

PROGRESS REPORT

MICROORGANISM STUDY, CIT CONTRACT NO. 950783

Jet Propulsion Laboratory

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Systematic Description and Key to Isolants from
Little Lake Volcanic Area, California

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The following described bacteria are isolants from soils of the Little Lake Volcanic Area in California. The individual isolants are separated into groups by a Dichotomous Key. The Descriptive Charts are arranged in these groups. In addition to this dichotomous key is a list of the isolants and species designations in the order of their code numbers.

Of the 19 cultures received, isolant 196Aa contained two different bacterial species, and isolant 196Ab exhibited no growth upon the original slant. Of these 19 isolants, 73.7% are bacteria, 10.5% are actinomycetes, 10.5% are yeasts, and 5.3% are molds.

Of the bacteria 50.0% are species of the genus Bacillus, 42.9% are soil diphtheroids, and 7.1% are species of Micrococcus.

The pictures in the following report are all 1000x magnification. The nigrosin stains were prepared from 24 hour cultures. Methylene blue spore stains were from 12 hour cultures.

LIST OF ISOLANTS AND SPECIES DESIGNATIONS

Code Number	Species Designation	Page
196Aa-1	<u>Bacillus megaterium.</u>	11
*196Aa-2	"Soil diphtheroid".	3
196Ab	No growth upon original slant.	
196Ac	<u>Bacillus megaterium.</u>	13
197Aa	"Soil diphtheroid."	5
197Ab	<u>Bacillus megaterium.</u>	15
197Bc	<u>Bacillus megaterium.</u>	17
300Aa	<u>Bacillus megaterium.</u>	19
*300Ab	"Soil diphtheroid."	
300Bc	<u>Micrococcus</u> sp.	1
**300Bd	Yeast.	
300Ae	<u>Bacillus megaterium.</u>	21
*301Aa	"Soil diphtheroid."	
301Ab	Actinomycete.	
302Aa	Mold.	
302Bb	Actinomycete.	
303Ba	"Soil diphtheroid."	7
**303Bb	Yeast.	
304Aa	<u>Bacillus subtilis</u> var. <u>niger.</u>	23
304Bc	"Soil diphtheroid."	9

DICHOTOMOUS KEY

I. Molds.

302Aa

II. Yeasts.**

300Bd

303Bb

III. Actinomycetes.

301Ab

302Bb

IV. Bacteria.

A. Isolants failing to grow upon original transfer.

1. No visible growth on original slant.

196Ab

2. Growth on original slant; soil diphtheroid.

301Aa

B. Isolants failing to grow on subsequent transfers.

196Aa-2 "Soil diphtheroid."

300Ab "Soil diphtheroid."

C. Growing isolants; Gram-positive.

1. Do not survive pasteurization.

a. Cocci.

300Bc Micrococcus sp. 1

b. Non-sporulating rods.

*196Aa-2 "Soil diphtheroid." 3

197Aa "Soil diphtheroid." 5

*300Ab "Soil diphtheroid." 7

303Ba "Soil diphtheroid." 7

304Bc "Soil diphtheroid." 9

2. Survive pasteurization.

The following key for isolants surviving pasteurization is in accord with the arrangement of:

- (1) Smith, Nathan R., Ruth E. Gordon, and Francis E. Clark. 1952. Aerobic Sporeforming Bacteria. Agriculture Monograph No. 16. U.S. Department of Agriculture.
- and (2) Breed, Robert S., E. G. D. Murray, and Nathan R. Smith. 1957. Bergey's Manual of Determinative Bacteriology. 7th ed. Baltimore. The Williams and Wilkins Company. 1094 pp.

I. Sporangia not definitely swollen. Spores ellipsoidal to cylindrical, central to terminal. Spore wall thin and not easily stained. Gram-positive.

A. Diameter of vegetative rods is 0.9 micron or more.

1. Acetylmethylcarbinol not produced.
Acid from mannitol with ammonium salts as sole source of nitrogen.

Bacillus megaterium.

196Aa-1	11
196Ac	13
197Ab	15
197Bc	17
300Aa	19
300Ac	21

B. Diameter of vegetative rods less than 0.9 micron.

1. Growth on glucose-nutrient agar as good or better than on nutrient agar; good growth on soybean agar.

a. Growth in 5 percent NaCl broth; strong hydrolysis of gelatin.

(1) Starch hydrolyzed; nitrates reduced to nitrites.

(a) Scant if any growth under anaerobic conditions, no gas from nitrates under alkaline anaerobiosis.

(aa) Black pigment on tyrosine mediums only.

Bacillus subtilis var. niger

304Aa 23

* Died upon further transfer.

** See page 25 of this report.

Descriptive Chart

300Bc Trypticase Soy Agar Little Lake, California
(code number) (medium) (source)

Micrococcus sp.* 28°C. W.B. Bollen
(name of organism) (temperature) (studied by)

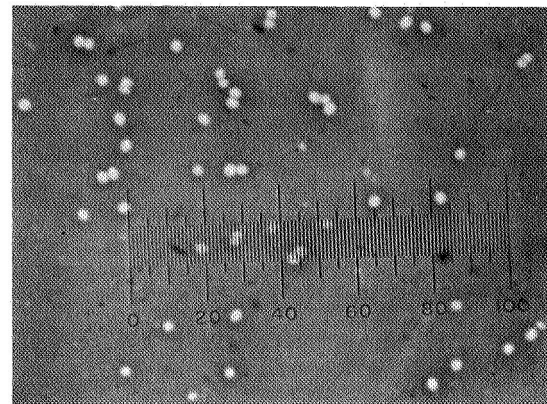
I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends _____,
filaments, cocci, spirals,
branching _____.

Size: average - 1.12 x 1.29 μ .
range - 0.96-1.29 x 1.06-1.41 μ .

Irregular forms:



GRAM REACTION:

18 hrs: 50% POSITIVE.
24 hrs: 80% POSITIVE.
48 hrs: 100% NEGATIVE.

