

# International Committee on Systematics of Prokaryotes Subcommittee on the taxonomy of *Agrobacterium* and *Rhizobium* Minutes of the meeting, 7 September 2014, Tenerife, Spain

Philippe de Lajudie<sup>1,\*</sup> and Esperanza Martinez-Romero<sup>2</sup>

## MINUTE 1. CALL TO ORDER

The closed meeting was called by the Chairperson, E. Martinez-Romero, at 14:00 on 7 September 2014 during the 11th European Nitrogen Fixation Conference in Costa Adeje, Tenerife, Spain.

## MINUTE 2. RECORD OF ATTENDANCE

The members present were J. P. W. Young, E. Martinez-Romero, P. Vinuesa, B. Eardly and P. de Lajudie. K. Lindström was represented by S. A. Mousavi. All subcommittee members had the opportunity to participate in the online discussions. K. Lindström, secretary of the subcommittee since 1996, resigned from this responsibility, but expressed her willingness to continue to act as an active subcommittee member. P. Vinuesa agreed to act as a temporary secretary for the current meeting. Philippe de Lajudie was later (online, November 2015) co-opted to take on the role.

## MINUTE 3. 2010 MINUTES APPROVAL

The minutes of the previous meeting held on 7 September 2010, Geneva, Switzerland, were unanimously approved (Lindström and Young, 2011, *Int J Syst Evol Microbiol* 61: 3089–3093, DOI 10.1099/ijms.0.036913-0).

## MINUTE 4. NEW TAXA DESCRIBED SINCE THE LAST MEETING

Table 1 lists the novel species described since the last meeting of the subcommittee in September 2010.

## MINUTE 5. MEMBERSHIP ISSUES

Peter Van Berkum retired and formally resigned, K. Nandasena formally resigned, Peter Graham, Gisèle Laguerre and (later, October 2015) Brion Jarvis passed away. Julie Ardley became a new member. During the year 2015 Professor Wenxin Chen informed the subcommittee of her retirement and resignation from the subcommittee. Dr Chang Fu Tian

(Chinese Agricultural University, Beijing, China) was later elected (online, November 2015) as a member of the subcommittee. It was agreed to invite representative scientist(s) from Africa who have published validated novel rhizobial/agrobacterial species descriptions to become members of the subcommittee. Several tentative names came up.

## MINUTE 6. THE HOME PAGE

The website of the subcommittee can be accessed at <http://edzna.ccg.unam.mx/rhizobialtaxonomy>. It would be very useful to list genome sequenced type strains on the website.

## MINUTE 7. GUIDELINES FOR THE DESCRIPTION OF NEW TAXA

Some years ago, E. Martinez-Romero coordinated the preparation of a tentative subcommittee paper updating recommendations on minimal standards for description of novel rhizobial species. The paper was rejected, mainly because it was too early for unprepared minds to accept the subcommittee's proposal that novel species should rely more on robust phylogenetic studies based on genomic data (multi-locus sequence analysis) than on controversial DNA hybridization values. Minds and general taxonomy have evolved since then, and it may be the right time now to try again. The rejected paper should be revived, updated and re-submitted. The subcommittee recommends that the genome sequence of the type strain be included in the description of novel rhizobial species.

## MINUTE 8. LEGUME-NODULATING BACTERIAL SPECIES OUTSIDE RHIZOBIUM

The subcommittee earlier suggested that the word rhizobium (plural rhizobia) can be used as a common name for legume-nodulating, nitrogen-fixing bacteria, irrespective of genus (Lindström and Martinez-Romero, 2005, *Int J Syst Evol Microbiol* 55, 1383 DOI 10.1099/ijms.0.63744-0), and further distinction of alpha-rhizobia and beta-rhizobia for rhizobia affiliated

Author affiliations: <sup>1</sup>IRD, LSTM, Campus International de Baillarguet TA A-82/J, 34398 Montpellier Cédex 5, France; <sup>2</sup>Centro de Ciencias Genómicas, Universidad Nacional Autónoma de México, Cuernavaca, Morelos, Mexico.

\*Correspondence: Philippe de Lajudie, [philippe.lajudie@ird.fr](mailto:philippe.lajudie@ird.fr)

Keywords: *Agrobacterium*; *Rhizobium*.

