



International Rhododendron Conservation Conference

A Chinese perspective on Rhododendron Conservation

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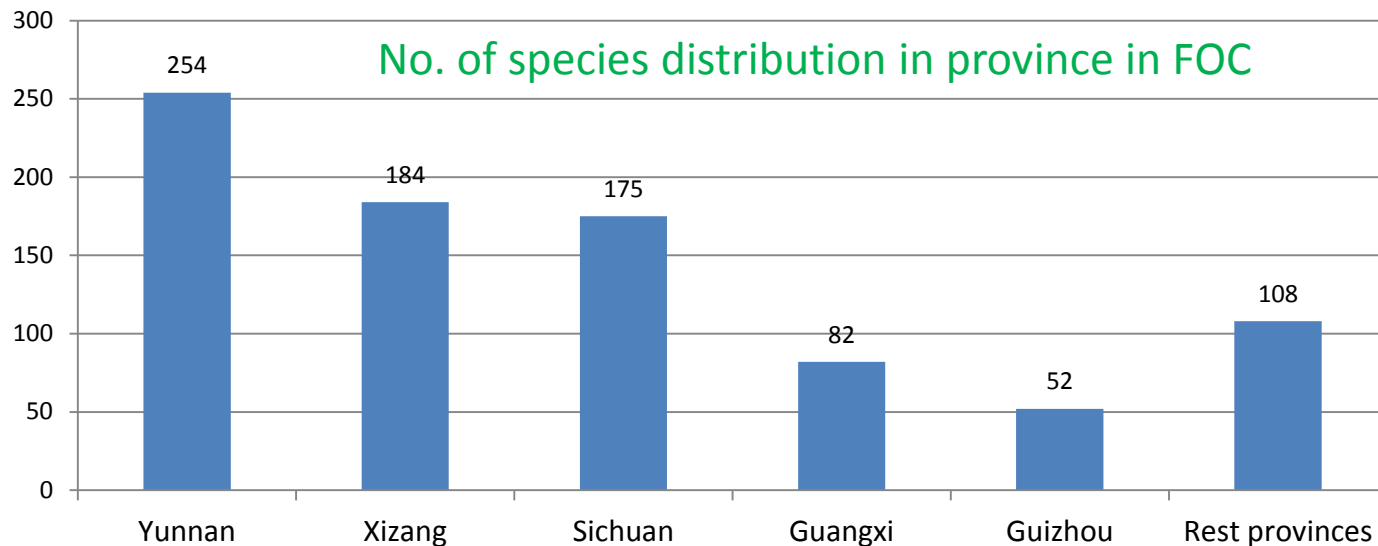
Outline

- Introduction of *Rhododendron* in China
- *Rhododendron* surveys in Southwest China
- Protective actions taken in China
- Chinese perspective of *Rhododendron* conservation



Rhododendron in China

- Around 1000 species of *Rhododendron* worldwide;
- 571 species in China (55.7% of total), of which 409 (71.6%) are endemic (FOC, 2005)



Rhododendron in China

- **Eighteen new species were described thereafter.**
- **Of the newly described species, 13 species belonging to subg. *Hymenanthus*, 2 species to subg. *Rhododendron* and 3 species to subg. *Tsutsusi* .**
- **11 of the newly described species (by Xiang Chen and others) are from Baili *Rhododendron* Nature Reserve of Northwest Guizhou.**
- **Total of 589 species in China to date.**





Rhododendron yaoshanense



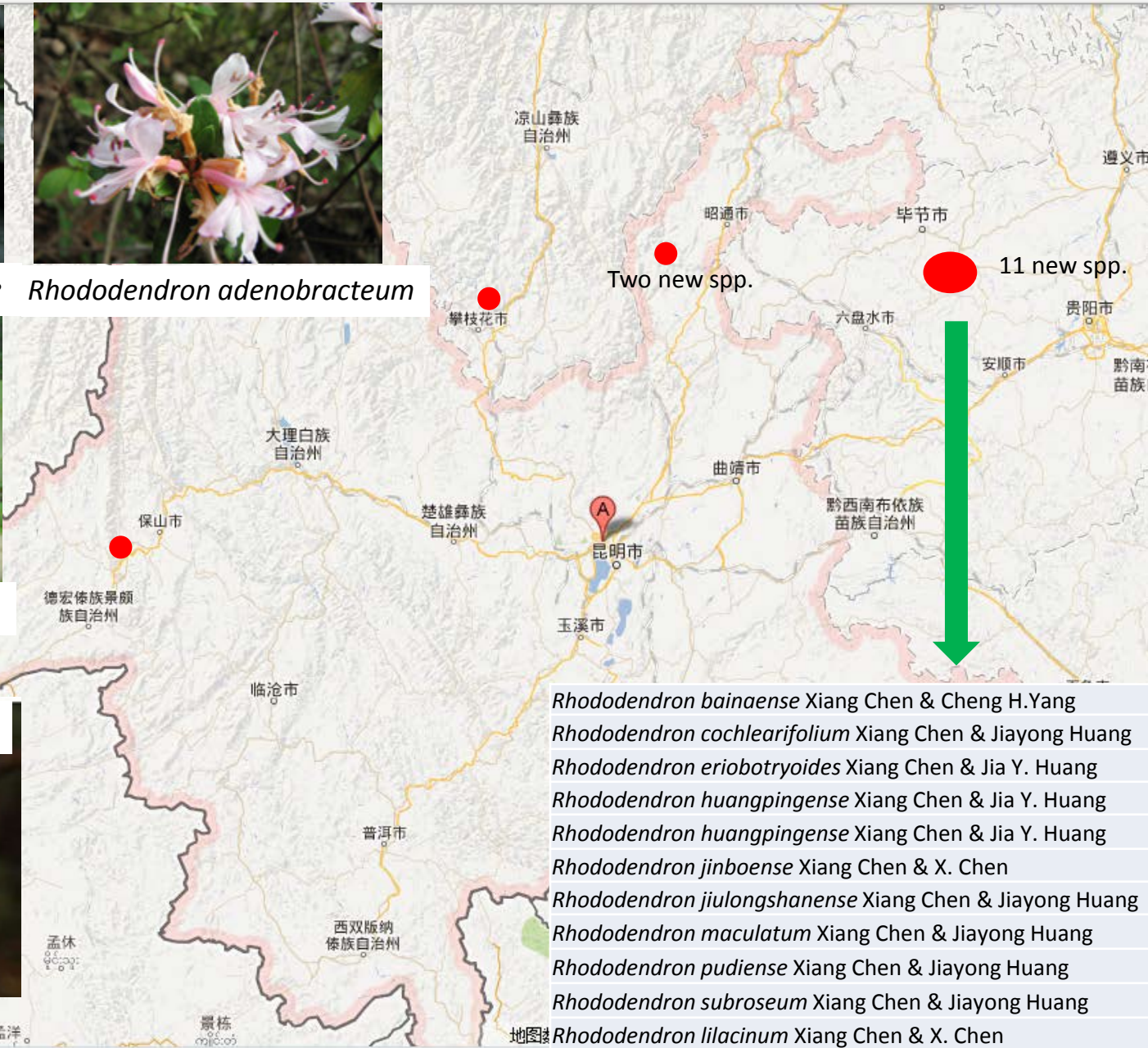
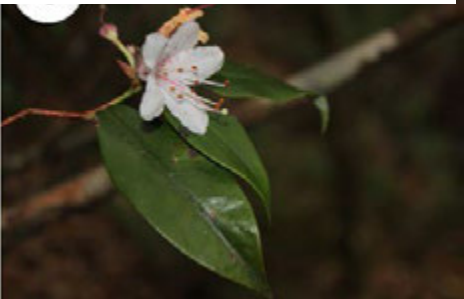
Rhododendron adenobracteum



Rhododendron qiaojaense

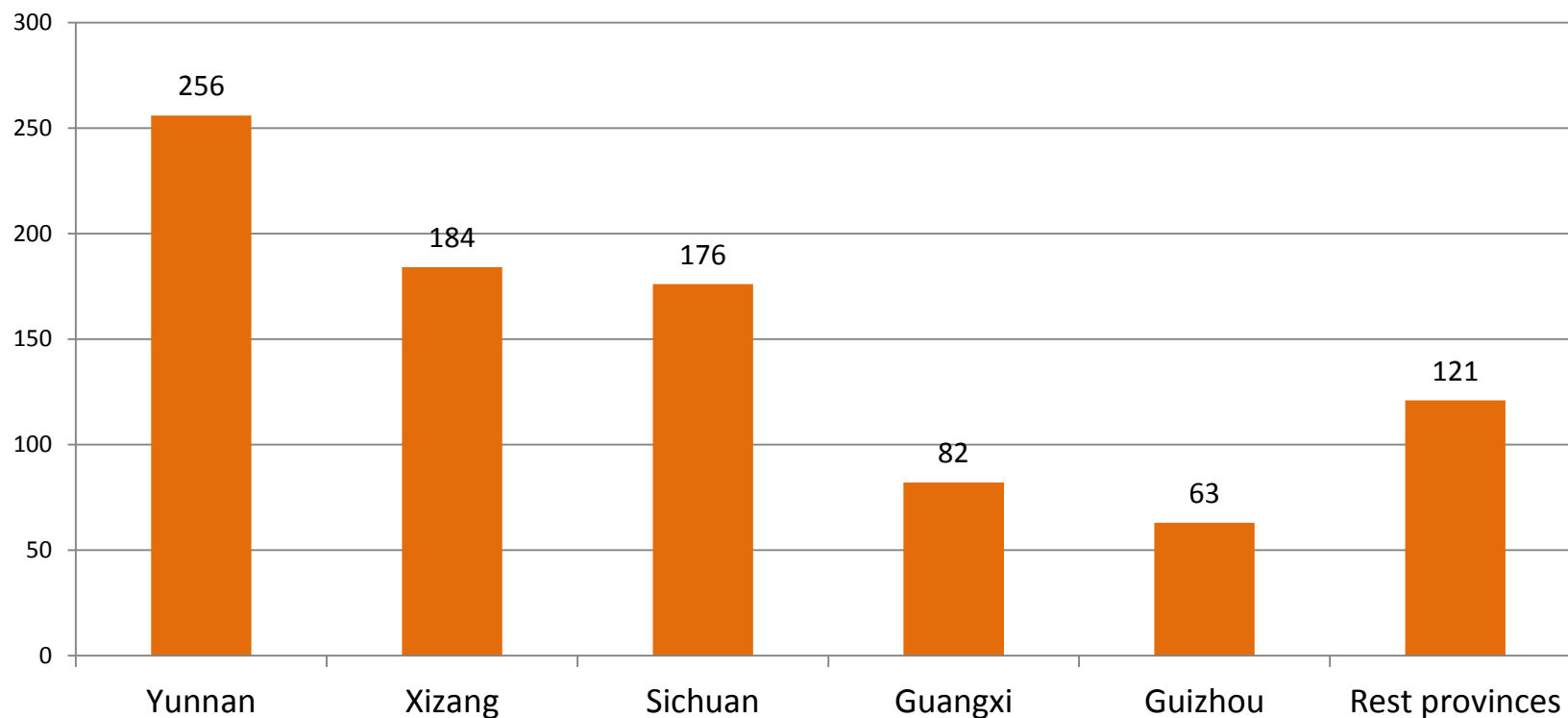


Rhododendron baihuaense



Subg. *Hymenanthes* 13 spp., subg. *Rhododendron* 2 spp., subg. *Tsutsusi* 3 spp.

No. of species distribution in China to date



- There are 468 species of *Rhododendron* occurring in five provinces in Southwest China, which is 79.5 % of total species in China.
- Yunnan has most species of *Rhododendron* with 43.5 % of total species in China.
- Sino-Himalayas is the diversification center of *Rhododendron* with 317 species (53.8%), of which 210 are endemic (35.6%).



