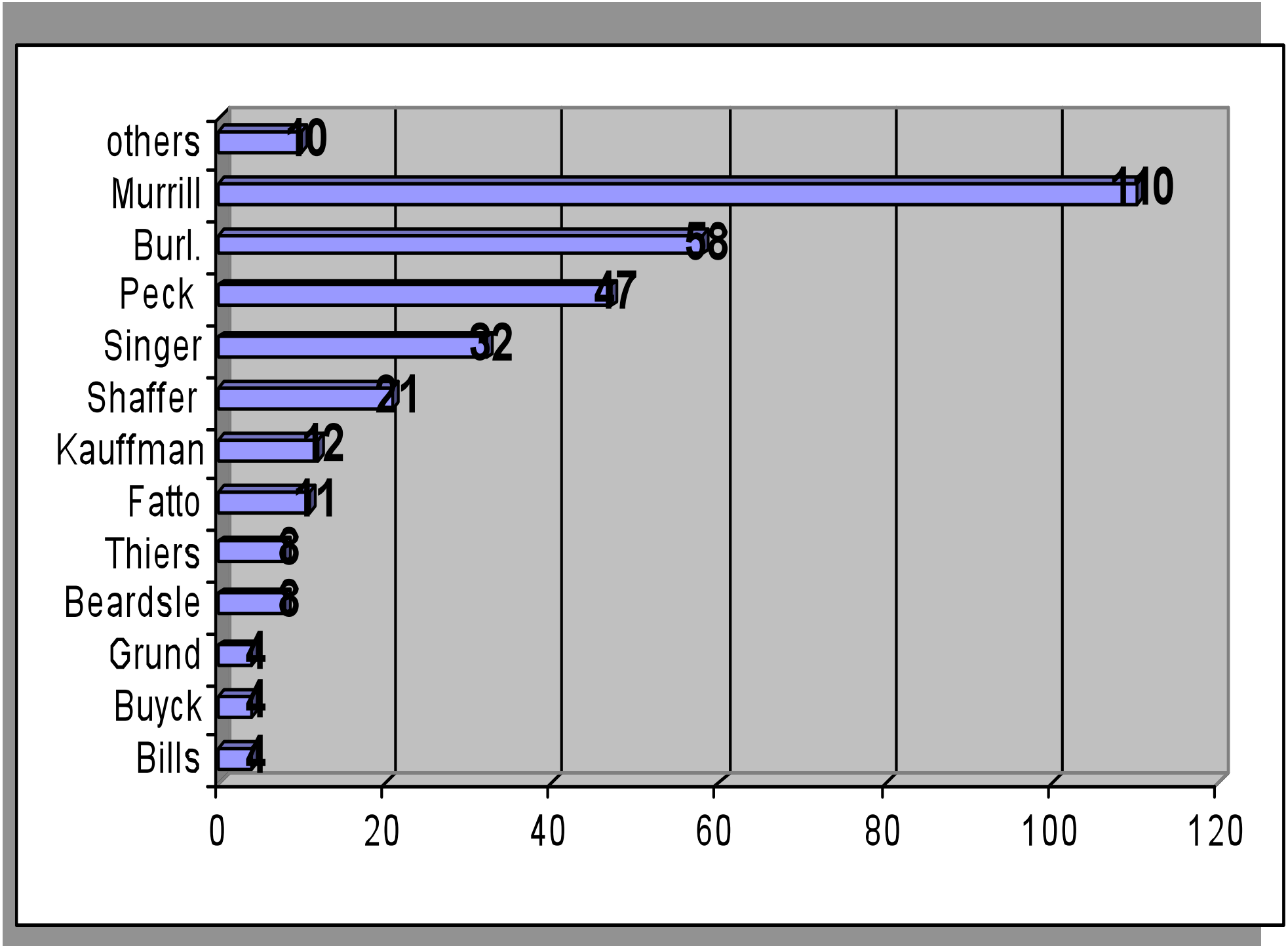
A multiple-entry key to European Russula species based on macroscopical and ecological features is being prepared by Bart in cooperation with Vincent Robert (CBS, The Netherlands), using Vincent's BioloMICS software.