**Table 1.** Novel species described since the last meeting of the subcommittee in September 2010

Species	Host	Reference
<b>Rhizobium</b>		
<i>Rhizobium tubonense</i> CCBAU 85046 <sup>T</sup>	<i>Oxytropis glabra</i>	[1]
<i>Rhizobium vallis</i> CCBAU 65647 <sup>T</sup>	<i>Phaseolus vulgaris</i>	[2]
<i>Rhizobium vignae</i> HAMB1 3093	<i>Astragalus dahuricus</i>	[3]
<i>Rhizobium aggregatum</i> DSM 1111 <sup>T</sup>	Water	[4, 5]
<i>Rhizobium borbori</i> DN316 <sup>T</sup>	Sludge	[6]
<i>Rhizobium herbae</i> CCBAU 83011 <sup>T</sup>	<i>Astragalus membranaceus</i>	[7]
<i>Rhizobium pseudoryzae</i> J3-A127 <sup>T</sup>	<i>Oryza sativa</i>	[8]
<i>Rhizobium pusense</i> NRCPB10 <sup>T</sup>	Rhizosphere soil	[9]
<i>Rhizobium rosettiformans</i> w3 <sup>T</sup>	Contaminated groundwater	[5]
<i>Rhizobium grahamii</i> CCGE 502 <sup>T</sup>	<i>Dalea leporina</i>	[10]
<i>Rhizobium halophytocola</i> YC6881 <sup>T</sup>	<i>Rosa rugosa</i>	[11]
<i>Rhizobium leucaena</i> CFN 299 <sup>T</sup>	<i>Phaseolus vulgaris</i>	[12]
<i>Rhizobium mesoamericanum</i> CCGE 501 <sup>T</sup>	<i>Phaseolus vulgaris</i>	[10]
<i>Rhizobium nepotum</i> 39/7 <sup>T</sup>	<i>Prunus cerasifera</i>	[13]
<i>Rhizobium petrolearium</i> SL-1 <sup>T</sup>	Petroleum-contaminated sludge	[14]
<i>Rhizobium skierniewicense</i> Ch11 <sup>T</sup>	<i>Chrysanthemum</i> sp.	[15]
<i>Rhizobium sphaerophysae</i> CCNWS0238 <sup>T</sup>	<i>Sphaerophysa salsula</i>	[16]
<i>Rhizobium taibaishanense</i> CCNWSX 0483 <sup>T</sup>	<i>Kummerowia striata</i>	[17]
<i>Rhizobium jaguaris</i> CCGE525 <sup>T</sup>	<i>Calliandra grandiflora</i>	[18]
<i>Rhizobium mayense</i> CCGE526 <sup>T</sup>	<i>Calliandra grandiflora</i>	[18]
<i>Rhizobium paknamense</i> L6-8 <sup>T</sup>	<i>Lemna aequinoctialis</i>	[19]
<i>Rhizobium subbaraonis</i> JC85 <sup>T</sup>	beach sand	[20]
<i>Rhizobium tarimense</i> PL-41 <sup>T</sup>	<i>Populus euphratica</i> forest soil	[21]
<i>Rhizobium calliandrae</i> CCGE524 <sup>T</sup>	<i>Calliandrae grandiflora</i>	[18]
<i>Rhizobium freirei</i> PRF 81 <sup>T</sup>	<i>Phaseolus vulgaris</i>	[22]
<i>Rhizobium qilianshanense</i> CCNWQLS01	<i>Oxytropis ochrocephala</i>	[23]
<i>Rhizobium paranaense</i> CNPSo 120	<i>Phaseolus vulgaris</i>	[24]
<b>Ciceribacter</b>		
<i>Ciceribacter lividus</i> gen. nov., sp. nov., MSSRFBL1	<i>Cicer arietinum</i> (rhizosphere soil), <i>nifH</i> gene was amplified	[25]
<b>Ensifer</b>		
<i>Ensifer sojae</i> CCBAU 05684 <sup>T</sup>	<i>Glycine max</i>	[26]
<i>Ensifer mexicanus</i> ITTG R7 <sup>T</sup>	<i>Acacia angustissima</i>	[27]
<b>Mesorhizobium</b>		
<i>Mesorhizobium muleiense</i> CCBAU 83963	<i>Cicer arietinum</i>	[28]
<i>Mesorhizobium silamurunense</i> CCBAU 01550	<i>Astragalus</i> spp.	[29]
<i>Mesorhizobium tamadayense</i> Ala-3	<i>Anagyris latifolia</i> , <i>Lotus berthelotii</i>	[30]
<i>Mesorhizobium abyssinicae</i> HAMB1 3306	<i>Acacia abyssinica</i> , <i>Acacia tortilis</i>	[31]
<i>Mesorhizobium shonense</i> HAMB1 3295	<i>Acacia abyssinica</i>	[31]
<i>Mesorhizobium hawassense</i> HAMB13301	<i>Sesbania sesban</i>	[31]
<i>Mesorhizobium qingshengii</i> CCBAU 33460	<i>Astragalus sinicus</i>	[32]
<i>Mesorhizobium sangaii</i> HAMB1 3318	<i>Astragalus ernestii</i>	[33]
<b>Bradyrhizobium</b>		
<i>Bradyrhizobium lablabi</i> CCBAU 23086	<i>Lablab purpureus</i> , <i>Arachis hypogaea</i>	[34]
<i>Bradyrhizobium cytisi</i> CTAW11	<i>Cytisus villosus</i>	[35]
<i>Bradyrhizobium huanghuaihaiense</i> HAMB1 3180	<i>Glycine max</i>	[36]
<i>Bradyrhizobium oligotrophicum</i> ATCC 43045	Rice paddy soil	[37]
<i>Bradyrhizobium daqingense</i> CCBAU 15774	<i>Glycine max</i>	[38]
<i>Bradyrhizobium diazoefficiens</i> USDA 110	<i>Glycine max</i>	[39]
<i>Bradyrhizobium arachidis</i> CCBAU 051107	<i>Arachis hypogaea</i>	[40]
<b>Aminobacter</b>		
<i>Aminobacter anthyllidis</i> STM4645	<i>Anthyllis vulneraria</i>	[41]