Subgenus *Hymenanthus*

(section *Pontica*)

- Subsection 23/24
- 270 spp. in total
- 259 spp. in China
- 190 spp. endemic to China
- 179 spp. in Sino-Himalayas

Subgenus *Rhododendron*

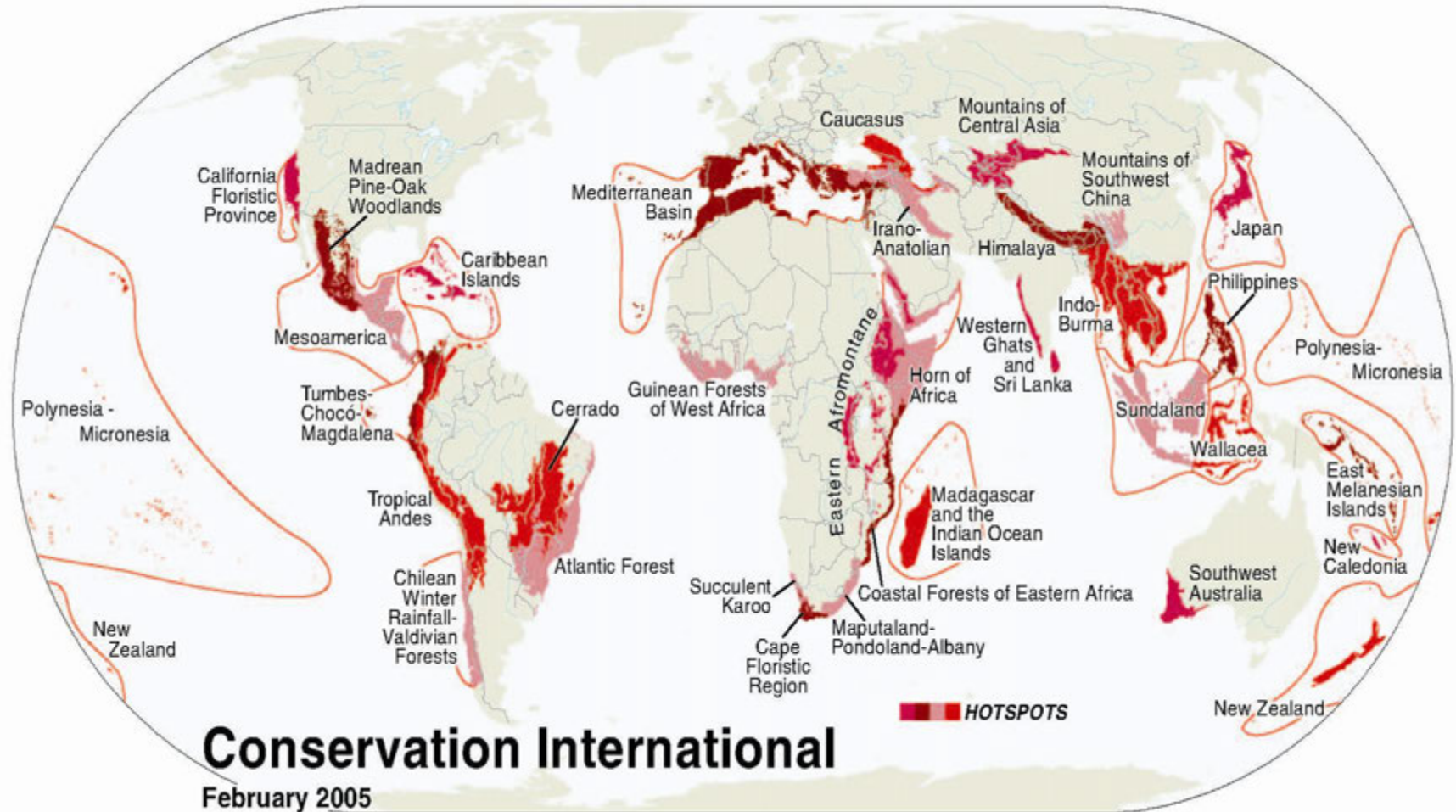
(section *Rhododendron*)

- Subsection 25/27
- 211 spp. in total
- 171 spp. in China
- 105 endemic to China
- 136 spp. in Sino-Himalayas

Rhododendron stewartianum Diels



The 34 global biodiversity hotspots



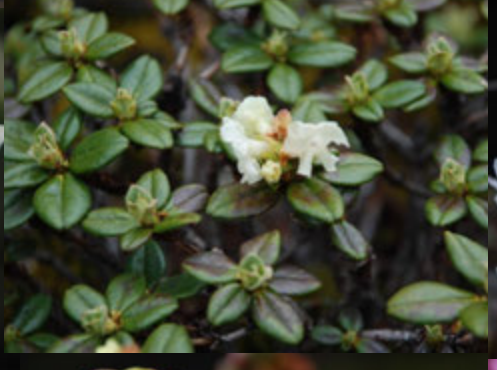
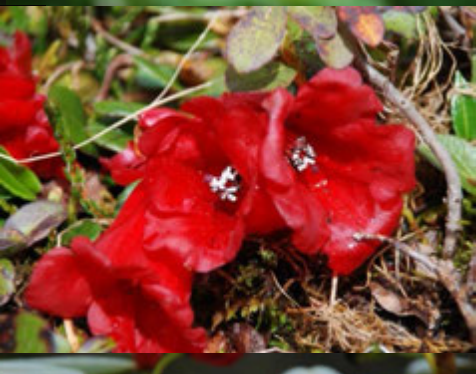
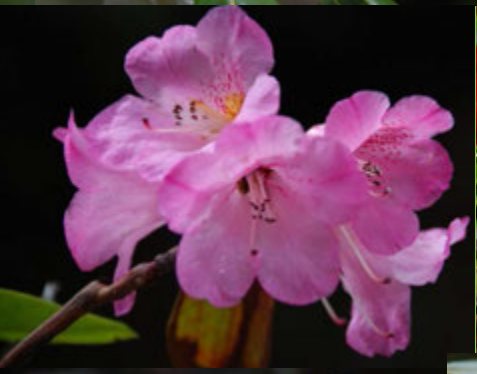


With dramatic variations in climate and topography, the Himalayas and mountains of Southwest China support a wide array of habitats, that is one of the distribution and diversification centers of *Rhododendron*. There are around 1500 higher plants distributed in these hotspots.





Songlinkou, Milin County, Tibet, Alt. 3750m



Why such a high diversity in this region?

- **Dramatic variations in climate and topography;**
- **Wide range of habitats and niches provided for an array of species;**
- **Thus, many congeneric species can grow sympatrically, and gene flow and introgression may happen frequently.**
- **Natural hybridization can take place easily due to the extraordinary weakness of species barriers within the genus.**



Rhododendron surveys in the last few years



Rhododendron surveys in Northwest China



99 dragon pool in Laojun Mt.



Daxueshan Mt., Shangri-La



Yilong, Tacheng, Lijiang



Habashan Mt., Shangri-La



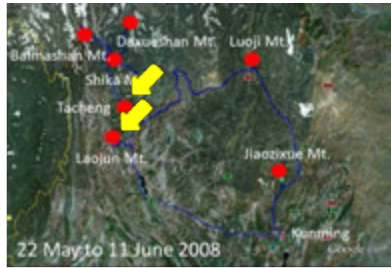
Shikashan Mt., Shangri-La



Luojishan Mt., Zhaojue, Sichuan



Rhododendron surveys in Northwest China



Rhododendron beesianum



R. fictolacteam



R. polycladum



R. selense subsp. *dasycladum*



R. rubiginosum



R. traillianum



R. complexum



R. nivale subsp. *boreale*



R. russatum



R. roxieanum var. *roxieanum*



R. roxieanum var. *oreonastes*



R. racemosum



R. selense subsp. *selense*



R. saluense var. *prostratum*



R. calostrotum var. *calciphilum*



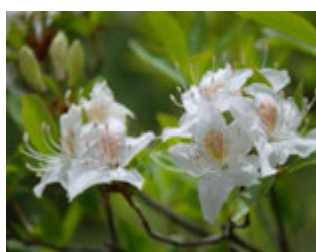
R. cuneatum



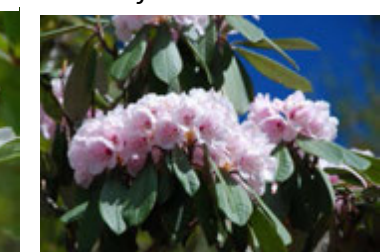
R. hippophaeoides



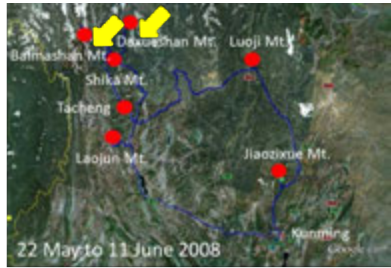
R. yunnanense



R. uvarifolium



Rhododendron surveys in Northwest China



R. tapetiforme



R. vernicosum



R. wardii



R. phaeochrysum



R. primuliflorum



R. callimorphum



R. rupicola var. *chryseum*



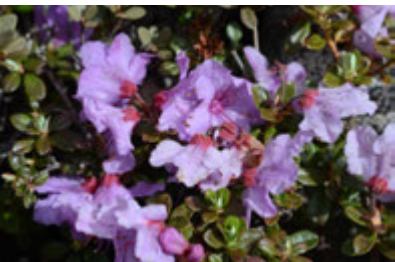
R. impeditum



R. aganniphum var. *aganniphum*



R. saluenense var. *prostratum*



R. yunningense



R. decorum



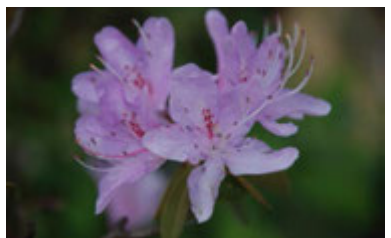
R. roxieanum



R. phaeochrysum var. *agglutinatum*



R. tatsienense



R. yunningense



R. intricatum



R. aganniphum



R. cephalanthum

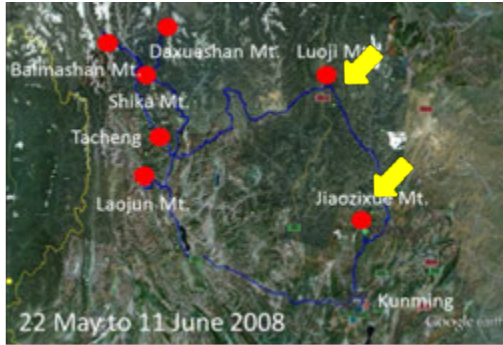


Rhododendron surveys in Northwest China

R. alutaecum



R. clementinae



R. traillianum



R. heliolepis



R. lacteum



R. bureavii



R. williamsianum



R. sikangense



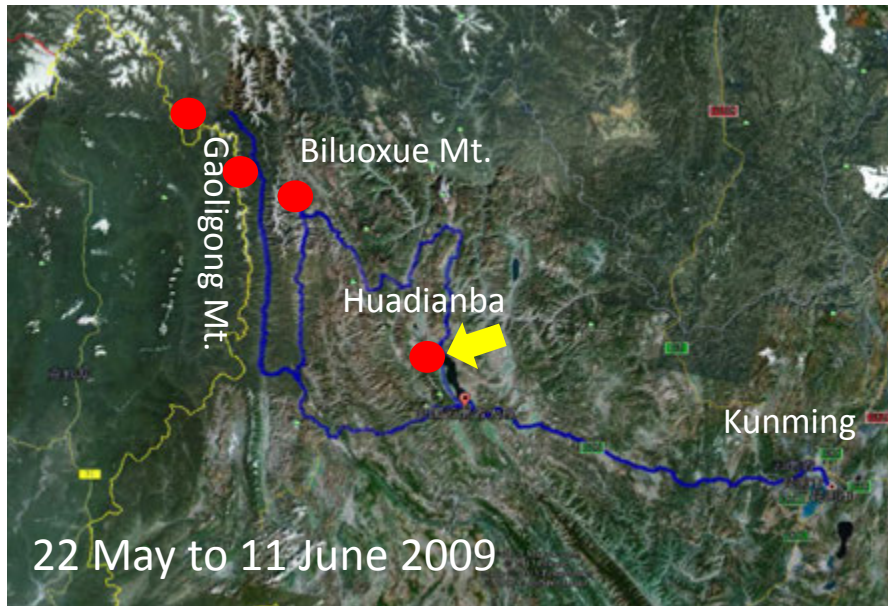
R. sphaeroblastum



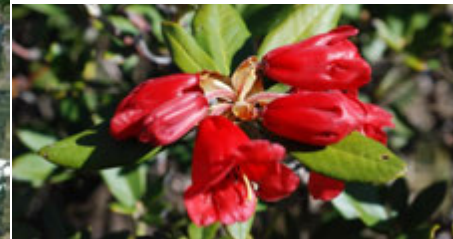
R. impeditum



Rhododendron surveys in West Yunnan



R. haematodes



R. yunnanense



R. delavayi

R. fastigiatum



R. decorum

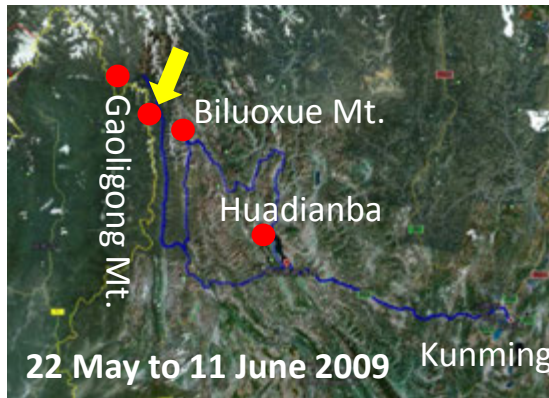
R. trichocladum



R. aperantum

R. virgatum

Rhododendron surveys in West Yunnan



Rhododendron arizelum



R. glischrum



R. campylocarpum



R. haematodes



R. sinonuttallii



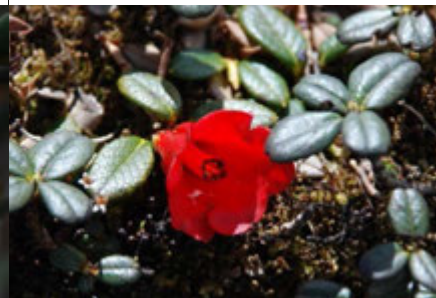
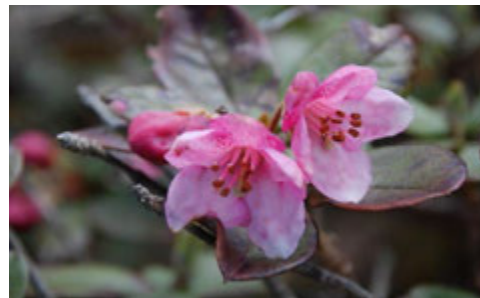
R. cephalanthum