NIGROSIN:

PASTEURIZATION SURVIVAL (85°C, 10 minutes): NEGATIVE.

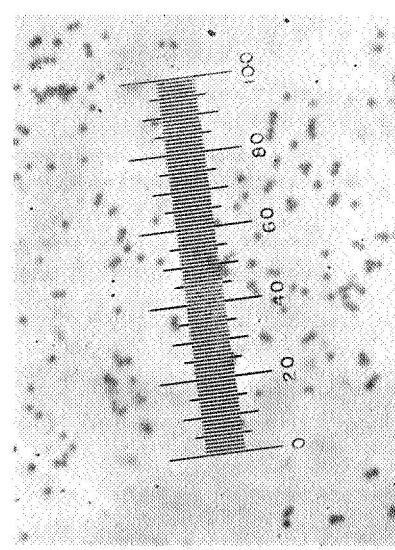
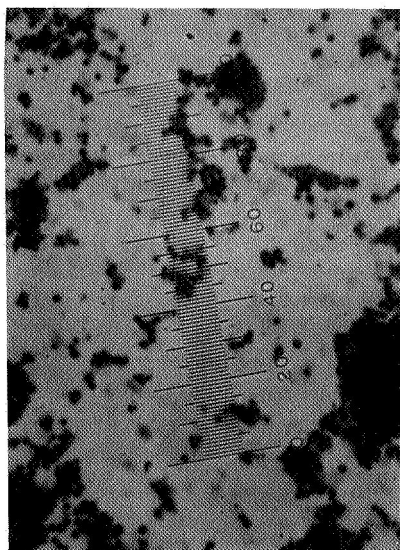
Sporangia: none, rods, spindles, elliptical, clavate, drumstick.
Endospores: swollen, not swollen.
Position: central to excentric, terminal, subterminal.
Shape: spherical, ellipsoidal, cylindrical, oval.
size: average -
range -

MOTILITY: age 1 DA. NEGATIVE.

Flagella:

OTHER STAINS:

~~Acid fast~~ 18; 24; 48 hr. GRAM:



* resembling M. roseus and M. rubens.

II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 3 DA.

Amount of growth: abundant, moderate, scant.

Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.

Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 8 DA.

Macroscopic

Size: 6 mm.

Shape: filamentous, irregular, oval, puntiform, round.

Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.

Topography: contoured, rough, smooth, striated, wrinkled.

Habit: compact, spreading.

Microscopic (100x)

Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.

Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties

Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.

Appearance by transmitted light: opaque, translucent, transparent.

Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.

Chromogenesis:

(medium) (color) (CHM No.)

Trypticase soy agar ORANGE 46

Potato slant NO GROWTH

-
-

NUTRIENT BROTH: age 4 DA.

Amount of growth: abundant, moderate, scant.

Surface growth: none, flocculent, membranous, pellicle, ring.

Subsurface growth: none, granular, turbid.

Sediment: none, compact, flaky, flocculent, granular, viscid.

Odor: resembling NONE.

GELATIN STAB: age 18 DA.

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.

Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: GOOD.

Fat agar:

Glucose-nitrate agar: NO GROWTH.

GLUCOSE-NUTRIENT AGAR: MODERATE.

NUTRIENT AGAR: EXCELLENT.

ANAEROBIC NITRATE BROTH: NEGATIVE.

ANAEROBIC GLUCOSE BROTH: GROWTH.

PH 7.2.

DNA

G:C _____

G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age 3 DA.

Growth at 10°C. +, 20°C. +, 28°C. +, 37°C. +, 45°C. +, 55°C. -.

SOLE CARBON SOURCE: age 7 DA.

Glucose: positive, negative. 7 DA.

Sucrose: positive, negative. 7 DA.

Xylose: positive, negative. 7 DA.

Citrate: positive, negative. 7 DA.

NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative. 7 DA.

MANNITOL: POSITIVE. 7 DA.

LACTOSE: POSITIVE. 7 DA.

REDUCTIONS:

Nitrate: NO₂⁻ +, NH₄⁺ _____, gas _____, negative. 1 DA.

Methylene blue: positive, negative. 16 DA.

Selenite: positive, negative. _____

Tellurite: positive, negative. _____

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid +, alkaline _____, neutral, gas. 7 DA.

Sucrose: acid +, alkaline _____, neutral, gas. 7 DA.

Lactose: acid +, alkaline _____, neutral, gas. 7 DA.

Xylose: acid +, alkaline _____, neutral, gas. 7 DA.

Mannitol: acid +, alkaline, neutral, gas. 7 DA.

HYDROLYSIS:

Gelatin: positive, negative. 12 DA.

Casein: positive, negative. 12 DA.

Fat: positive, negative. 7 DA.

Starch: positive, negative. 7 DA.

Cellulose: positive, negative. _____

Urea: positive, negative. _____

TOLERANCES:

Salt: 2% positive, negative. 7 DA.

7% positive, negative.

10% positive, negative.

pH: acid _____, alkaline _____. _____

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 20 DA.

Curd: acid, alkaline, absent, gas. 20 DA.

Peptonization: positive, negative. 20 DA.

Reduction: positive, negative. 20 DA.

OTHER REACTIONS:

H₂S from _____: positive, negative. _____

NH₄⁺ from peptone: positive, negative. 7 DA.

Acetylmethylcarbinol: positive, negative. 15 DA.

Indol: positive, negative. 23 DA.

Methyl red: positive, negative. 15 DA.

