

***Mycobacterium shigaense*, Strain UN-152**

Catalog No. NR-49090

Product Description: *Mycobacterium shigaense* (*M. shigaense*), strain UN-152 was isolated in 2009 from a skin biopsy specimen of a 55-year-old male in Japan. *M. shigaense* has been effectively published, though not validly published, as its own species.

Lot¹: 64362443

Manufacturing Date: 27JUL2016

TEST	SPECIFICATIONS	RESULTS
Phenotypic Analysis^{2,3} Cellular morphology Colony morphology ⁴ Growth rate Growth at 45°C Growth at 55°C Acid-fast stain Pigmentation in the dark (Scotochromogen) Photoinduction for 1 hour (Photochromogen) Nonchromogen (no pigment) Biochemical tests Catalase Catalase (semiquantitative) Catalase (68°C) Iron uptake Nitrate reduction Tween 80 hydrolysis Urease Growth in the presence of 5% sodium chloride Growth in the presence of thiophene-2-carboxylic acid hydrazide (TCH)	Rods Report results ≥ 7 days Negative Report results Positive (red colonies) Positive (pigment) Negative Negative Report results Positive Positive Negative Negative Negative Positive Positive Positive	Rods Circular, convex, entire, rough and yellow ⁵ (Figure 1) 14 days Negative Negative Positive (red colonies) Positive (pigment) Negative Negative Positive Negative ⁶ Positive Negative Negative Negative Positive Positive Positive
Genotypic Analysis Sequencing of 16S ribosomal RNA gene (~1470 base pairs) Digital DNA-DNA hybridization (dDDH) ⁸	≥ 99% sequence identity to <i>Mycobacterium</i> sp., strain UN-152 (GenBank: AB547401.1) ≥ 70% for species identification	100% sequence identity to <i>Mycobacterium</i> sp., strain UN-152 ⁷ (GenBank: AB547401.1) Not determined ^{9,10} (Table 1)
Purity (post-freeze) Middlebrook 7H10 agar with OADC enrichment ¹¹ Tryptic Soy agar ¹¹	Growth consistent with expected colony morphology Report results	Growth consistent with expected colony morphology No growth
Viability (post-freeze)⁴	Growth	Growth

¹NR-49090 was produced by inoculation of the deposited material into Middlebrook 7H9 broth with ADC enrichment and grown for 10 days at 37°C in an aerobic atmosphere with 5% CO₂. Broth inoculum was added to Middlebrook 7H10 agar with OADC enrichment kolles, which were grown for 6 days at 37°C in an aerobic atmosphere with 5% CO₂ to produce this lot.

²Information on *Mycobacterium* testing is available from Ribón, W. "Biochemical Isolation and Identification of *Mycobacteria*." *Biochemical Testing*. (2012) Jose C. Jimenez-Lopez (Ed.), InTech, <http://www.intechopen.com/books/biochemical-testing/biochemical-isolation-and-identification-of-mycobacteria> and Lévy-Frébault, V. V. and F. Portaels. "Proposed Minimal Standards for the Genus *Mycobacterium* and for Description of New Slowly Growing *Mycobacterium* Species." *Int. J. Syst. Bacteriol.* 42 (1992): 315-323. PubMed: 1581193.

³Phenotypic characterization of *M. shigaense* was performed following: Nakanaga, K., et al. "*Mycobacterium shigaense* sp. nov., a Novel Slowly Growing Scotochromogenic *Mycobacterium* that Produced Nodules in an Erythroderma Patient With Severe Cellular Immunodeficiency and a History of Hodgkin's Disease." *J. Dermatol.* 39 (2012): 389-396. PubMed: 21955184.

⁴14 days at 37°C in an aerobic atmosphere with 5% CO₂ on Middlebrook 7H10 agar with OADC enrichment

⁵NR-49090 was deposited as *M. shigaense* and reported to produce colonies with a smooth morphology. Testing performed in duplicate by BEI Resources indicates colonies produced a rough morphology.

⁶NR-49090 was deposited as *M. shigaense* and reported to be positive for catalase (semiquantitative). Testing performed in triplicate by BEI Resources indicates a negative result.

⁷*M. shigaense* is the proposed name, which has been effectively published, though not validly published, as a new species of *Mycobacterium*.

⁸Relatedness between bacterial strains has traditionally been determined using DDH. For additional information, refer to Auch, A.F., et al. "Digital DNA-DNA Hybridization for Microbial Species Delineation by Means of Genome-to-Genome Sequence Comparison." *Stand. Genomic Sci.* 2 (2010): 117-134. PubMed: 21304684.

⁹The whole genome of *M. shigaense*, strain UN-152 (Contig Total Length ~5.2 megabase pairs) was sequenced using the Illumina® MiSeq® system and was assembled and analyzed with CLC Genomics Workbench Version 7.0.2.

¹⁰The required whole genome sequence for the type strain of this species is not available. dDDH testing rules out all species listed in Table 1, however, this does not rule out species for which the type strains whole genome sequences are not available.

¹¹Purity of this lot was assessed for 14 days at 37°C in an aerobic atmosphere with 5% CO₂.