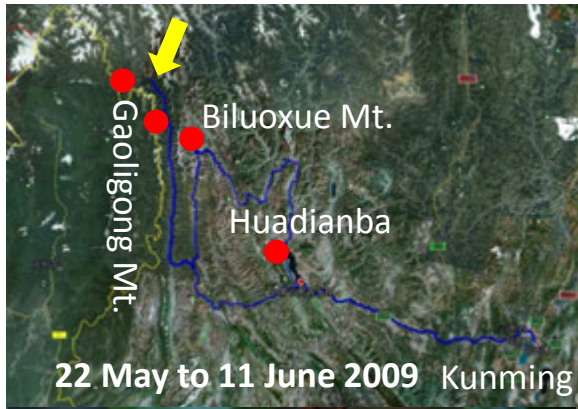
R. Charitopes

R. stewartianum

R. forrestii

R. oreotrepheis





R. aff. stewartianum



R. aff. oreotrepthes

R. selense



R. xanthostephanum

R. sanguineum var. *sanguineum*



R. citriniflorum var. *horaeum*

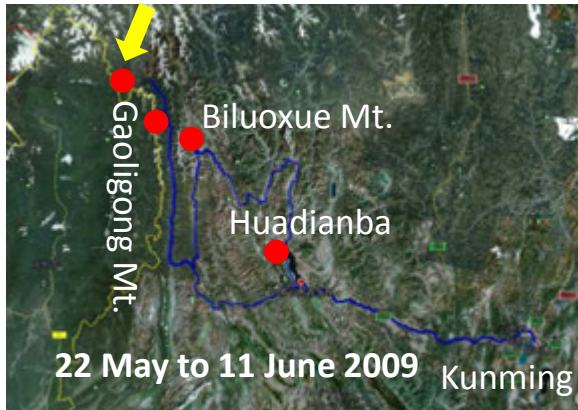


R. citriniflorum var. *horaeum*



R. citriniflorum var. *horaeum*





R. temenium



R. mekongense



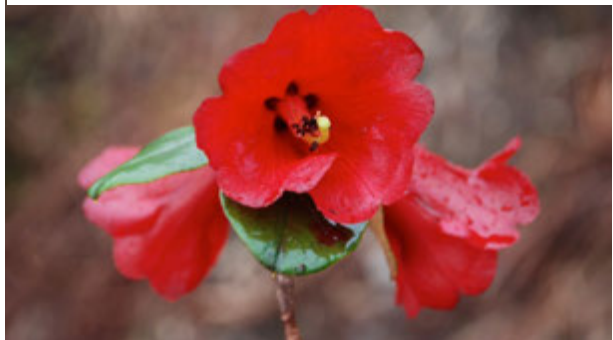
R. sanguineum var. *didymum*



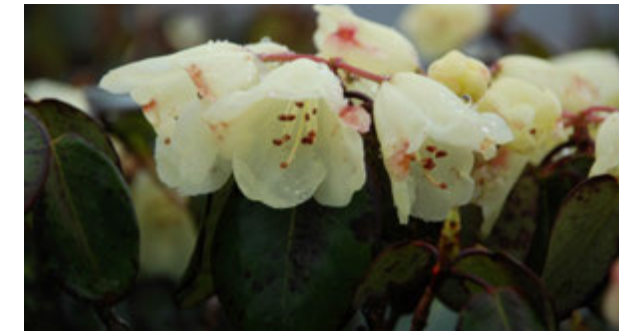
R. zaleucum var. *pubifolium*

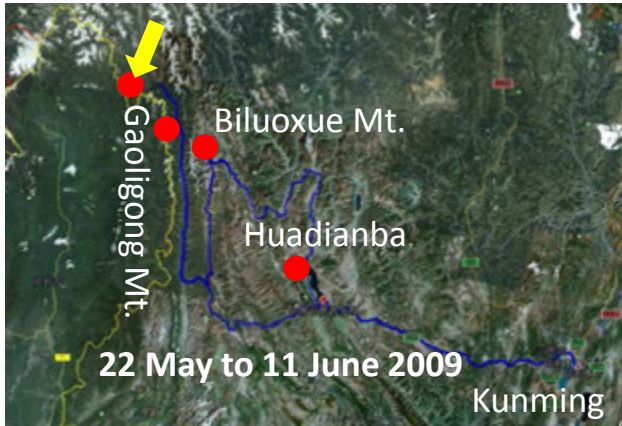


R. chaetomallum



R. campylocarpum subsp. *caloxanthum*





R. oreotrepes



R. floccigerum



R. sperabiloides



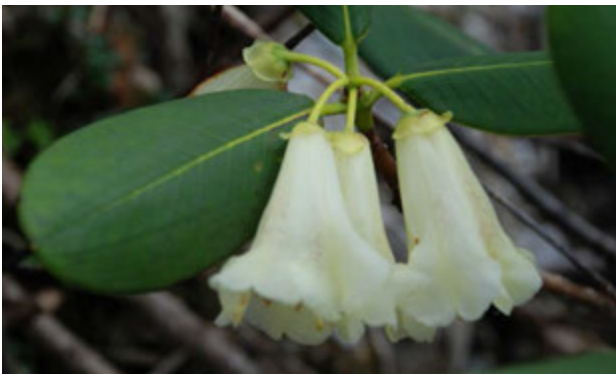
R. sanguineum var. *haemaleum*



R. sanguineum var. *sanguineum*



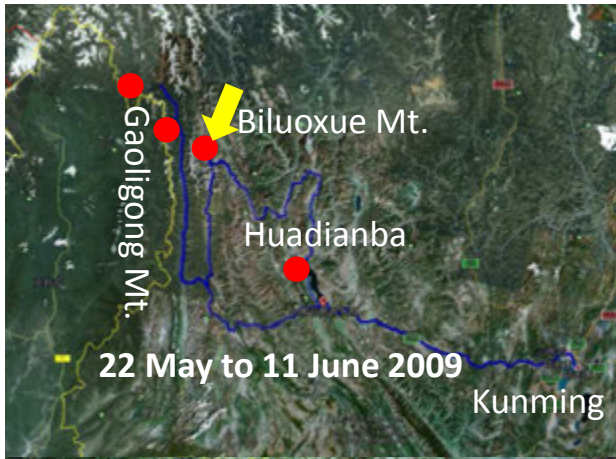
Rhododendron stewartianum



R. kasoense



R. cinnabarinum



R. leptothrium



Rhododendron aperantum



R. beesianum



R. calostrotum var. *caloxanthum*



R. campylocarpum subsp. *caloxanthum*



R. charitopes



Rhododendron surveys in NE Yunnan/NW Guizhou

R. concinnum



R. yunnanense



R. polylepis



R. davidsonianum



R. sphaeroblastum



R. lactum



R. bureavii



R. rex



R. stamineum



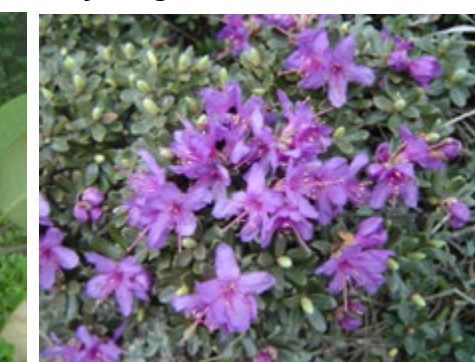
R. decorum



R. qiaojiaense



R. fastigiatum



Rhododendron surveys in central Yunnan

R. irroratum



R. decorum



R. agastrum



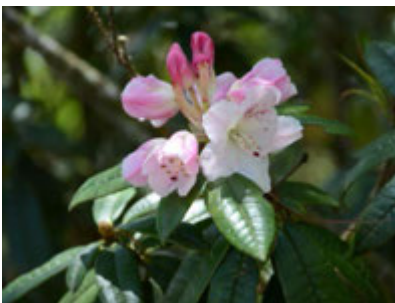
R. delavayi



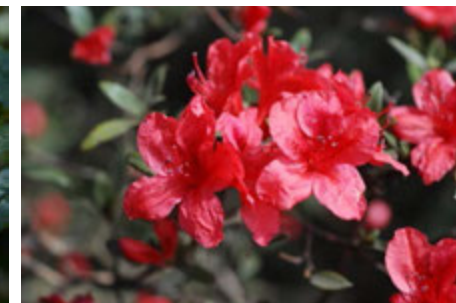
R. aberconwayi



R. mengtszense



R. simsii



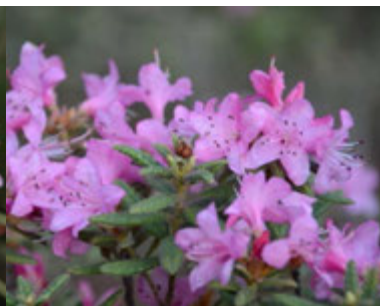
R. microphyton



R. fuyuanense



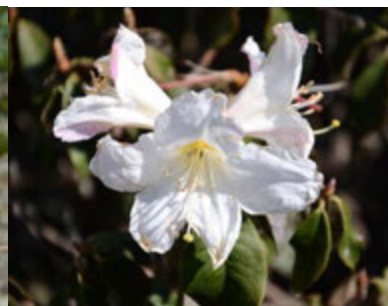
R. spiciferum



R. spinuliferum



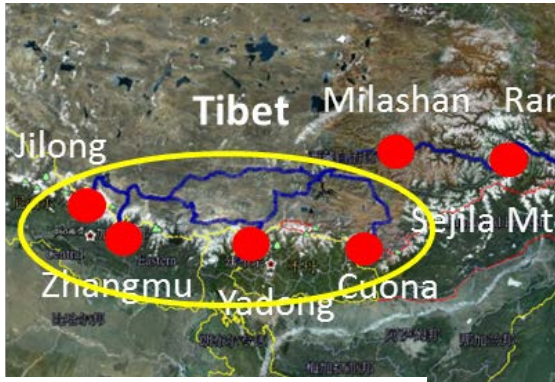
R. pachypodum



R. rigidum



Rhododendron surveys in South Tibet



R. campanulatum

R. hypenanthum



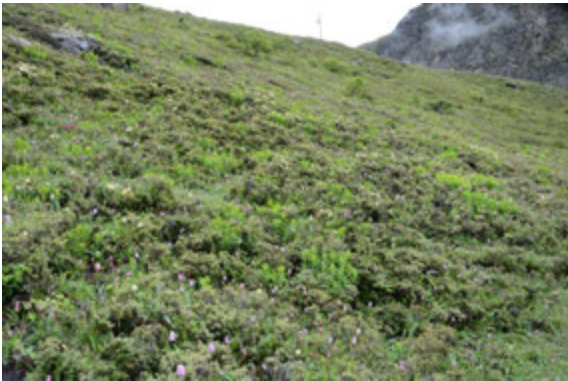
R. lepidotum

R. lepidotum

R. lepidotum



Rhododendron surveys in South Tibet



R. lepidotum

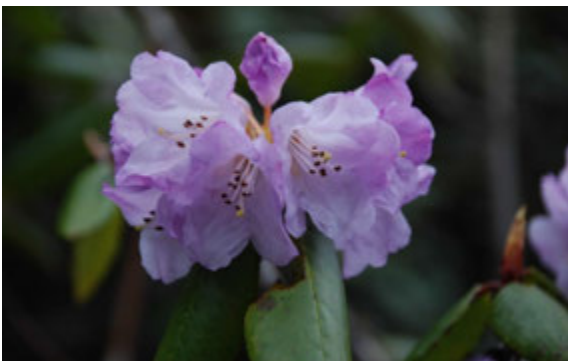
Nilamu



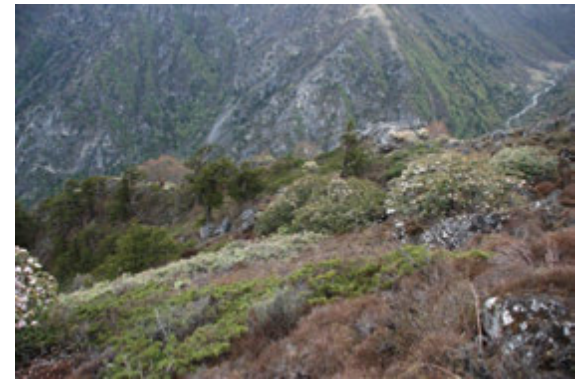
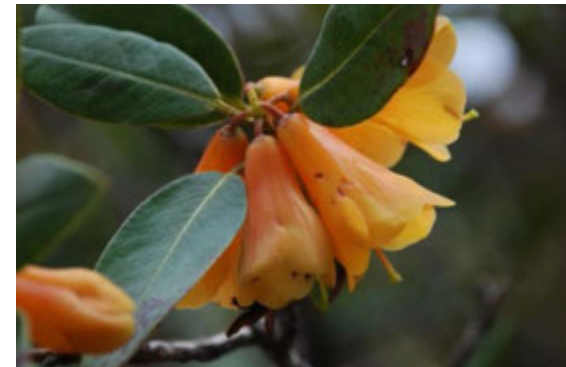
Yadong