Descriptive Chart

196Aa - 2 Trypticase Soy Agar Little Lake, California
(code number) (medium) (source)

"soil diphtheroid" 28°C. W. B. Bollen
(name of organism) (temperature) (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends POINTED-ROUND,
filaments, cocci, spirals,
branching _____

Size: average -
range -

Irregular forms:

GRAM REACTION:

18 hrs:
24 hrs:
48 hrs:

PASTEURIZATION SURVIVAL (85°C, 10 minutes): **NEGATIVE.**

Sporangia: *none, rods, spindles, elliptical, clavate, drumstick.*

Endospores: *swollen, not swollen,.*

Position: *central to excentric, terminal, subterminal.*

Shape: *spherical, ellipsoidal, cylindrical, oval.*

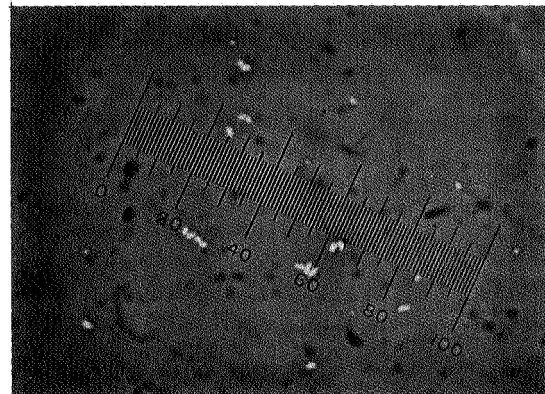
size: average -
range -

MOTILITY: age _____.

Flagella:

OTHER STAINS:

Acid fast:
Capsule:
Glycogen:
Crystalline dextrans:
Fat globules:
Metachromatic granules:



NIGRODIN: 24 HR. 1000X

THIS CULTURE GREW ON THE FIRST FEW TRANSFERS, BUT ON SUBSEQUENT TRANSFERS DIED.

II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 8 DA
 Amount of growth: *abundant, moderate, scant*.
 Form: *aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading*.
 Consistency: *adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy*.

AGAR COLONIES: age 8 DA
 Macroscopic
 Size: 0.5 mm.
 Shape: *filamentous, irregular, oval, punctiform, round*.
 Elevation: *beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate*.
 Topography: *contoured, rough, smooth, striated, wrinkled*.
 Habit: *compact, spreading*.
 Microscopic (100x)
 Margin: *Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate*.
 Internal structure: *amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated*.
 Optical properties
 Appearance by reflected light: *dull, fluorescent, glistening, iridescent, opalescent*.
 Appearance by transmitted light: *opaque, translucent, transparent*.
 Medium: *blackened, blued, browned, grayed, greened, yellowed, unchanged*.
 Chromogenesis:
 (medium) (color) (CHM No.)
 Trypticase soy agar **CANARY YELLOW** 100
 Potato slant
 -
 -

NUTRIENT BROTH: age _____
 Amount of growth: *abundant, moderate, scant*.
 Surface growth: *none, flocculent, membranous, pellicle, ring*.
 Subsurface growth: *none, granular, turbid*.
 Sediment: *none, compact, flaky, flocculent, granular, viscid*.
 Odor: resembling _____

GELATIN STAB: age _____
 Liquefaction: *none, crateriform, infundibuliform, napiform, saccate, stratiform*.
 Rate: *fast, moderate, slow*.

OTHER GROWTH CHARACTERISTICS:
 Soybean infusion agar: **MODERATE GROWTH**.
 Fat agar:
 Glucose-nitrate agar:

GLUCOSE-NUTRIENT AGAR GROWTH BETTER THAN NUTRIENT AGAR GROWTH.

DNA
 G:C _____
 G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: *aerobic, anaerobic, facultative, microaerophilic*.

CATALASE: *positive, negative*.

TEMPERATURE RELATIONSHIPS: age _____
 Growth at 10°C. _____, 20°C. _____, 28°C. _____, 37°C. _____, 45°C. _____, 55°C. _____

SOLE CARBON SOURCE: age _____
 Glucose: *positive, negative*.
 Sucrose: *positive, negative*.
 Xylose: *positive, negative*.
 Citrate: *positive, negative*. 7 DA
 NH₄⁺ AS SOLE NITROGEN SOURCE: *positive, negative*. 7 DA

REDUCTIONS:
 Nitrate: NO₂⁻ _____, NH₄⁺ _____, gas _____, *negative*.
 Methylene blue: *positive, negative*.
 Selenite: *positive, negative*.
 Tellurite: *positive, negative*.

OXIDATIVE-FERMENTATIVE REACTIONS
 Glucose: *acid* _____, *alkaline* _____, *neutral, gas*.
 Sucrose: *acid* _____, *alkaline* _____, *neutral, gas*.
 Lactose: *acid* _____, *alkaline* _____, *neutral, gas*.
 Xylose: *acid* _____, *alkaline* _____, *neutral, gas*.
 Mannitol: *acid* _____, *alkaline, neutral, gas*.

HYDROLYSIS:
 Gelatin: *positive, negative*.
 Casein: *positive, negative*. 7 DA
 Fat: *positive, negative*.
 Starch: *positive, negative*.
 Cellulose: *positive, negative*.
 Urea: *positive, negative*.

TOLERANCES:
 Salt: 2%—*positive, negative*.
 7%—*positive, negative*.
 10%—*positive, negative*.
 pH: *acid* _____, *alkaline* _____.

LITMUS MILK REACTIONS:
 Reaction: *acid, alkaline, neutral*.
 Curd: *acid, alkaline, absent, gas*.
 Peptonization: *positive, negative*.
 Reduction: *positive, negative*.

OTHER REACTIONS:
 H₂S from _____: *positive, negative*.
 NH₄⁺ from peptone: *positive, negative*.
 Acetylmethylcarbinol: *positive, negative*.
 Indol: *positive, negative*.
 Methyl red: *positive, negative*.