Figure 1: Colony Morphology

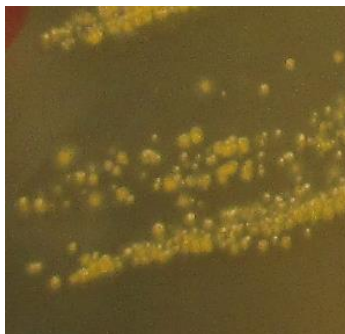


Table 1: Digital DNA-DNA hybridization (dDDH)

Species	Strain	Accession #	GGD vs. NR-49090 (Deposited as: <i>M. shigaense</i>)
<i>M. abscessus</i> subsp. <i>abscessus</i>	Hauduroy L948 ^T	NC_010397.1	19.9
<i>M. abscessus</i> subsp. <i>bolletii</i>	BD ^T	AHAS00000000.1	19.5
<i>M. abscessus</i> subsp. <i>massiliense</i>	CCUG 48898 ^T	NZ_AP014547.1	19.6
<i>M. aromaticivorans</i>	JS19b1 ^T	JALN00000000.2	19.8
<i>M. aurum</i>	ATCC 23366 ^T	CVQQ01000001.1	19.6
<i>M. austroafricanum</i>	E9789-SA12441 ^T	HG964450.1	19.1
<i>M. avium</i> subsp. <i>avium</i>	ATCC 25291 ^T	ACFI00000000.1	24
<i>M. avium</i> subsp. <i>paratuberculosis</i>	ATCC 19698 ^T	AGAR00000000.1	24.6
<i>M. avium</i> subsp. <i>silvaticum</i>	6409 ^T	AYOC00000000.1	24.4
<i>M. bohemicum</i>	CIP 105808 ^T	CSTD01000001.1	23.6
<i>M. canariense</i>	502329 ^T	BCSY00000000.1	20
<i>M. celatum</i>	ATCC 51131 ^T	BBUN00000000.1	22.2
<i>M. chelonae</i>	CM 6388 ^T	CP010946.1	19.2
<i>M. chlorophenicolum</i>	PCP-I ^T	JYNL00000000.1	19.9
<i>M. chubuense</i>	48013 ^T	NC_018027.1	20.2
<i>M. colombiense</i>	10B ^T	AFVW00000000.2	23.9
<i>M. conceptionense</i>	D16 ^T	CTEF00000000.1	20.1
<i>M. cosmeticum</i>	LTA-388 ^T	CCBB00000000.1	20
<i>M. crocinum</i>	czh-42 ^T	BBHD00000000.1	21.6
<i>M. farcinogenes</i>	IEMVT 75 ^T	CCAY00000000.1	19.8
<i>M. fluoranthenorans</i>	FA4 ^T	BBFT00000000.1	21.1
<i>M. fortuitum</i> subsp. <i>fortuitum</i>	ATCC 6841 ^T	CP014258.1	19.9
<i>M. fortuitum</i> subsp. <i>acetamidolyticum</i>	NCH E11620 ^T	BCSZ00000000.1	19.9
<i>M. gastri</i>	ATCC 15754 ^T	AZYN00000000.1	22.1
<i>M. genavense</i>	2289 ^T	JAGZ00000000.1	24.8

Species	Strain	Accession #	GGD vs. NR-49090 (Deposited as: <i>M. shigaense</i>)
<i>M. haemophilum</i>	ATCC 29548 ^T	CP011883.2	22.1
<i>M. hassiacum</i>	3849 ^T	ARBU00000000.1	20.2
<i>M. hodleri</i>	EMI2 ^T	BBGO00000000.1	23
<i>M. intracellulare</i>	ATCC 13950 ^T	NC_016946.1	24
<i>M. kansasii</i>	ATCC 12478 ^T	NC_022663.1	21.9
<i>M. kyorinense</i>	KUM 060204 ^T	BBKA00000000.1	21.6
<i>M. mageritense</i>	938 ^T	CCBF00000000.1	20
<i>M. neoaurum</i>	ATCC 25795 ^T	JMDW00000000.1	19.5
<i>M. neworleansense</i>	W6705 ^T	CWKH00000000.1	19.8
<i>M. novocastrense</i>	73 ^T	BCTA00000000.1	20.1
<i>M. obuense</i>	47001 ^T	JYNU00000000.1	19.8
<i>M. pallens</i>	czh-8 ^T	BBHE00000000.1	21.8
<i>M. parascrofulaceum</i>	HSC-68 ^T	ADNV00000000.1	24.1
<i>M. pseudoshottsii</i>	L15 ^T	BCND00000000.1	21.1
<i>M. pyrenivorans</i>	17A3 ^T	BBHB00000000.1	22.1
<i>M. rufum</i>	JS14 ^T	JROA00000000.1	20.2
<i>M. rutilum</i>	czh-117 ^T	BBHF00000000.1	23.5
<i>M. septicum</i>	W4964 ^T	CBMO00000000.1	19.8
<i>M. setense</i>	ABO-M06 ^T	JTJW00000000.1	19.5
<i>M. simiae</i>	ATCC 25275 ^T	CBMJ00000000.2	23.6
<i>M. smegmatis</i>	ATCC 19420 ^T	LN831039.1	19.8
<i>M. thermoresistibile</i>	ATCC 19527 ^T	BCTB00000000.1	20
<i>M. triplex</i>	90-1019 ^T	CCAU00000000.1	25.4
<i>M. tuberculosis</i>	H37Rv ^T	NC_000962.3	21.7
<i>M. vaccae</i>	ATCC 15483 ^T	BCRS00000000.1	20.1
<i>M. vanbaalenii</i>	PYR-1 ^T	NC_008726.1	20
<i>M. vulneris</i>	NLA000700772 ^T	CCBG00000000.1	19.9
<i>M. yongonense</i>	05-1390 ^T	NC_021715.1	23.9
<i>Nocardia asteroides</i>	NBRC 15531 ^T	BAFO00000000.2	19.6

Date: 28 JUL 2017

Signature: 

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