R. campanulatum



R. xanthocodon



Rhododendron surveys in South Tibet

R. subsp. aeruginosum



R. wightii



R. wightii



R. wallichii



R. campylocarpum



R. arboreum



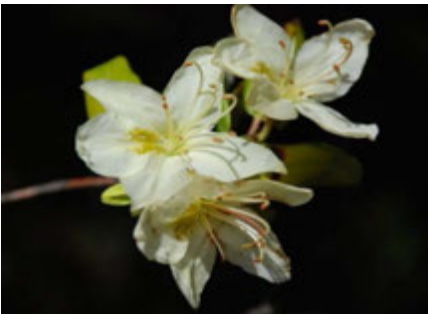
R. cinnabarinum



R. xanthocodon



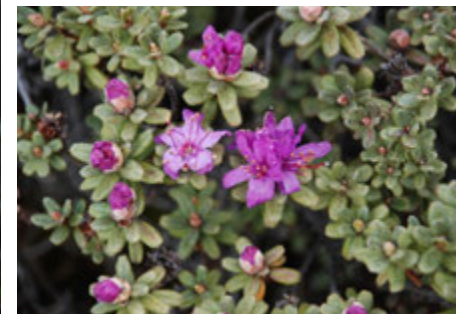
R. triflorum



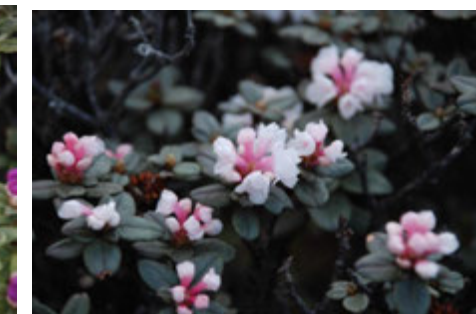
R. pendulum



R. fragariflorum



R. anthopogon



Yadong, Tibet

Rhododendron surveys in South Tibet



R. keysii



R. pruniflorum



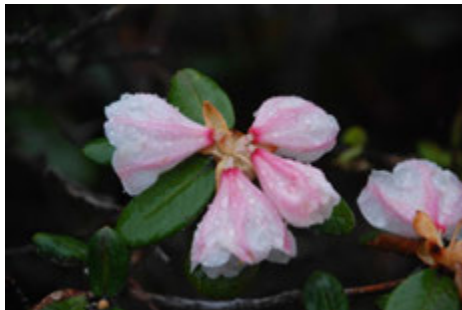
R. erythrocalyx



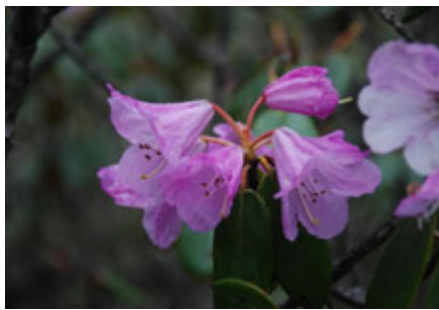
R. hodgsonii



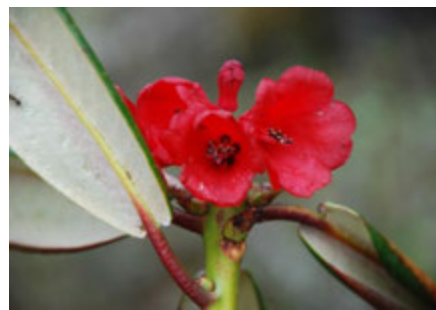
R. comisteum



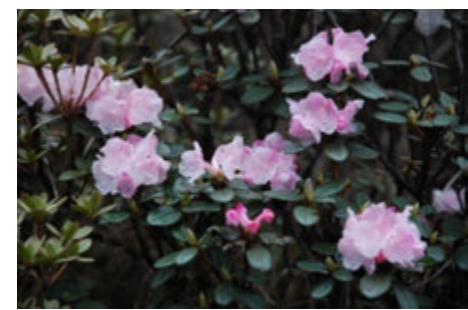
R. coryanum



R. fulgens

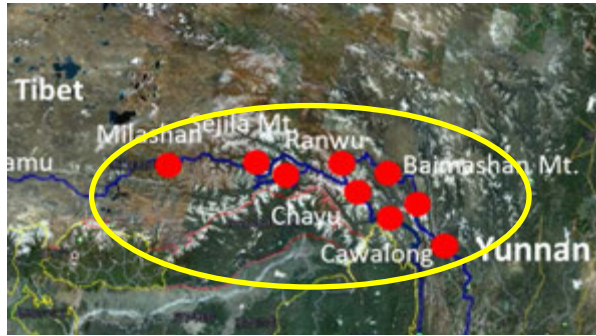


R. laudandum



Lebugou, Cunna, Tibet

Rhododendron surveys in Southeast Tibet



From 2008 to 2012, three times



Demulashan Mt. to Chayu
Sejilashan between Bomi and Linzhi



Galonglashan Mt. to Motuo



Mts. from Chayu to Gongshan



Duoxionglashan Mt. to Motuo



Milashan Mt. to Lasha



Rhododendron surveys in Southeast Tibet

R. montroseanum



R. ramsdenianum



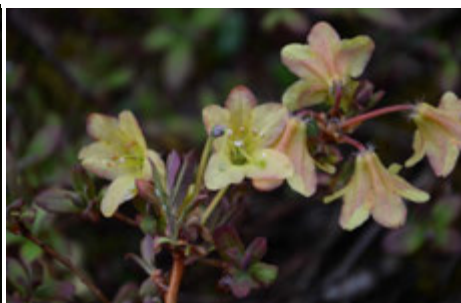
R. neriiflorum var. *phaedropum* *R. keysii*



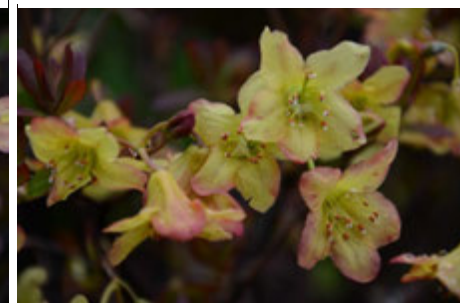
R. scopulorum



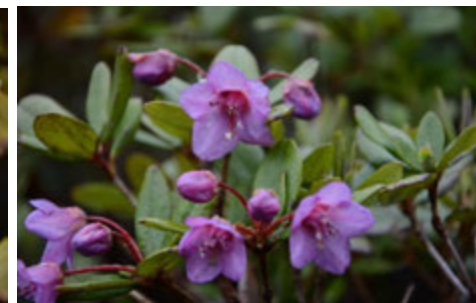
R. viridescens



R. mekongense



R. charitopes subsp. *tsangpoense*



R. calostrotum



R. campylogynum



R. nivale var. *nivale*



R. laudandum



Motou 80 KM to Galonglashan Mt. tunnel

Rhododendron surveys in Southeast Tibet

R. chamaethomsonii var. *chamaethauma* *R. chamaethomsonii*



R. aperanthum



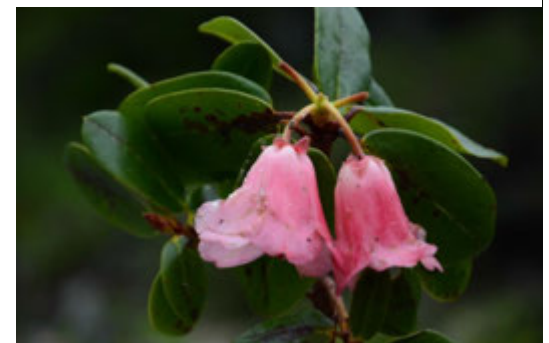
R. campylocarpum



R. pumilum



R. temenium



R. cinnabarinum



R. uvarifolium



Motou 80 KM to Galonglashan Mt. tunnel

Rhododendron surveys in Southeast Tibet

R. forrestii

4090m



R. chamaethomsonii 4085m



R. temenium

4085m



R. forrestii

4025m



R. chamaethomsonii 4000m



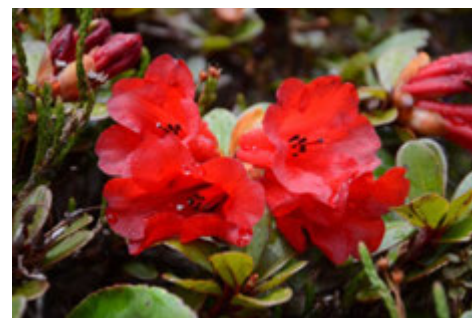
R. forrestii

3995m



R. forrestii

3970m



R. parmulatum

3990m

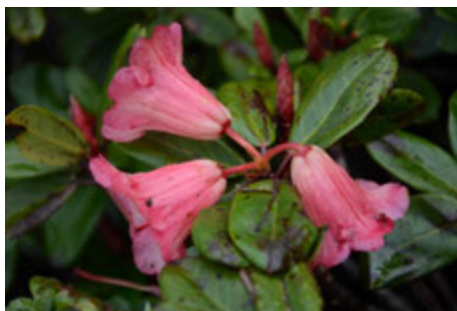


R. parmulatum

3940m



R. var. chamaethauma 3935m



R. chamaethomsonii 3932m

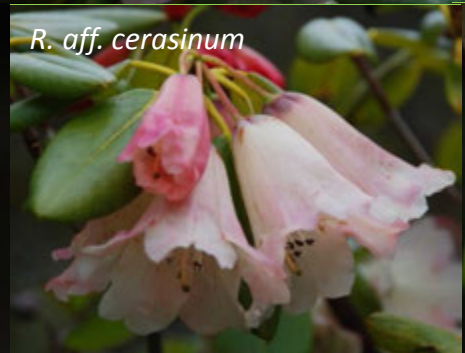


R. neriiflorum var. *phaedropum*



Duoxionglia Mt. (to be continued)

3750m

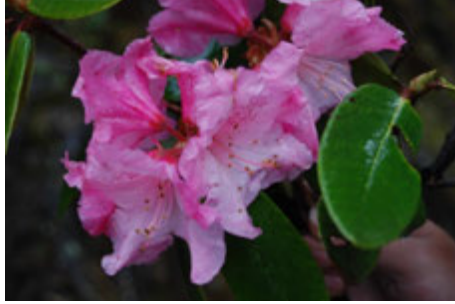


Rhododendron surveys in Southeast Tibet

R. wardii



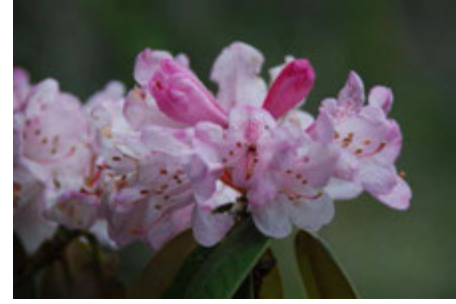
R. hirtipes



R. velleureum



R. phaeochrysum



R. triflorum



R. triflorum



R. uvarifolium



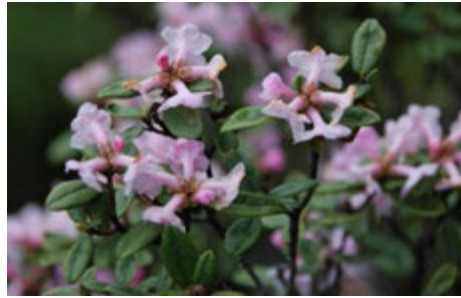
R. beesianum



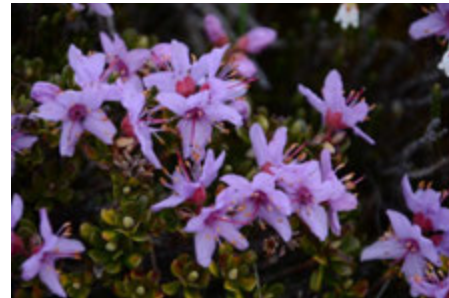
R. nivale



R. mainlingense



R. fragariflorum



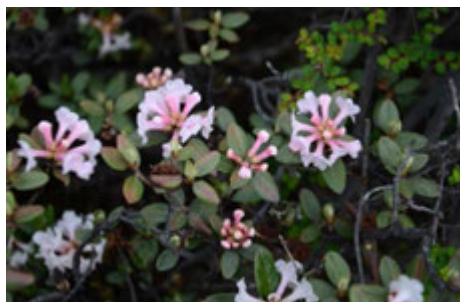
R. aganniphum



Sejilashan Mt.