Descriptive Chart

197Aa (code number)	Trypticase Soy Agar (medium)	Little Lake, California (source)
"soil diphtheroid" (name of organism)	28°C. (temperature)	W.B. Bollem (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends **ROUND**,
filaments, cocci, spirals,
branching _____

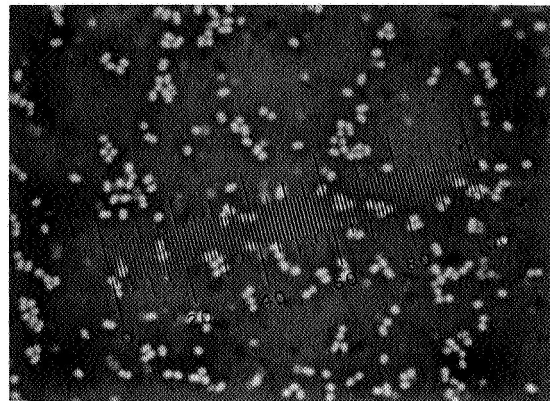
Size: average - **0.88 x 1.22 μ .**
range - **0.74-1.06 x 0.80-1.61 μ .**

Irregular forms:

GRAM REACTION:

18 hrs: **100% POSITIVE.**
24 hrs: **100% POSITIVE.**
48 hrs: **100% POSITIVE.**

NIGROSIN:



PASTEURIZATION SURVIVAL (85°C, 10 minutes): **NEGATIVE.**

Sporangia: *none, rods, spindles, elliptical, clavate, drumstick.*

Endospores: *swollen, not swollen.*

Position: *central to excentric, terminal, subterminal.*

Shape: *spherical, ellipsoidal, cylindrical, oval.*

size: average -

range -

MOTILITY: age 1 DA. **NEGATIVE.**

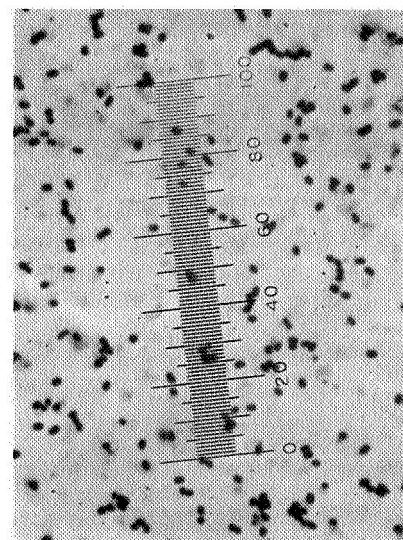
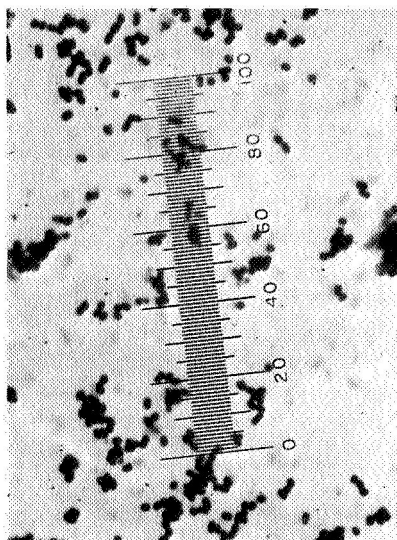
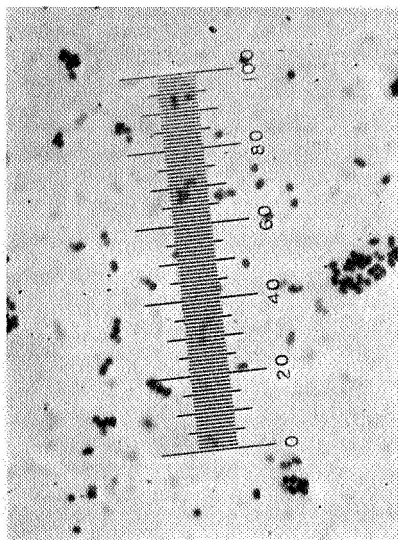
Flagella:

OTHER STAINS:

Acid-fast:

Capsule:

18: 24: 48 GRAM:



II. CULTURAL CHARACTERISTICS

III. PHYSIOLOGICAL CHARACTERISTICS

AGAR STROKE: age 3 DA

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

Amount of growth: abundant, moderate, scant.

Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.

CATALASE: positive, negative.

Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

TEMPERATURE RELATIONSHIPS: age 3 DA

Growth at 10°C. +, 20°C. +, 28°C. +, 37°C. +, 45°C. +, 55°C. +.

AGAR COLONIES: age 3 DA

Macroscopic

Size: 2 mm.

Shape: filamentous, irregular, oval, puntiform, round.

Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.

Topography: contoured, rough, smooth, striated, wrinkled.

Habit: compact, spreading.

Microscopic (100x)

Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.

Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties

Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.

Appearance by transmitted light: opaque, translucent, transparent.

Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.

Chromogenesis:

(medium) (color) (CHM No.)

Trypticase soy agar SUN ORANGE 5la

Potato slant ORANGE 5la

SOLE CARBON SOURCE: age 7 DA

Glucose: positive, negative. 7 DA

Sucrose: positive, negative. 7 DA

Xylose: positive, negative. 7 DA

Citrate: positive, negative. 7 DA

NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative. 7 DA

MANNITOL: POSITIVE. 7 DA

LACTOSE: POSITIVE. 7 DA

REDUCTIONS:

Nitrate: NO₂⁻ —, NH₄⁺ —, gas —, negative. 11 DA

Methylene blue: positive, negative. 20 DA

Selenite: positive, negative. —

Tellurite: positive, negative. —

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid —, alkaline —, neutral, gas. 23 DA

Sucrose: acid —, alkaline +, neutral, gas. 7 DA

Lactose: acid —, alkaline +, neutral, gas. 7 DA

Xylose: acid —, alkaline +, neutral, gas. 7 DA

Mannitol: acid —, alkaline, neutral, gas. 7 DA

HYDROLYSIS:

Gelatin: positive, negative. —

Casein: positive, negative. 7 DA

Fat: positive, negative. 7 DA

Starch: positive, negative. 7 DA

Cellulose: positive, negative. —

Urea: positive, negative. —

TOLERANCES:

Salt: 2%—positive, negative. 7 DA

7%—positive, negative. —

10%—positive, negative. —

pH: acid —, alkaline — —

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 20 DA

Curd: acid, alkaline, absent, gas. 20 DA

Peptonization: positive, negative. 20 DA

Reduction: positive, negative. 20 DA

OTHER REACTIONS:

H₂S from —: positive, negative. —

NH₄⁺ from peptone: positive, negative. 7 DA

Acetylmethylcarbinol: positive, negative. 15 DA

Indol: positive, negative. 23 DA

Methyl red: positive, negative. 15 DA

NUTRIENT BROTH: age 4 DA

Amount of growth: abundant, moderate, scant.