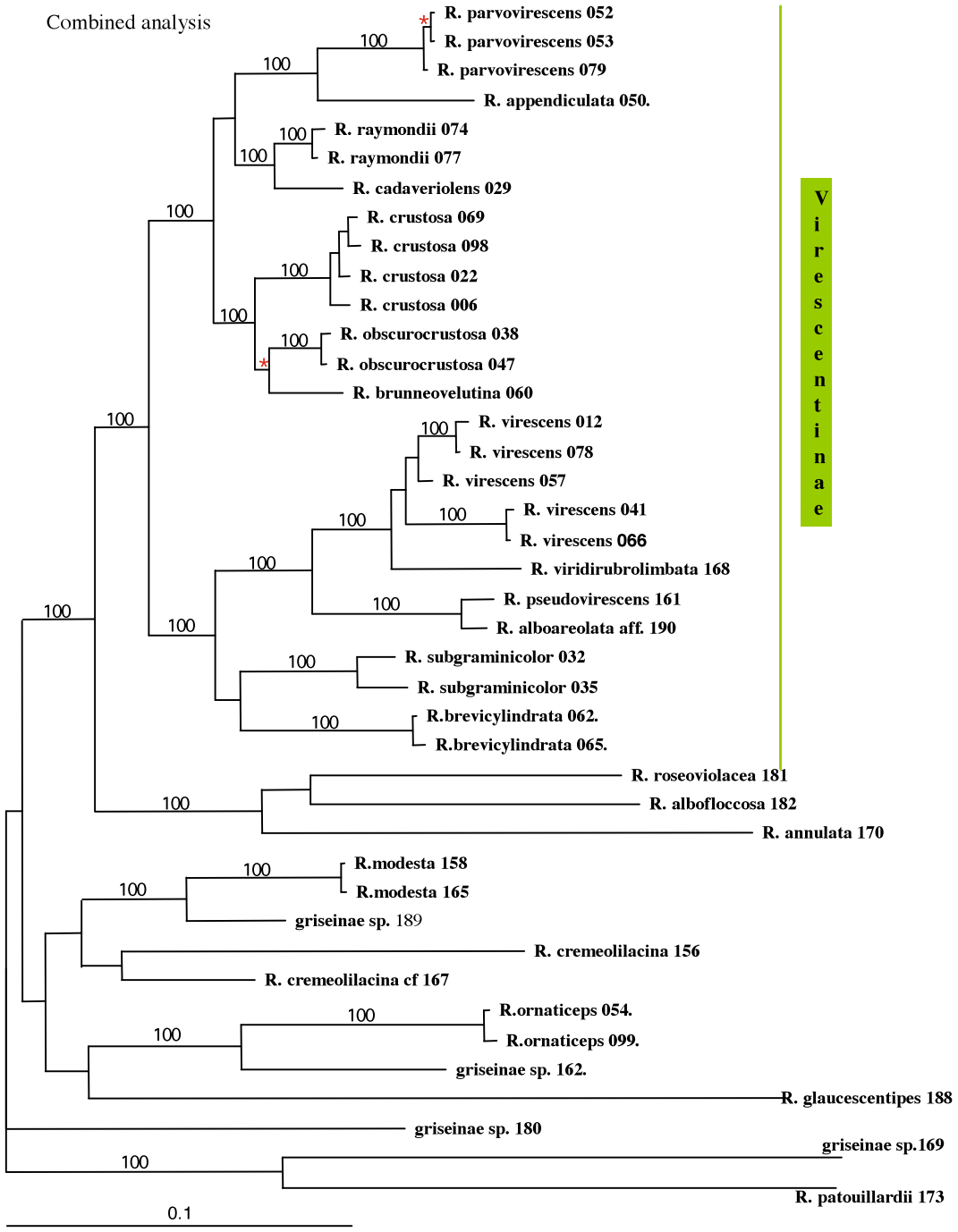
Thank you !