Rhododendron surveys in Southeast Tibet

R. cephalanthum



R. nivale



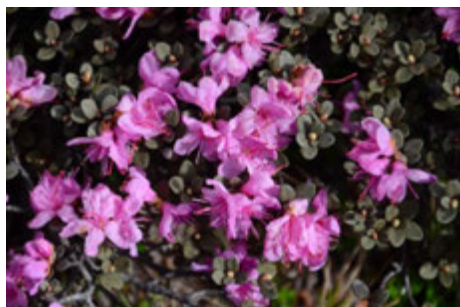
R. parmulatum



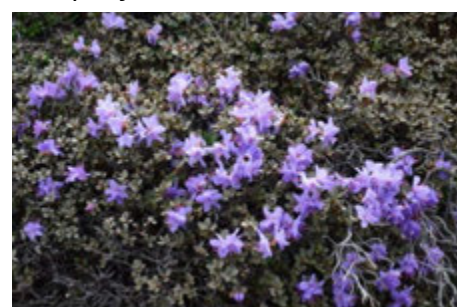
R. phaeochrysum



R. tapetiforme



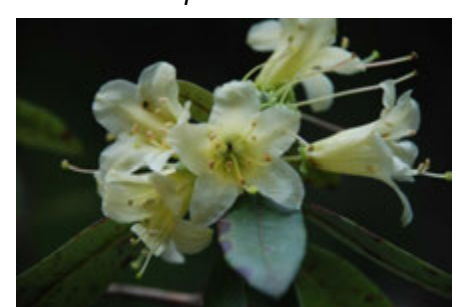
R. tapetiforme



R. virgatum



R. xanthostephanum



R. floccigerum



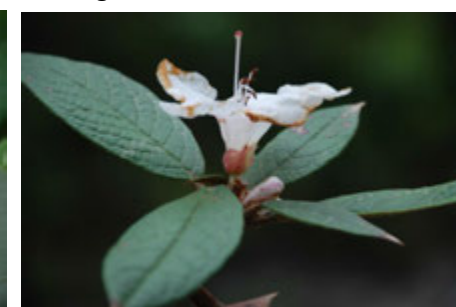
R. maddenii subsp. *crassum*



R. hylaeum



R. edgeworthii



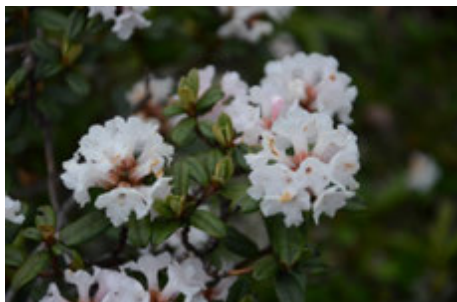
Demulashan Mt. and Chayu

Rhododendron surveys in Southeast Tibet

R. rupicola



R. kongboense



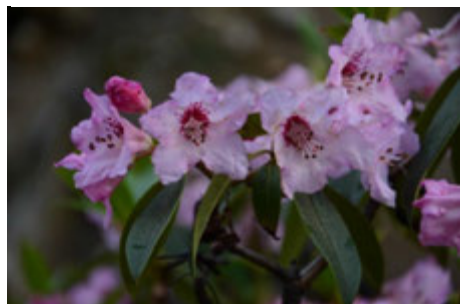
R. rupicola var. *chryseum*



R. wardii



R. heliolepis



R. lepidotum



R. wardii



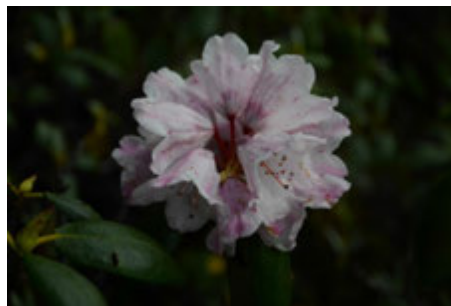
R. vernicosum



R. wardii



R. phaeochrysum var. *agglutinatum*



Chawalong nearby



From Chayu to Chawalong

Samples collected in the last few years

- Around 800 accessions of 200 *Rhododendron* species collected in China.
- Including vouchers, DNA materials and images.
- And detailed information of collection data

	<i>Hymenanthes</i>	<i>Rhododendron</i>	<i>Azaleastrum</i>	<i>Tsutsusi</i>	<i>Pentanthera</i>	<i>Candidastrum</i>	<i>Mumeazalea</i>	<i>Therorhodium</i>
subgenus	100%	100%	100%	100%	100%	100%	100%	100%
section	100% (1)	100% (3)	100% (2)	100% (2)	100% (4)	100% (1)	100% (1)	100% (1)
subsection	20/24	21/28,2/7						



Subg. <i>Hymenanthes</i>				
Subsection	Total species	Species in China	Sampled species	Individual
Arborea	4	4	2	13
Argyrophylla	21	21	4	4
Auriculata	2	2	1	1
Barbata	5	4	1	1
Campanulata	4	4	1	2
Campylocarpa	6	6	2	12
Falconera	11	10	5	10
Fortunea	31	31	7	25
Fulva	2	2	2	7
Fulgensia	3	3	1	1
Glischra	6	6	1	2
Grandia	12	10	3	8
Greirsoniana	1	1	0	0
Irrorata	24	21	10	26
Lanata	4	4	0	0
Maculifera	13	13	3	4
Nerriflora	27	27	14	37
Parishia	8	7	1	1
Pontica	12	2	1	1
Selensia	9	9	2	6
Taliensia	56	56	19	54
Thomsonia	15	15	2	7
Venatora	1	0	0	0
Williamsiana	2	2	1	1
Total	279	260	83	223

Subg. <i>Rhododendron</i>				
Subsection	Total species	Species in China	Sampled species	Individual
Afghanica	1	0	0	0
Baileya	1	1	1	1
Boothia	7	7	1	1
Camelliiflora	1	1	0	0
Campylogyna	1	1	1	1
Carolinana	1	0	0	0
Cinnabarina	8	6	3	8
Edgeworthia	3	3	3	14
Fragariflora	1	1	1	4
Genestieriana	1	1	1	2
Glauca	6	5	3	5
Heliolepidia	5	5	2	22
Lapponica	40	40	17	65
Ledum	6	1	2	3
Lepidota	3	1	1	17
Maddenia	45	34	11	22
Micrantha	3	3	1	1
Monantha	4	3	2	4
Moupinensia	3	3	0	0
Rhododendron	3	0	1	1
Rhodorastra	2	2	2	2
Saluenensia	4	4	4	11
Scabrifolia	9	9	5	24
Tephropepla	6	6	2	7
Trichoclada	6	6	2	8
Triflora	25	24	8	47
Uniflora	4	4	2	4
Virgata	1	1	1	4
Total	200	172	77	278

Classification followed Chamberlain et al. 1996

Protective actions on *Rhododendron* taken in China

- An online flora of all known plants (including *Rhododendron*) in China based on the Flora Reipublicae Popularis Sinicae.
- Assessments of the conservation status of all *Rhododendron* species in China has been done.
- Some associated studies have been undertaken.



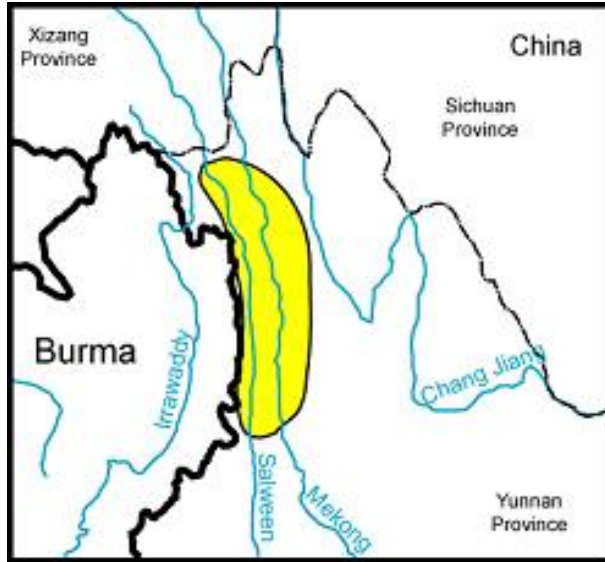
R. protistum var. *giganteum* (大树杜鹃)

Red list category: CR

- In 1919 firstly found in Tengchong, Yunnan; Gaoligong Mountains, alt. 2100-2400m .
- In 1981, re-discovered in this area.
- Number of living trees less than 100 in the wild.
- Biggest tree of *Rhododendron* known in the world.
- Research on conservation has been carried out.



Gaoligong Mt.



Location: West Yunnan
Biodiversity hotspot

Flora: Family, 201; Genus, 1103; Species, 4187

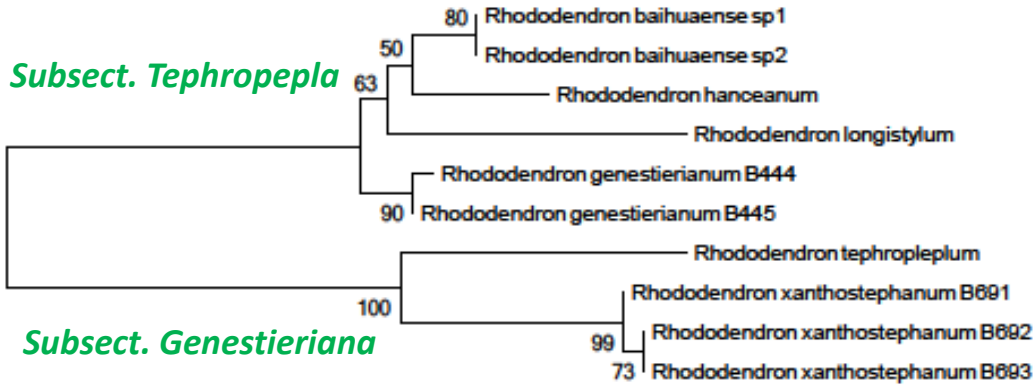
Elevation range: 730-5128 m

Area: 111, 000 km²

Li *et al.*. 2000. Flora of Gaoligong Mountains; Wang *et al.*. 2004. Biodiversity Science. 12: 82-88



A new species of *Rhododendron* (Ericaceae) from the Gaoligong Mountains, Yunnan, China



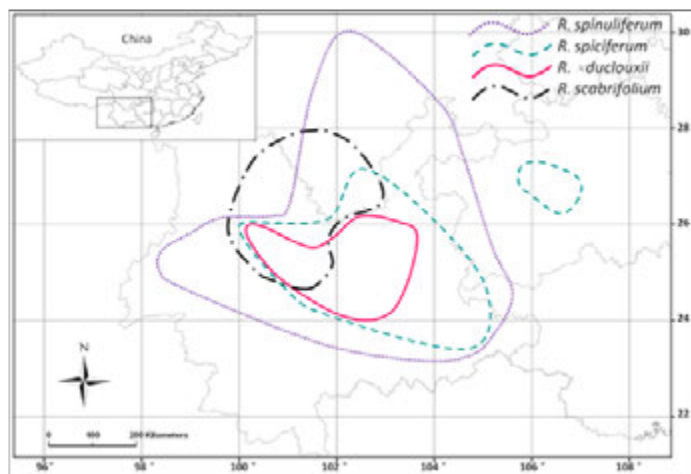
Rhododendron baihuaense Y. P. Ma (百花杜鹃)

NJ tree based on the combination of the four DNA barcodes

DNA barcodes: *rbcL*, *matK*, *trnH-psbA* and ITS

	trnH-psbA																ITS													
Position	4	5	5	5	8	0	0	0	0	0	0	0	1	2	3	8	9	1	4	5	8	0	2	1	1	2	4	4	5	5
Species	9	0	1	8	3	2	3	4	5	6	7	8	3	5	5	1	8	0	0	3	2	1	0	9	4	8	3	4	1	2
<i>R. baihuaense</i> sp1	A	T	A	T	A	A	A	A	C	A	A	-	A	T	C	C	A	A	A	-	A	G	T	C	A	C	C	T	T	G
<i>R. baihuaense</i> sp2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
<i>R. genestierianum</i> B444	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	-	.	.	.	.	.	.	T	C	C	.
<i>R. genestierianum</i> B445	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C	-	.	.	.	.	.	.	Y	C	C	.
<i>R. hanceanum</i>	.	.	.	.	T	-	-	-	.	.	.	.	.	.	.	.	.	.	.	A	.	.	.	.	.	.	.	C	.	A
<i>R. longistylum</i>	.	.	C	.	.	.	.	.	A	.	.	A	.	.	A	.	.	.	C	-	.	.	G	.	.	T	.	C	.	A
<i>R. tephropleplum</i>	.	G	.	G	.	-	-	-	-	-	-	T	.	C	.	T	T	-	C	-	C	T	.	T	.	.	.	C	.	A
<i>R. xanthostephanum</i> B691	G	G	.	.	.	A	-	-	-	-	T	T	C	C	.	T	T	-	C	-	C	T	.	.	R	.	.	C	C	.
<i>R. xanthostephanum</i> B692	G	G	.	.	.	A	-	-	-	-	T	T	C	C	.	T	T	-	C	-	C	T	.	.	G	.	.	C	C	.
<i>R. xanthostephanum</i> B693	G	G	.	.	.	A	-	-	-	-	T	T	C	C	.	T	T	-	C	-	C	T	.	.	G	.	.	C	C	.