Surface growth: none, flocculent, membranous, pellicle, ring.

Subsurface growth: none, granular, turbid.

Sediment: none, compact, flaky, flocculent, granular, viscid.

Odor: resembling — NONE —

GELATIN STAB: age 12 DA

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.

Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: NO GROWTH.

Fat agar:

Glucose-nitrate agar: FAINT.

GLUCOSE-NUTRIENT AGAR: SCANT.

NUTRIENT AGAR: GOOD.

ANAEROBIC NITRATE BROTH: NO GAS.

ANAEROBIC GLUCOSE BROTH: SLIGHT GROWTH

PH 7.2.

DNA

G:C —

G+C — moles %

Descriptive Chart

303Ba Trypticase Soy Agar Little Lake, California.
(code number) (medium) (source)

"Soil diphtheroid" 28°C W.B. Bollen
(name of organism) (temperature) (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

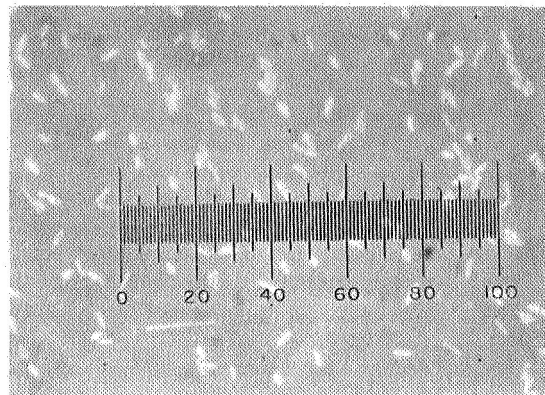
MORPHOLOGY:

Form: rods, ends POINTED,
filaments, cocci, spirals,
branching

Size: average - 0.70 x 2.18 μ.
range - 0.55 - 0.94 x 1.88 - 2.60 μ.

Irregular forms:

NIGROSIN:



GRAM REACTION:

18 hrs: 100 % POSITIVE.
24 hrs: 100 % POSITIVE.
48 hrs: 100 % POSITIVE.

PASTEURIZATION SURVIVAL (85°C, 10 minutes): NEGATIVE.

Sporangia: none, rods, spindles, elliptical, clavate, drumstick.

Endospores: swollen, not swollen.

Position: central to excentric, terminal, subterminal.

Shape: spherical, ellipsoidal, cylindrical, oval.

size: average -

range -

MOTILITY: age 1 DA. NEGATIVE.

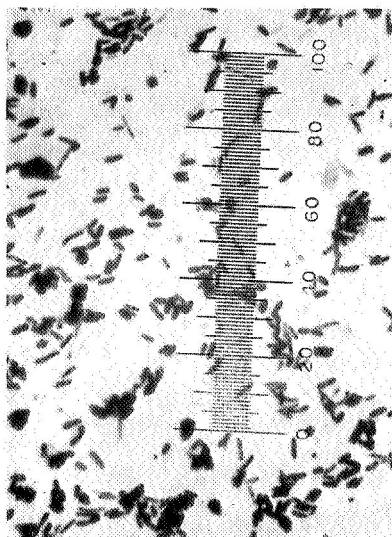
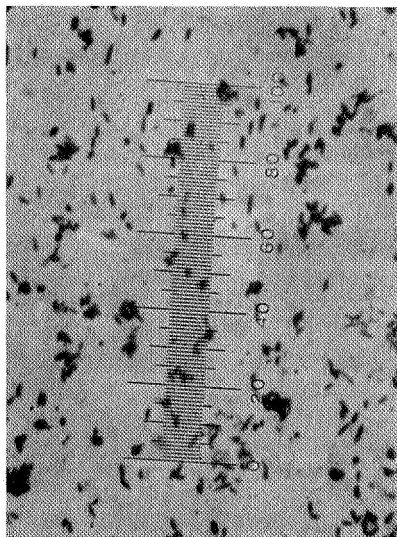
Flagella:

OTHER STAINS:

~~Acid-fast~~

18; 24; 48 hr. GRAM:

~~Capsule~~



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 3 DA.

Amount of growth: abundant, moderate, scant.
Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.
Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 5 DA

Macroscopic
Size: 3 mm.
Shape: filamentous, irregular, oval, puntiform, round.
Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.
Topography: contoured, rough, smooth, striated, wrinkled.
Habit: compact, spreading.
Microscopic (100x)
Margin: ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.
Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties
Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.
Appearance by transmitted light: opaque, translucent, transparent.
Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.
Chromogenesis: (medium) (color) (CHM No.)
Trypticase soy agar LT. MELLOW YELLOW 3ea
Potato slant LT. MELLOW YELLOW 3ea

NUTRIENT BROTH: age 4 DA.

Amount of growth: abundant, moderate, scant.
Surface growth: none, flocculent, membranous, pellicle, ring.
Subsurface growth: none, granular, turbid.
Sediment: none, compact, flaky, flocculent, granular, viscid.
Odor: resembling H2S

GELATIN STAB: age 18 DA.