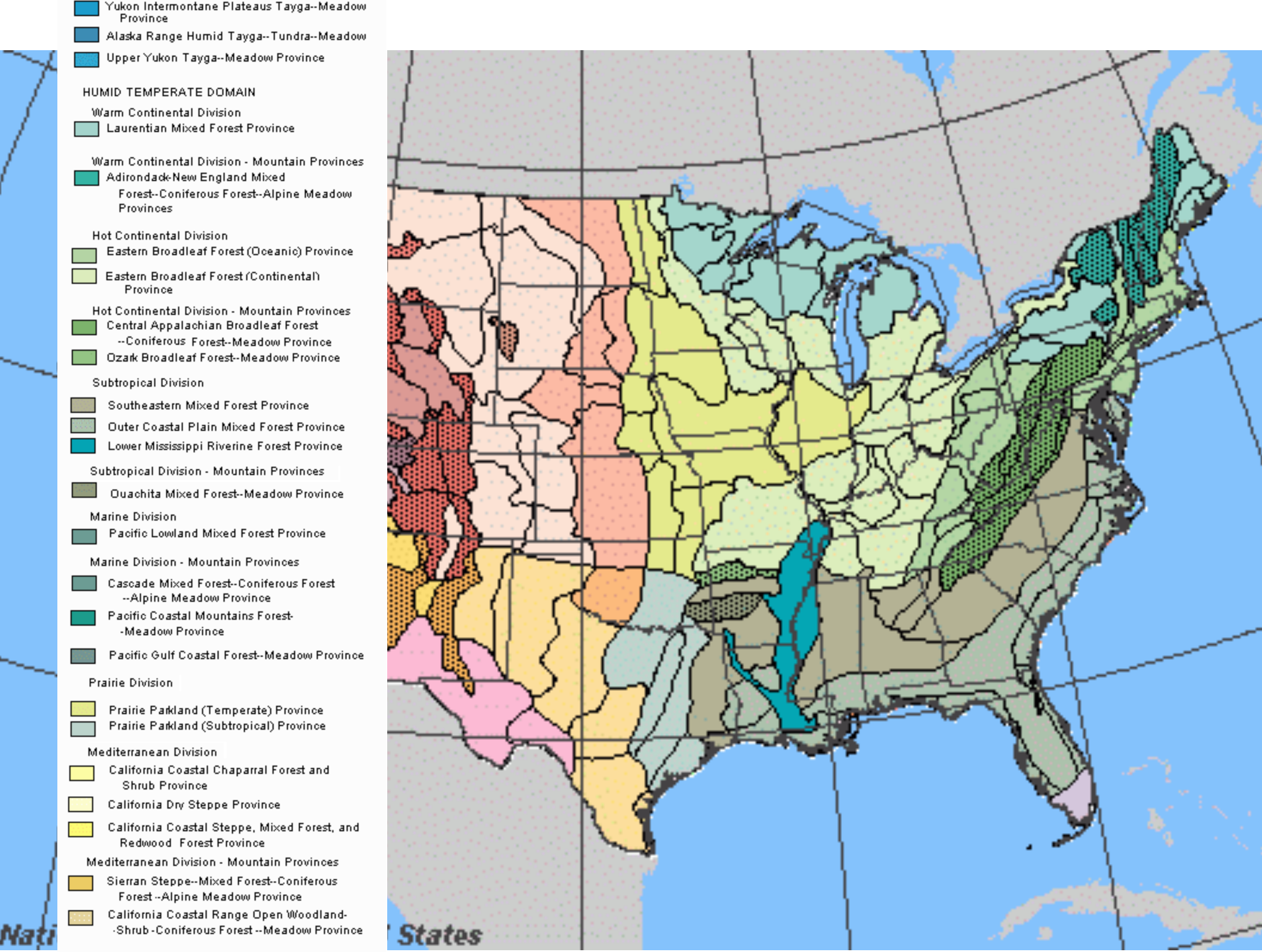
- … and thanks to:
  - all collaborators in the field (David & Patricia Lewis, Donna Mitchell, Bill Roody, Jay Justice, Arleen Bessette, Glenn Boyd, Raymond Fatto, Gene Yetter, Roy Halling, Alejandro Kong Luz)
  - in the lab (Valerie Hofstetter, Jeri Parrent, Rytas Vilgalys)
  - with type studies (Slavomir Adamcik, curators of the main Russula herbaria in the US: NYS, NYBG, FLAS, MICH, F)
  - website creation and updating (Marco Floriani, the Russulales News team…)
  - Travel funding (PPF Ph. Janvier, MNHN, Paris)
  - Sequencing ('Phylogeny of life'-project, MNHN, Paris)



A new key based on characters for generic subdivision is urgently needed !