Natural hybridization of *Rhododendron*



Taxon ^o	Corolla color ^o	Corolla shape ^o	Corolla lobes position ^o	Ventral leaf surface indumentum
<i>R. spiciferum</i> ^o	Pink or rarely white ^o	Funnelform ^o	Below the middle ^o	Dense ^o
<i>R. ×duclouxii</i> ^o	Peach or rosy red ^o	Tubular-campanulate	Above the middle ^o	Slightly sparse ^o
<i>R. spinuliferum</i> ^o	Bright or orange red ^o	Tubular ^o	Near the top ^o	Sparse ^o
<i>R. scabrifolium</i> ^o	White or pale pink ^o	Broadly funnelform ^o	Below the middle ^o	Dense ^o

Type ^o	Sample ID ^o	Taxon ^o	ITS variable sites ^o						
			149 ^o	232 ^o	459 ^o	514 ^o	519 ^o	528 ^o	542 ^o
SC I ^o	G64, 622, 199, 620, G61-clone3, G61-clone5, G61-clone6 ^o	<i>R. spiciferum</i> ^o	C ^o	T ^o	A ^o	A ^o	G ^o	C ^o	G ^o
SC II ^o	191, 446, 618, 440, 634 ^o	<i>R. spiciferum</i> ^o	A/C ^o	T ^o	A ^o	A ^o	G ^o	C ^o	G ^o
DC I ^o	210, 551 ^o	<i>R. ×duclouxii</i> ^o	A/C ^o	T ^o	A ^o	A ^o	G ^o	C/T ^o	G/A ^o
DC II ^o	5, 67, 545, 628 ^o	<i>R. ×duclouxii</i> ^o	A/C ^o	T ^o	A/T ^o	A/G ^o	G ^o	C/T ^o	G/A ^o
DC III ^o	41, 56, 432, 437, G61 ^o	<i>R. ×duclouxii</i> ^o	C ^o	T ^o	A/T ^o	A/G ^o	G ^o	C/T ^o	G/A ^o
DC IV ^o	221, 414, 630, 631, 636 ^o	<i>R. ×duclouxii</i> ^o	C ^o	T ^o	A/T ^o	A/G ^o	G ^o	T ^o	A ^o
SN ^o	33, 59, 183, 188, 424, 442, 560, 629, 632, G61-clone1, G61-clone2, G61-clone4 ^o	<i>R. spinuliferum</i> ^o	C ^o	T ^o	T ^o	G ^o	G ^o	T ^o	A ^o
SN ^o	726 ^o	<i>R. scabrifolium</i> ^o	C ^o	T ^o	T ^o	G ^o	G ^o	T ^o	A ^o
RA ^o	G13 ^o	<i>R. racemosum</i> ^o	C ^o	T ^o	A ^o	A ^o	G ^o	T ^o	A ^o
MO ^o	3334 ^o	<i>R. mollicomum</i> ^o	C ^o	C ^o	A ^o	A ^o	A ^o	T ^o	A ^o

Taxon ^o	Sample ID ^o	trnL-F variable sites ^o						
		110-111 ^o	267 ^o	286 ^o	735 ^o	787 ^o	806 ^o	844 ^o
<i>R. spiciferum</i> ^o	191, 199, 440, 446, 618, 620, 622, 634, G64 ^o	AA ^o	G ^o	A ^o	A ^o	A ^o	T ^o	G ^o
<i>R. ×duclouxii</i> ^o	5, 41, 67, 414, 628, 631, G61 ^o	AA ^o	G ^o	A ^o	A ^o	A ^o	T ^o	G ^o
<i>R. ×duclouxii</i> ^o	56, 210, 221, 432, 437, 545, 551, 630, 636 ^o	-- ^o	G ^o	C ^o	A ^o	A ^o	T ^o	G ^o
<i>R. spinuliferum</i> ^o	33, 59, 183, 188, 424, 442, 560, 629, 632 ^o	-- ^o	G ^o	C ^o	A ^o	A ^o	T ^o	G ^o
<i>R. scabrifolium</i> ^o	726 ^o	-- ^o	G ^o	C ^o	A ^o	A ^o	T ^o	G ^o
<i>R. racemosum</i> ^o	G13 ^o	AA ^o	T ^o	C ^o	C ^o	C ^o	G ^o	T ^o
<i>R. mollicomum</i> ^o	3334 ^o	AA ^o	G ^o	C ^o	C ^o	C ^o	G ^o	T ^o





Rh. delavayi



Rh. irroratum



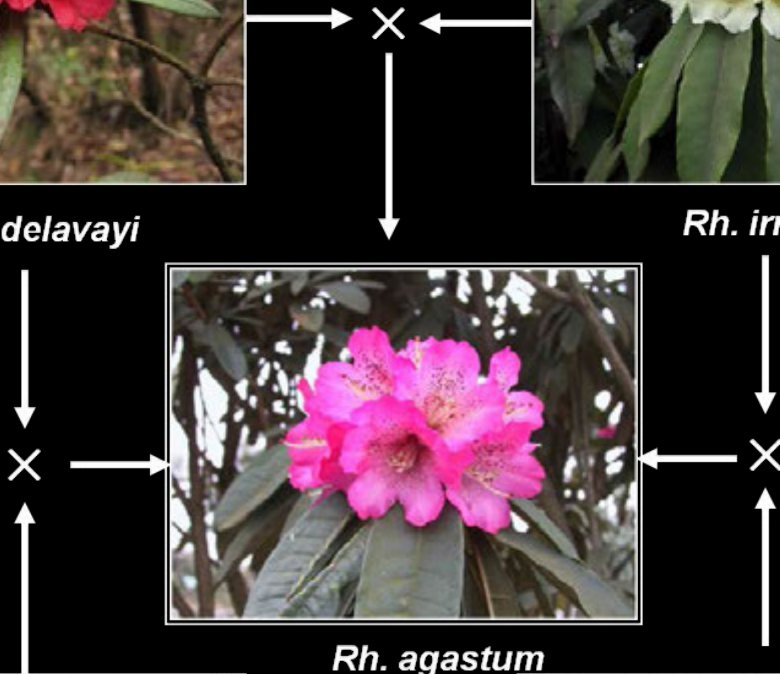
Rh. agastum



Rh. decorum



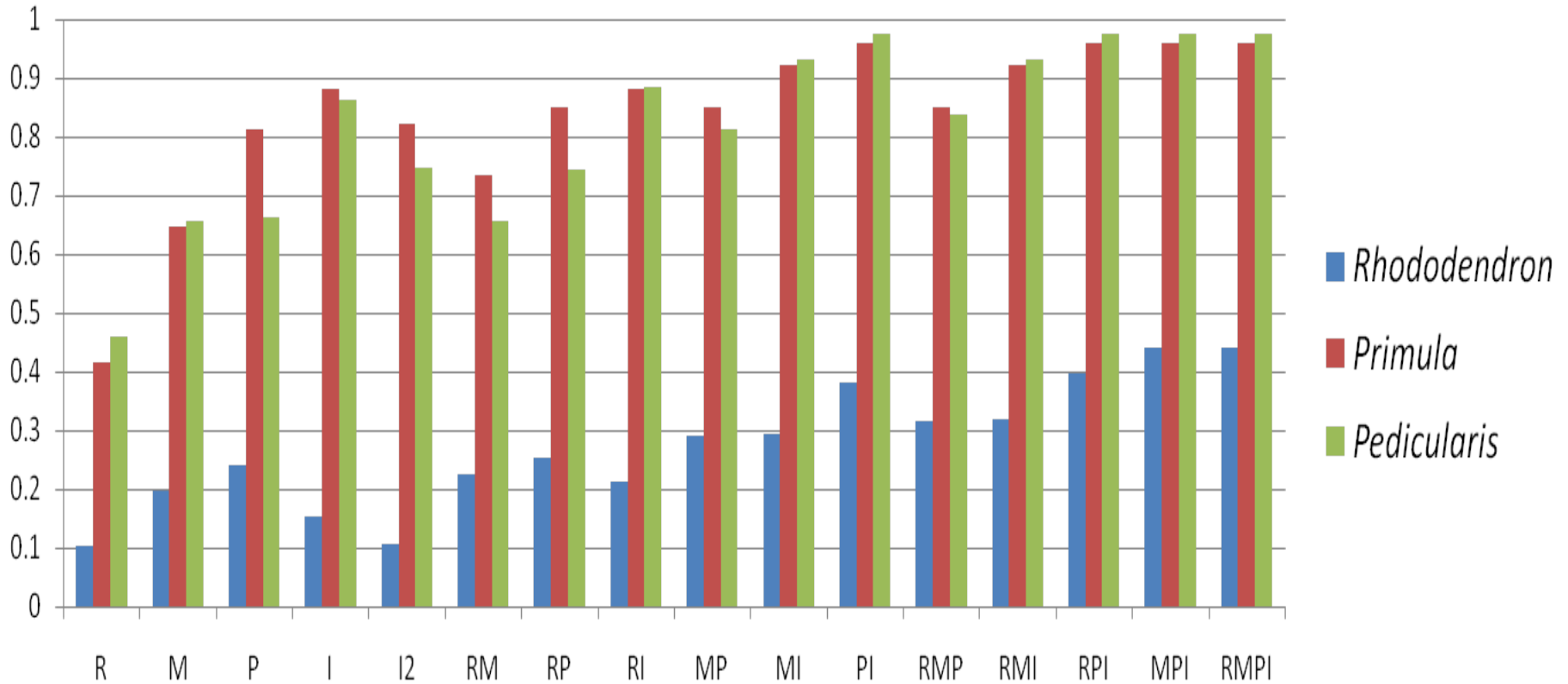
Rh. delavayi



- ✓ *R. agastum* includes populations of hybrids between *R. delavayi* and *R. irroratum* (or *R. decorum*), which are comprised mostly or only of F₁ plants in the wild.
- ✓ Asymmetrical hybridization is found between the two parents. *R. delavayi* is the maternal parent.
- ✓ Anthropogenic disturbances may have increased the chances of hybridization .

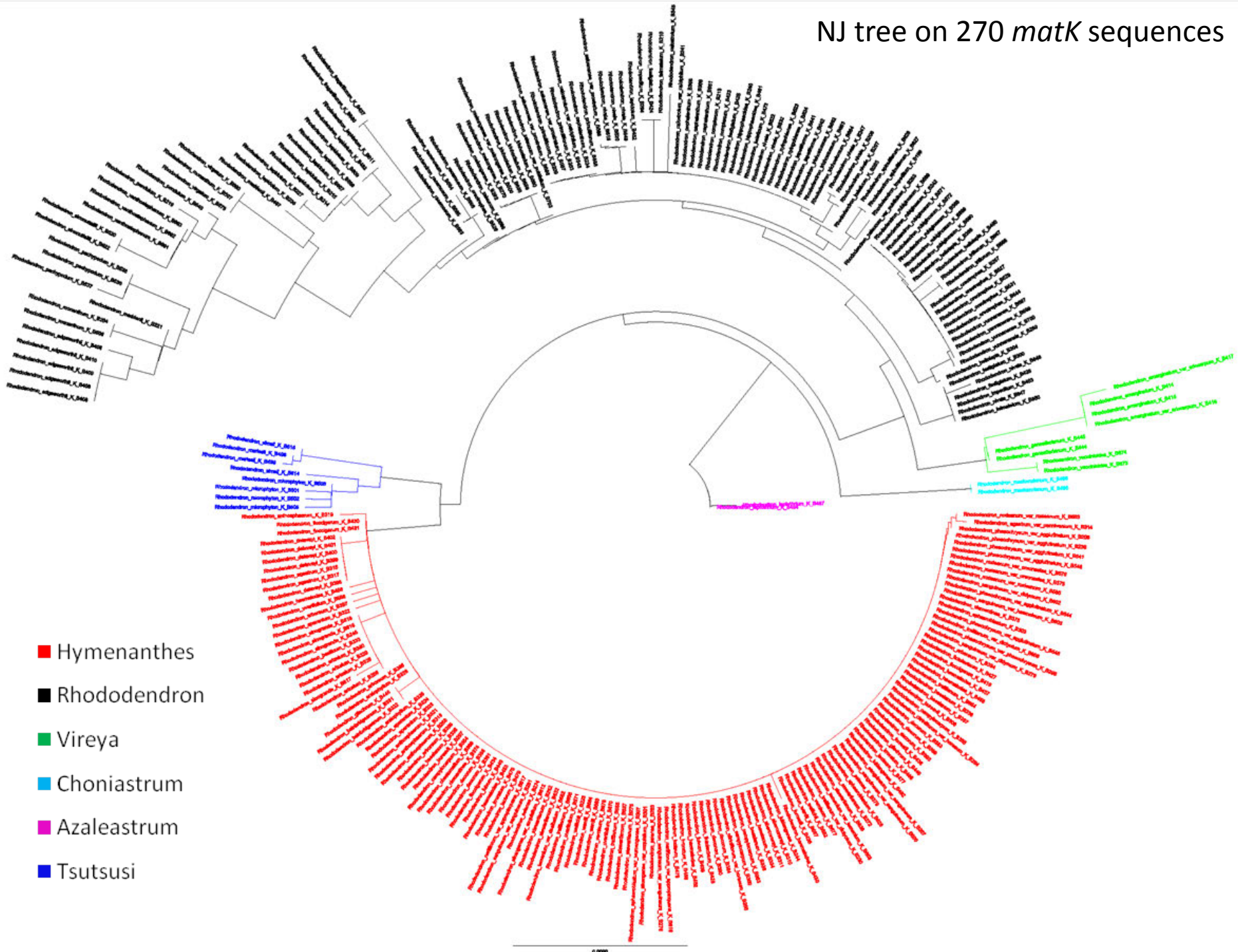
Molecular phylogeny and DNA barcoding of *Rhododendron*