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.
Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: FAIR.
Fat agar:
Glucose-nitrate agar: FAIR.
GLUCOSE-NUTRIENT AGAR: GOOD.
NUTRIENT AGAR: MODERATE.
ANAEROBIC NITRATE BROTH: NO GAS.
ANAEROBIC GLUCOSE BROTH: SLIGHT GROWTH.

DNA
G:C
G+C moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O2: aerobic, anaerobic, facultative, microaerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age 3 DA.
Growth at 38°C. -, 20°C. +, 28°C. +, 37°C. +, 45°C. -, 55°C. -.

SOLE CARBON SOURCE: age
Glucose: positive, negative. 7 DA.
Sucrose: positive, negative. 7 DA.
Xylose: positive, negative. 7 DA.
Citrate: positive, negative. 7 DA.
NH4+ AS SOLE NITROGEN SOURCE: positive, negative. 7 DA.

MANNITOL: NEGATIVE. 7 DA.
LACTOSE: NEGATIVE. 7 DA.

REDUCTIONS:
Nitrate: NO2- +, NH4+ -, gas -, negative. 11 DA.
Methylene blue: positive, negative. 1 DA.
Selenite: positive, negative.
Tellurite: positive, negative.

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid +, alkaline -, neutral, gas. 7 DA.
Sucrose: acid -, alkaline +, neutral, gas. 7 DA.
Lactose: acid -, alkaline +, neutral, gas. 7 DA.
Xylose: acid +, alkaline -, neutral, gas. 7 DA.
Mannitol: acid -, alkaline, neutral, gas. 7 DA.

HYDROLYSIS:

Gelatin: positive, negative. 7 DA.
Casein: positive, negative. 12 DA.
Fat: positive, negative. 7 DA.
Starch: positive, negative. 7 DA.
Cellulose: positive, negative.
Urea: positive, negative.

TOLERANCES:

Salt: 2%-positive, negative. 7 DA.
7%-positive, negative.
10%-positive, negative.
pH: acid -, alkaline -.

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 20 DA.
Curd: acid, alkaline, absent, gas. 20 DA.
Peptonization: positive, negative. 20 DA.
Reduction: positive, negative. 20 DA.

OTHER REACTIONS:

H2S from -: positive, negative.
NH4+ from peptone: positive, negative. 7 DA.
Acetylmethylcarbinol: positive, negative. 18 DA.
Indol: positive, negative. 23 DA.
Methyl red: positive, negative. 18 DA.

Descriptive Chart

304Bc Trypticase Soy Agar Little Lake, California
(code number) (medium) (source)

"soil diphtheroid" 28°C. W.B. Bollen
(name of organism) (temperature) (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: ~~rods, ends POINTED-ROUND~~
filaments, cocci, spirals,
branching _____

Size: average —
range —

Irregular forms:



GRAM REACTION:

18 hrs:
24 hrs: 100% POSITIVE.
48 hrs: 100% POSITIVE.

NIROSIK:

PASTEURIZATION SURVIVAL (85°C, 10 minutes): NEGATIVE.

Sporangia: none, rods, spindles, elliptical, clavate, drumstick.

Endospores: swollen, not swollen,

Position: central to excentric, terminal, subterminal.

Shape: spherical, ellipsoidal, cylindrical, oval.

size: average —
range —

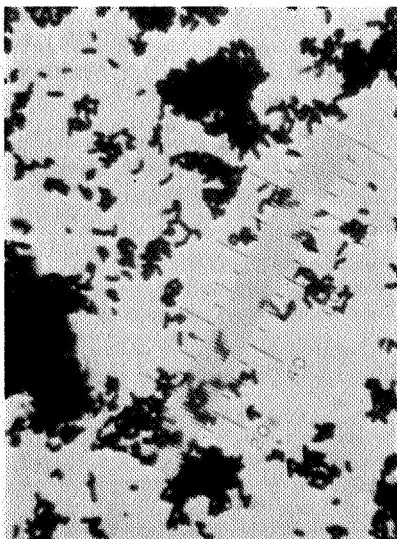
MOTILITY: age _____.

Flagella:

OTHER STAINS:

Acid fast:
Capsule:
Glycogen:
Crystalline dextrans:
Fat globules:
Metachromatic granules:

24:48 hr. Gram:



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 22 DA

Amount of growth: abundant, moderate, scant.
 Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.
 Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 22 DA

Macroscopic
 Size: 3 mm.
 Shape: filamentous, irregular, oval, puntiform, round.
 Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.
 Topography: contoured, rough, smooth, striated, wrinkled.
 Habit: compact, spreading.

Microscopic (100x)
 Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.
 Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties
 Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.
 Appearance by transmitted light: opaque, translucent, transparent.
 Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.
 Chromogenesis:
 (medium) (color) (CHM No.)
 Trypticase soy agar BRITE GOLD 2pc
 Potato slant
 -
 -

NUTRIENT BROTH: age _____

Amount of growth: abundant, moderate, scant.
 Surface growth: none, flocculent, membranous, pellicle, ring.
 Subsurface growth: none, granular, turbid.
 Sediment: none, compact, flaky, flocculent, granular, viscid.
 Odor: resembling _____

GELATIN STAB: age _____

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.
 Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: ABUNDANT GROWTH.
 Fat agar:
 Glucose-nitrate agar: NO GROWTH.

GLUCOSE NUTRIENT AGAR GROWTH BETTER THAN NUTRIENT AGAR GROWTH.
ANAEROBIC NITRATE BROTH: NO GAS.

DNA
 G:C _____
 G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age _____
 Growth at 10°C. _____, 20°C. _____, 28°C. _____, 37°C. _____, 45°C. _____, 55°C. _____.