Table 1. cont.

Species	Host	Reference
<b>Azorhizobium</b>		
<i>Azorhizobium oxalatophilum</i> NS12	Macerated petioles of <i>Rumex</i> sp.	[42]
<b>Bosea</b>		
<i>Bosea lathyri</i> LMG 26379	<i>Lathyrus latifolius</i>	[43]
<i>Bosea lupini</i> LMG 26383	<i>Lupinus polyphyllus</i>	[43]
<i>Bosea robiniae</i> LMG 26381	<i>Robinia pseudoacacia</i>	[43]
<b>Phyllobacterium</b>		
<i>Phyllobacterium endophyticum</i> LMG 26470	<i>Phaseolus vulgaris</i> (nodules)	[44]
<b>Ochrobactrum</b>		
<i>Ochrobactrum ciceri</i> Ca-34	<i>Cicer arietinum</i> (nodules)	[45]
<b>Microvirga</b>		
<i>Microvirga lotononidis</i> WSM3557	<i>Listia angolensis</i> (nodules)	[46]
<i>Microvirga lupini</i> Lut6	<i>Lupinus texensis</i> (nodules)	[46]
<i>Microvirga zambiensis</i> WSM3693	<i>Listia angolens</i> (nodules)	[46]
<b>Burkholderia</b>		
<i>Burkholderia symbiotica</i> NKMU-JPY345	<i>Mimosa</i> spp. (nodules)	[47]
<i>Burkholderia diazotrophica</i> JPY461	<i>Mimosa</i> spp. (nitrogen-fixing nodules)	[48]
<i>Burkholderia rhynchosiae</i> WSM3937	<i>Rhynchosia ferulifolia</i> (nodules)	[49]
<i>Burkholderia sprentiae</i> WSM5005	<i>Lebeckia ambigua</i> (nodules)	[50]

to *Alphaproteobacteria* and *Betaproteobacteria*, respectively, is now suggested. Communication should be established with other subcommittees dealing with *Devosia*, *Methylobacterium*, *Ochrobactrum*, *Ciceribacter*, *Aminobacter*, *Bosea*, *Phyllobacterium*, *Microvirga* and betaproteobacteria (*Burkholderia*, *Cupriavidus*) for guidelines and terminology of legume-nodulating bacterial species in these taxa.

## MINUTE 9. CURRENT MEMBERSHIP

The current members of the subcommittee are E. Martinez-Romero (Mexico) (Chairperson), P. de Lajudie (France) (Secretary), K. Lindström (Finland), G. Wei (China), B. Eardly (USA), J. Ardley (Australia), C. F. Tian (China), X. Nesme (France), P. Vinuesa (Mexico), A. Willems (Belgium) and J. P. W. Young (UK).

## MINUTE 10. NEXT MEETING

The next meeting will be held during the 12th European Nitrogen Fixation Conference (ENFC) on 23–28 August–2016, in Budapest, Hungary.

## MINUTE 11. ADJOURNMENT

The meeting was adjourned at 17:00 on 7 September 2014. The meeting continued online and during a partial meeting in Beijing on 15 January 2016. Online discussion was adjourned on 30 May 2016.

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