88 species, 309 individuals of *Rhododendron* sampled



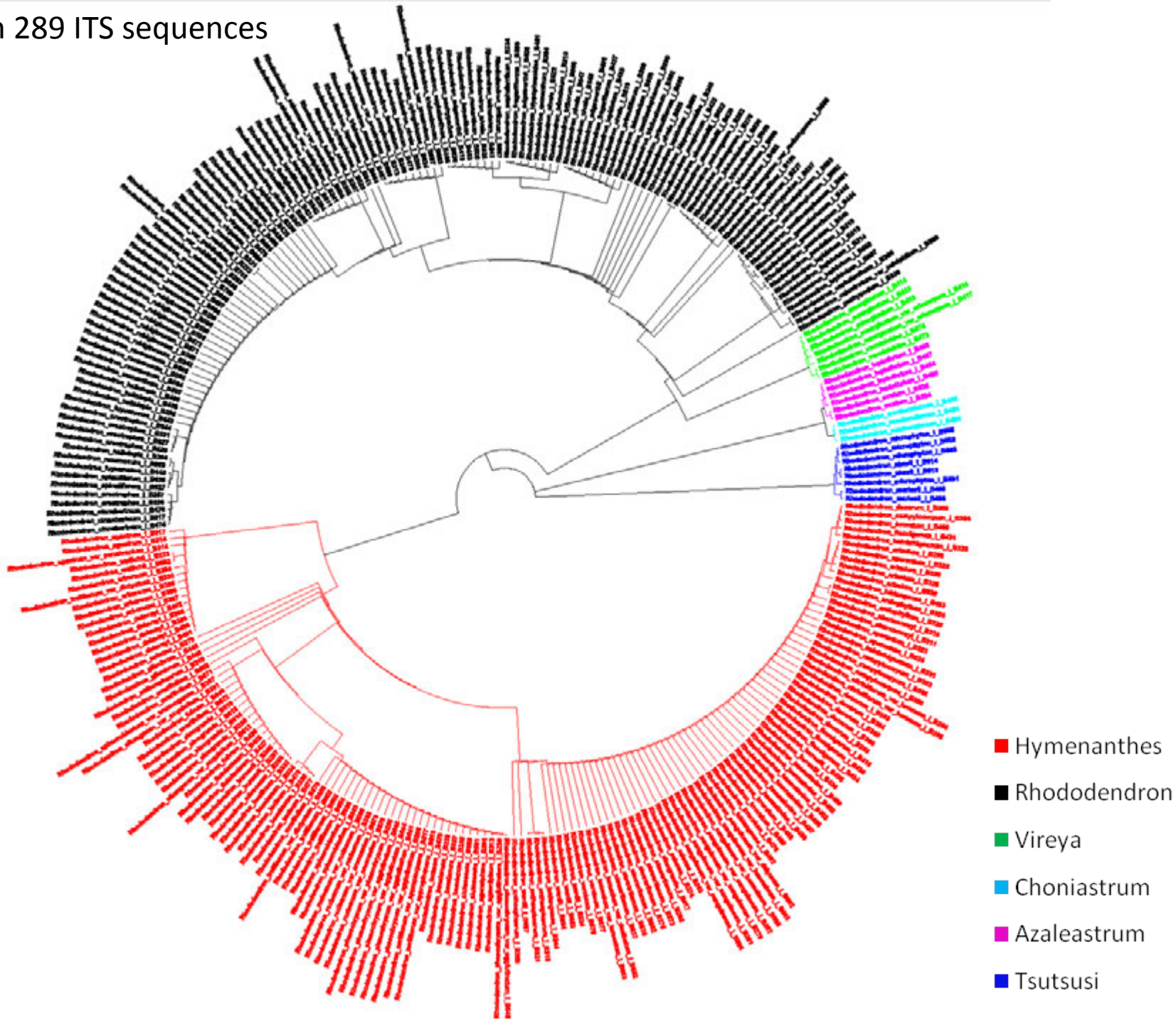
Comparison of discriminatory power among three big genera

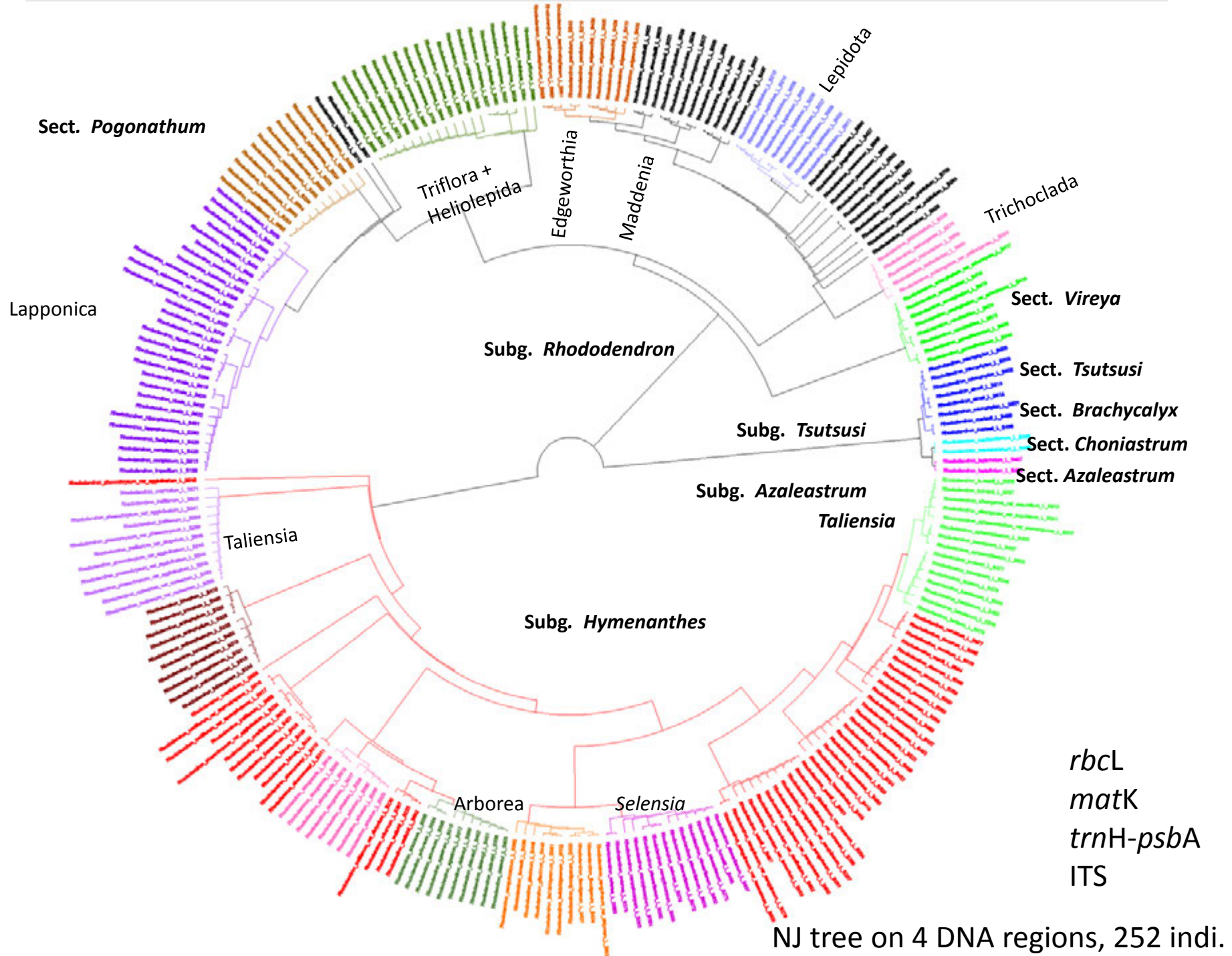
NJ tree on 270 *matK* sequences

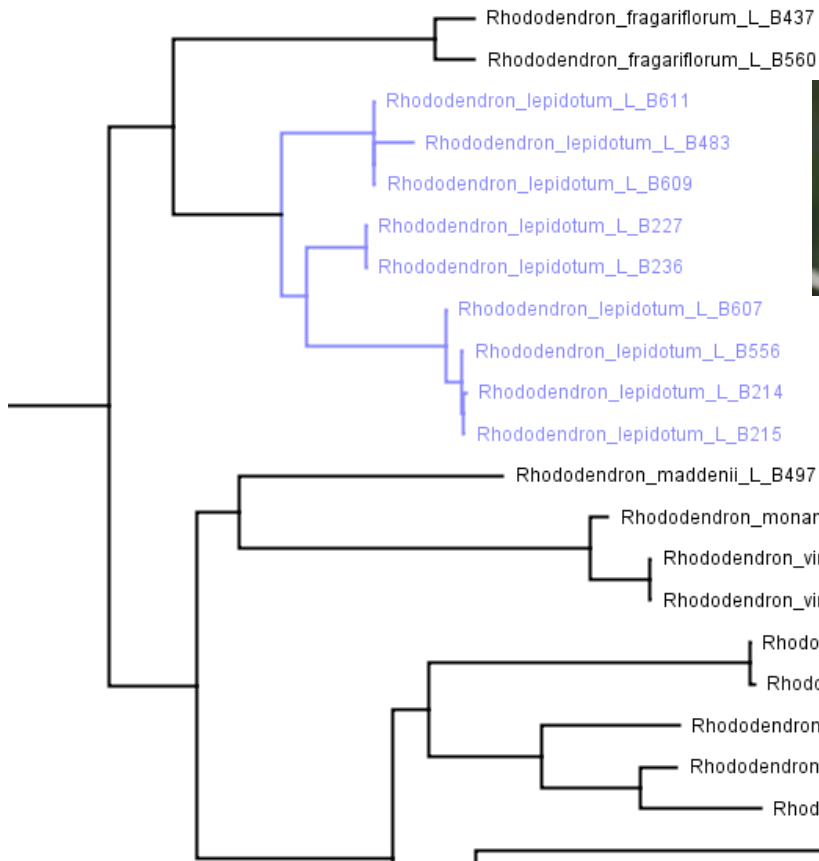


- Hymenanthes
- Rhododendron
- Vireya
- Choniastrum
- Azaleastrum
- Tsutsusi

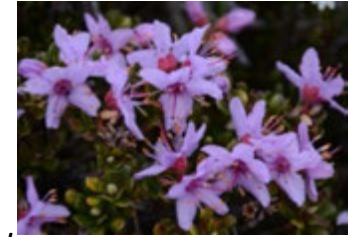
NJ tree on 289 ITS sequences







Subsect. Fragariflora



Subsect. Lepidota



Subsect. Monantha



Subsect. Virgata



Subsect. Maddenia



Subsect. Edgeworthia



Subsect. Tephropepla





R. triflorum



R. heliolepis

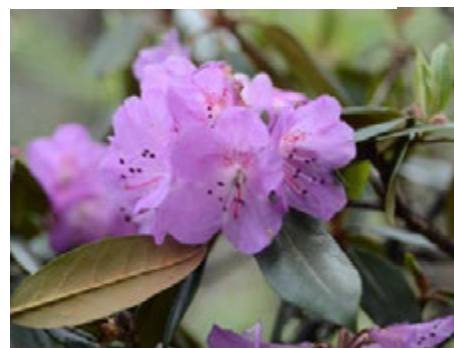


R. oreotrephes



Subsect. Heliolepida

R. rubiginosum



R. yunnanense



Subsect. Triflora

Sect. Pogonanthum

- Rhododendron_lepidotum_L_B482
- Rhododendron_cephalanthum_L_B366
- Rhododendron_nyingchiense_L_B524
- Rhododendron_nyingchiense_L_B523
- Rhododendron_trichostomum_L_B662
- Rhododendron_cephalanthum_L_B368
- Rhododendron_primuliflorum_L_B209
- Rhododendron_trichostomum_L_B664
- Rhododendron_trichostomum_L_B663
- Rhododendron_primuliflorum_L_B203
- Rhododendron_primuliflorum_L_B665



Subsect. Lapponica

- Rhododendron_telmateium_L_B650
- Rhododendron_impeditum_L_B463
- Rhododendron_fastigiatum_L_B300
- Rhododendron_nivale_L_B647
- Rhododendron_fastigiatum_L_B426
- Rhododendron_nivale_L_B648

R. calostrotum



R. saluenense



Subsect. Saluenensia

- Rhododendron_keleticum_L_B473
- Rhododendron_keleticum_L_B255
- Rhododendron_saluenense_var_prostratum_L_B596
- Rhododendron_saluenense_var_prostratum_L_B597
- Rhododendron_saluenense_var_pros