SOLE CARBON SOURCE: age _____

Glucose: positive, negative. _____
 Sucrose: positive, negative. _____
 Xylose: positive, negative. _____
 Citrate: positive, negative. 2 DA.
 NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative. 2 DA

REDUCTIONS:

Nitrate: NO₂⁻ _____, NH₄⁺ _____, gas _____, negative. _____
 Methylene blue: positive, negative. _____
 Selenite: positive, negative. 7 DA.
 Tellurite: positive, negative. _____

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid _____, alkaline _____, neutral, gas. _____
 Sucrose: acid _____, alkaline _____, neutral, gas. _____
 Lactose: acid _____, alkaline _____, neutral, gas. _____
 Xylose: acid _____, alkaline _____, neutral, gas. _____
 Mannitol: acid _____, alkaline, neutral, gas. _____

HYDROLYSIS:

Gelatin: positive, negative. 6 DA.
 Casein: positive, negative. _____
 Fat: positive, negative. _____
 Starch: positive, negative. _____
 Cellulose: positive, negative. _____
 Urea: positive, negative. _____

TOLERANCES:

Salt: 2% positive, negative. 2 DA.
 7% positive, negative.
 10% positive, negative.
 pH: acid _____, alkaline _____

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 7 DA.
 Curd: acid, alkaline, absent, gas. _____
 Peptonization: positive, negative. _____
 Reduction: positive, negative. 14 DA.

OTHER REACTIONS:

H₂S from _____: positive, negative. _____
 NH₄⁺ from peptone: positive, negative. _____
 Acetylmethylcarbinol: positive, negative. _____
 Indol: positive, negative. _____
 Methyl red: positive, negative. _____

Descriptive Chart

196Aa Trypticase Soy Agar Little Lake, California
(code number) (medium) (source)

Bacillus megaterium. 28°C. W.B. Bolten
(name of organism) (temperature) (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends ROUND,
filaments, cocci, spirals,
branching _____

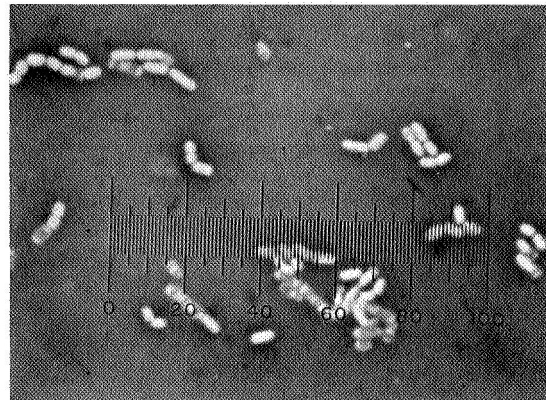
Size: average - 1.13 x 2.92 μ.
range - 1.12 - 1.26 x 2.40 - 5.22 μ.

Irregular forms:

GRAM REACTION:

18 hrs: **100% POSITIVE.**
24 hrs: **100% POSITIVE.**
48 hrs: **100% POSITIVE.**

NIGROSIN:



PASTEURIZATION SURVIVAL (85°C, 10 minutes): **POSITIVE.**

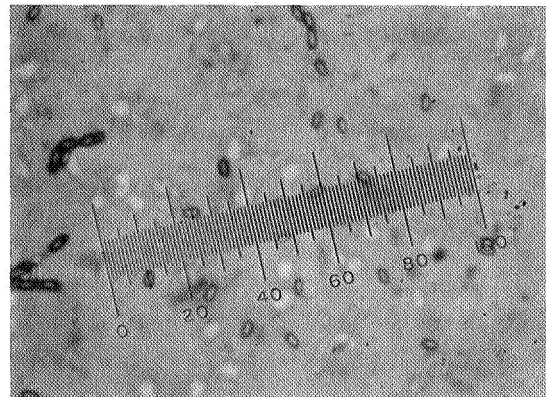
Sporangia: none, rods, spindles, elliptical, clavate, drumstick.

Endospores: swollen, not swollen.

Position: central to excentric, terminal, subterminal.

Shape: spherical, ellipsoidal, cylindrical, oval.

size: average - 1.23 x 2.30 μ.
range - 1.01 - 1.40 x 1.92 - 2.82 μ.



MOTILITY: age 1 DA. **NEGATIVE.**

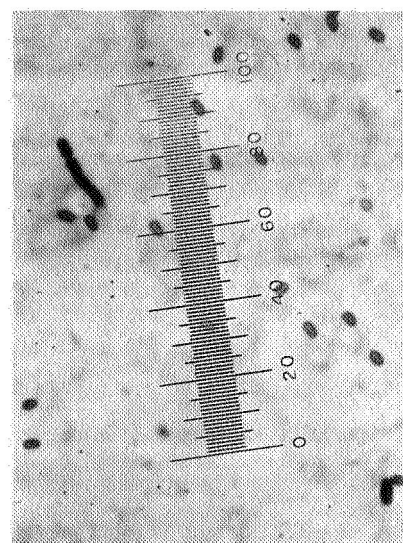
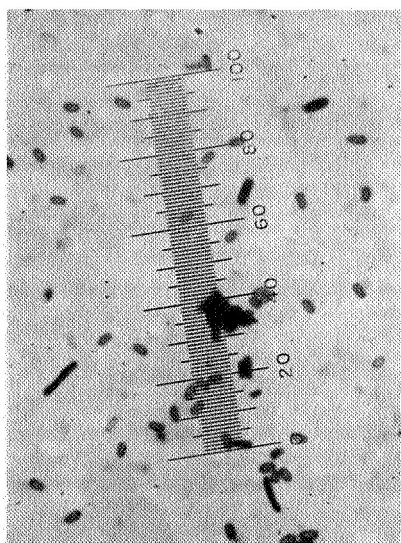
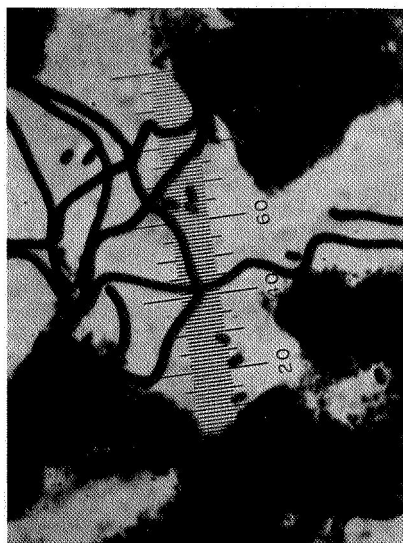
Flagella:

SPORE:

OTHER STAINS:

~~Acid-fast~~
Capsule:

18; 24; 48 GRAM:



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 3 DA.