others
Murrill
Burl.
Peck
Singer
Shaffer
Kauffman
Fatto
Thiers
Beardsle
Grund
Buyck
Bills
10
110
58
47
32
21
12
11
6
6
4
4
4
0
20
40
60
80
100
120


Combined analysis
R. parvovirescens 052
R. parvovirescens 053
R. parvovirescens 079
R. appendiculata 050.
R. raymondii 074
R. raymondii 077
R. cadaveriolens 029
R. crustosa 069
R. crustosa 098
R. crustosa 022
R. crustosa 006
R. obscurocrustosa 038
R. obscurocrustosa 047
R. brunneovelutina 060
R. virescens 012
R. virescens 078
R. virescens 057
R. virescens 041
R. virescens 066
R. viridirubrolimbata 168
R. pseudovirescens 161
R. alboareolata aff. 190
R. subgraminicolor 032
R. subgraminicolor 035
R.brevicylindrata 062.
R.brevicylindrata 065.
R. roseoviolacea 181
R. albofloccosa 182
R. annulata 170
R.modesta 158
R.modesta 165
griseinae sp. 189
R. cremeolilacina 156
R. cremeolilacina cf 167
R.ornaticeps 054.
R.ornaticeps 099.
griseinae sp. 162.
R. glaucescentipes 188
griseinae sp. 180
griseinae sp.169
R. patouillardii 173
0.1
Virescentinae


Yukon Intermontane Plateaus Tayga--Meadow Province
Alaska Range Humid Tayga--Tundra--Meadow
Upper Yukon Tayga--Meadow Province
HUMID TEMPERATE DOMAIN
Warm Continental Division
Laurentian Mixed Forest Province
Warm Continental Division - Mountain Provinces
Adirondack-New England Mixed Forest--Coniferous Forest--Alpine Meadow Provinces
Hot Continental Division
Eastern Broadleaf Forest (Oceanic) Province
Eastern Broadleaf Forest (Continental) Province
Hot Continental Division - Mountain Provinces
Central Appalachian Broadleaf Forest --Coniferous Forest--Meadow Province
Ozark Broadleaf Forest--Meadow Province
Subtropical Division
Southeastern Mixed Forest Province
Outer Coastal Plain Mixed Forest Province
Lower Mississippi Riverine Forest Province
Subtropical Division - Mountain Provinces
Ouachita Mixed Forest--Meadow Province
Marine Division
Pacific Lowland Mixed Forest Province
Marine Division - Mountain Provinces
Cascade Mixed Forest--Coniferous Forest --Alpine Meadow Province
Pacific Coastal Mountains Forest--Meadow Province
Pacific Gulf Coastal Forest--Meadow Province
Prairie Division
Prairie Parkland (Temperate) Province
Prairie Parkland (Subtropical) Province
Mediterranean Division
California Coastal Chaparral Forest and Shrub Province
California Dry Steppe Province
California Coastal Steppe, Mixed Forest, and Redwood Forest Province
Mediterranean Division - Mountain Provinces
Sierran Steppe--Mixed Forest--Coniferous Forest--Alpine Meadow Province
California Coastal Range Open Woodland--Shrub-Coniferous Forest--Meadow Province
DRY DOMAIN
States