R. nivale



R. tapetiforme



Subsect. Lapponica

- Rhododendron_nivale_L_B207
- Rhododendron_nivale_L_B208
- Rhododendron_nivale_L_B247
- Rhododendron_tapetiforme_L_B642
- Rhododendron_tapetiforme_L_B641
- Rhododendron_fastigiatum_L_B424
- Rhododendron_impeditum_L_B294
- Rhododendron_nivale_L_B518
- Rhododendron_nivale_L_B520
- Rhododendron_nivale_L_B532
- Rhododendron_nivale_L_B522
- Rhododendron_hippophaeoides_L_B461
- Rhododendron_hippophaeoides_L_B240
- Rhododendron_fastigiatum_L_B425
- Rhododendron_complexum_L_B423
- Rhododendron_complexum_L_B213
- Rhododendron_impeditum_L_B199

R. hippophaeoides



R. fastigiatum



Subg. Hymenanthes

Subsect. Irrorata

Rhododendron_aberconwayi_L_B310

Rhododendron_aberconwayi_L_B311

Subsect. Grandia

Rhododendron_sinogrande_L_B616

Rhododendron_sinogrande_L_B245

Rhododendron_sinogrande_L_B619

Rhododendron_sinogrande_L_B617

Rhododendron_arizelum_L_B328

Rhododendron_arizelum_L_B330

Rhododendron_arizelum_L_B266

Rhododendron_arizelum_L_B329

Subsect. Falconera

Subsect. Campanulata

Rhododendron_arboreum_L_B397

Rhododendron_wallichii_L_B223

Rhododendron_wallichii_L_B682

Rhododendron_arboreum_L_B395

Rhododendron_arboreum_L_B394

Rhododendron_arboreum_L_B396

Rhododendron_agastrum_L_B315

Rhododendron_agastrum_L_B317

Rhododendron_delavayi_L_B399

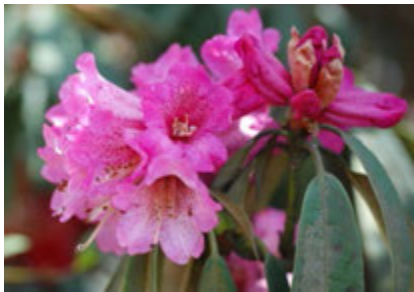
Rhododendron_delavayi_L_B402

Rhododendron_delavayi_L_B401

Rhododendron_delavayi_L_B398

Rhododendron_delavayi_L_B400

R. agastrum



R. sinogrande



R. aberconwayi



R. arizelum



R. arboreum



R. delavayi

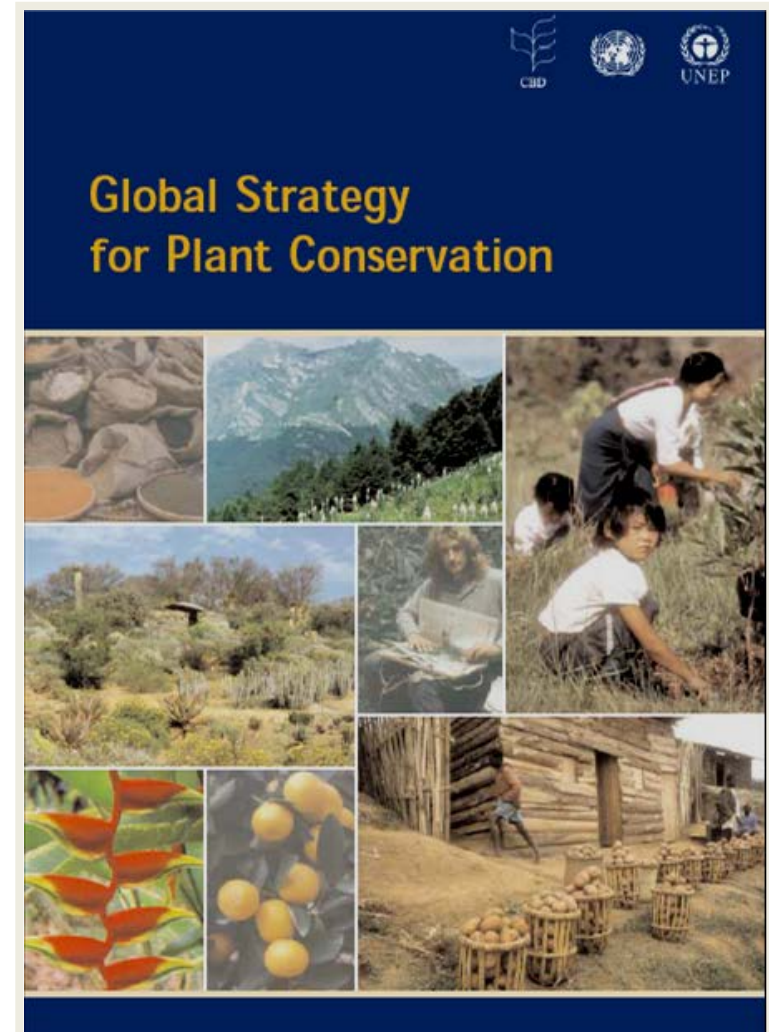


Subsect. Arborea

Objectives of the Global Strategy for Plant Conservation (2011-2020)

1. Plant diversity is well understood, documented and recognized;
2. Plant diversity is urgently and effectively conserved;
3. Plant diversity is used in a sustainable and equitable manner;
4. Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on Earth is promoted;
5. The capacities and public engagement necessary to implement the Strategy have been developed.

16 Targets for 2020.



- **Target 1** : An online flora of all known plants.
- **Target 2**: An assessment of the conservation status of all known plant species, as far as possible, to guide conservation action.
- **Target 3**: Information, research and associated outputs, and methods necessary to implement the Strategy developed and shared.



Chinese *Rhododendron* species on the red list

- Ten species listed in **China Red Data Book of Plants** (Fu et al. 1992)
- *R. chrysanthum* Pall. NE China
- *R. redowskianum* Maxim. NE China, Changbaishan
- *R. cyanocarpum* (Franch.) W. W. Smith Dali, Diancangshan
- *R. fictolacteum* Balf. f. NW Yunnan
- *R. haematodes* Franch. West Yunnan, Dali
- *R. jucundum* Balf. f. et W. W. Smith Dali, Diancangshan
- *R. protistum* var. *giganteum* (Forr. ex Tagg.) Chamberlain Tengchong
- *R. rex* Lévl. SW China, common species in the field
- *R. sulfureum* Franch. West Yunnan, Diancangshan & Biluoxueshan



Some *Rhododendron* species in need of red listing

Subg. *choniastrum* (for example)

- *R. longilobum* L.M. Gao et D.Z. Li, West Yunnan, Daweishan EW
- *R. dayaoshanense* L.M. Gao et D.Z. Li, E Guangxi, Dayaoshan CR
- *R. vaniotii* Lévl., Guizhou, Anshun, possibly extinct in the wild (EW).
- *R. taishunense* B.Y. Ding, S Zhejiang, Taishun, CR
- *R. subespitatum* Chun ex Tam, W Guangdong & E Guangxi, EN
- *R. feddei* Lévl., Central Guizhou, Guiding, EN

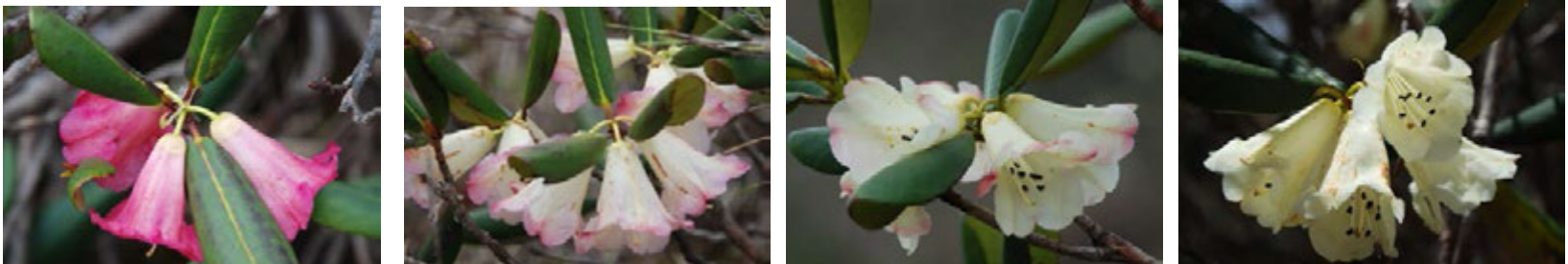
About 1/3 species in subg. *Choniastrum* are endangered.



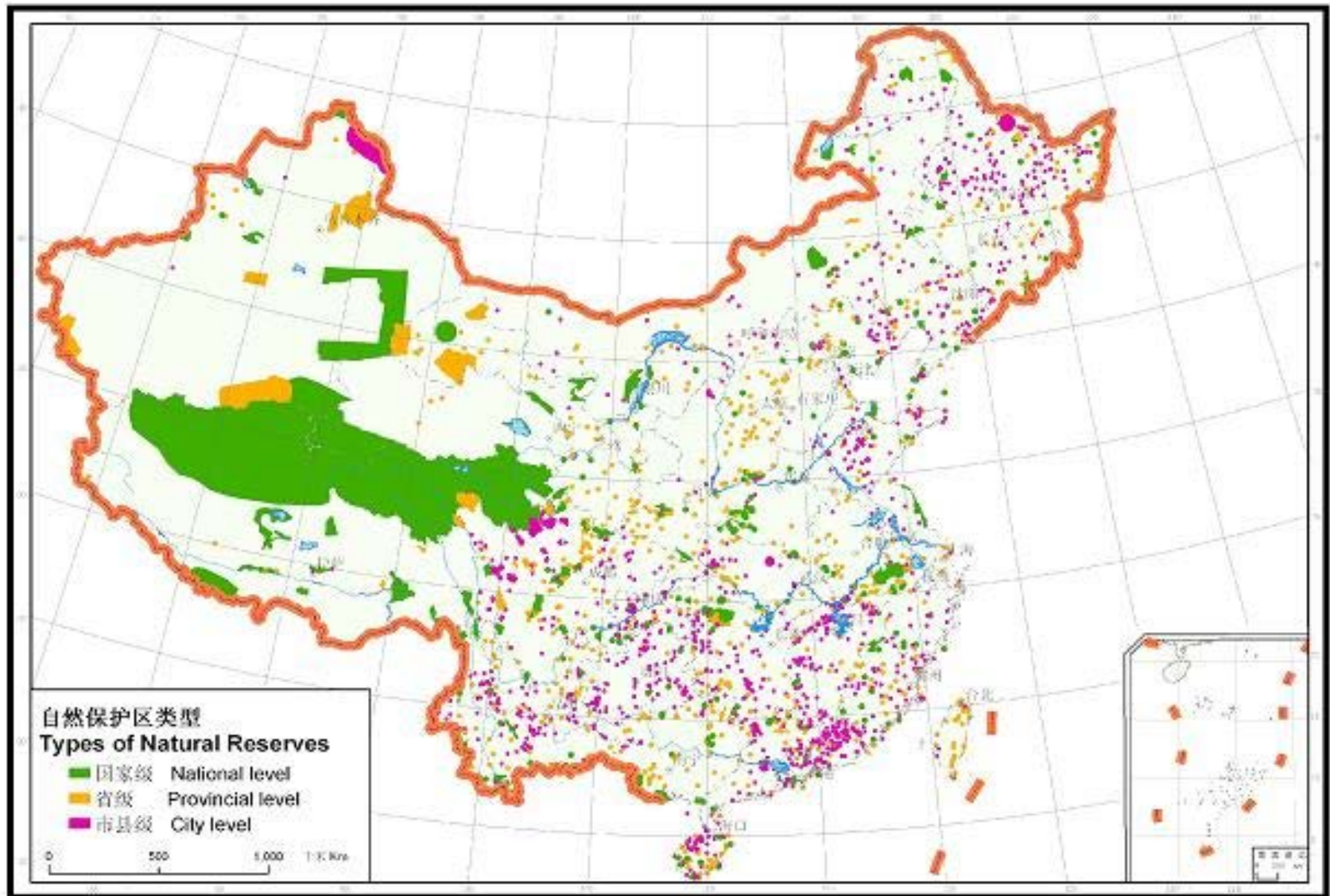
The protection status of red listed *Rhododendron* species

- All listed *Rhododendron* species listed in **China Red Data Book of Plants** are protected in Nature Reserves and National Forest Parks.
- Around 60% of species of *Rhododendron* in China occur in Nature Reserves and National Forest Parks.
- There are 2640 Nature Reserves in China with a total area of 15M km², which is about 15.2% of the total area of China.
- There are a total of 323 National Nature Reserves in China covering all the provinces.

R. stewartianum Diels



Distribution of Nature Reserves in China



Perspectives of *Rhododendron* conservation

- The red list of *Rhododendron* in China needs to be updated.
The red list was produced in 1992, twenty years ago.
Climate changes, urbanization, infrastructure construction and human activities increased greatly over the last two decades in China.
- Some *Rhododendron* species may be more rare or endangered, even extinct in the wild.
- Conservation re-assessments for *Rhododendron* species by scientific means in China are needed (has not been done yet).
- Protection strategies and related research is necessary.
- Both *ex-situ* and *in-situ* conservation of endangered species in *Rhododendron* are required.



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- **Colleagues from KIB:**
- **Profs. De-Zhu Li, Chang-Qin Zhang, Jun-Bo Yang**
- **Drs. Jie Liu, Peng-Fei Ma, Zhi-Rong Zhang etc.**
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