Amount of growth: *abundant, moderate, scant.*

Form: *aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.*

Consistency: *adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.*

AGAR COLONIES: age 1 DA.

Macroscopic

Size: 3 mm.

Shape: *filamentous, irregular, oval, puntiform, round.*

Elevation: *beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.*

Topography: *contoured, rough, smooth, striated, wrinkled.*

Habit: *compact, spreading.*

Microscopic (100x)

Margin: *Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.*

Internal structure: *amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.*

Optical properties

Appearance by reflected light: *dull, fluorescent, glistening, iridescent, opalescent.*

Appearance by transmitted light: *opaque, translucent, transparent.*

Medium: *blackened, blued, browned, grayed, greened, yellowed, unchanged.*

Chromogenesis:

(medium) (color) (CHM No.)

Trypticase soy agar **PEARL** **3ba**

Potato slant **BAMBOO** **2gc**

NUTRIENT BROTH: age 4 DA.

Amount of growth: *abundant, moderate, scant.*

Surface growth: *none, flocculent, membranous, pellicle, ring.*

Subsurface growth: *none, granular, turbid.*

Sediment: *none, compact, flaky, flocculent, granular, viscid.*

Odor: resembling NONE

GELATIN STAB: age 12 DA.

Liquefaction: *none, crateriform, infundibuliform, napiform, saccate, stratiform.*

Rate: *fast, moderate, slow.*

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: **GOOD.**

Fat agar:

Glucose-nitrate agar: **GROWTH.**

GLUCOSE-NUTRIENT AGAR: EXCELLENT.

NUTRIENT AGAR: GOOD.

ANAEROBIC NITRATE BROTH: NO GAS.

ANAEROBIC GLUCOSE BROW: SLIGHT GROWTH.

pH = 7.0.

DNA

G:C _____

G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: *aerobic, anaerobic, facultative, micro-aerophilic.*

CATALASE: *positive, negative.*

TEMPERATURE RELATIONSHIPS: age 3 DA.

Growth at 10°C. +, 20°C. +, 28°C. +, 37° +, 45°C. +, 55°C. +.

SOLE CARBON SOURCE: age 7 DA.

Glucose: *positive, negative.* 7 DA.

Sucrose: *positive, negative.* 7 DA.

Xylose: *positive, negative.* 7 DA.

Citrate: *positive, negative.* 7 DA.

NH₄⁺ AS SOLE NITROGEN SOURCE: *positive, negative.* 7 DA.

MANNITOL: POSITIVE. 7 DA.

LACTOSE: POSITIVE. 7 DA.

REDUCTIONS:

Nitrate: NO₃⁻ +, NH₄⁺ _____, gas _____, *negative.* 1 DA.

Methylene blue: *positive, negative.* 16 DA.

Selenite: *positive, negative.* _____

Tellurite: *positive, negative.* _____

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: *acid +, alkaline _____, neutral, gas.* 7 DA.

Sucrose: *acid +, alkaline _____, neutral, gas.* 7 DA.

Lactose: *acid +, alkaline _____, neutral, gas.* 7 DA.

Xylose: *acid +, alkaline _____, neutral, gas.* 7 DA.

Mannitol: *acid +, alkaline, neutral, gas.* 7 DA.

HYDROLYSIS:

Gelatin: *positive, negative.* 7 DA.

Casein: *positive, negative.* 12 DA.

Fat: *positive, negative.* 7 DA.

Starch: *positive, negative.* 10 DA.

Cellulose: *positive, negative.* _____

Urea: *positive, negative.* _____

TOLERANCES:

Salt: 2%—*positive, negative.* 7 DA.

7%—*positive, negative.*

10%—*positive, negative.*

pH: *acid _____, alkaline _____.*

LITMUS MILK REACTIONS:

Reaction: *acid, alkaline, neutral.* 20 DA.

Curd: *acid, alkaline, absent, gas.* 20 DA.

Peptonization: *positive, negative.* 20 DA.

Reduction: *positive, negative.* 20 DA.

OTHER REACTIONS:

H₂S from _____: *positive, negative.*

NH₄⁺ from peptone: *positive, negative.* 7 DA.

Acetylmethylcarbinol: *positive, negative.* 15 DA.

Indol: *positive, negative.* 23 DA.

Methyl red: *positive, negative.* 15 DA.

196 AA-1

Descriptive Chart

196Ac Trypticase Soy Agar Little Lake, California
(code number) (medium) (source)

Bacillus megaterium. 28°C. W.B. Bollen
(name of organism) (temperature) (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends ROUND,
filaments, cocci, spirals,
branching _____

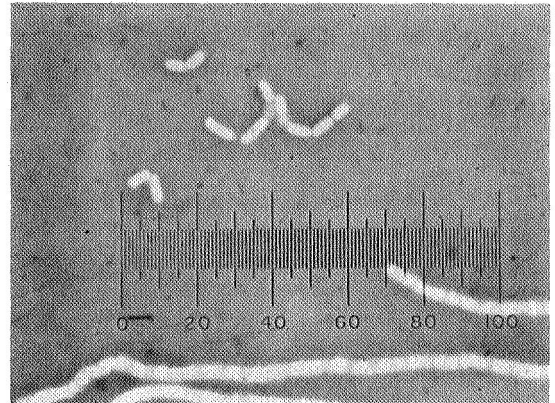
Size: average - 1.32 x 3.19 μ.
range - 1.19-1.46 x 2.25-3.81 μ.

Irregular forms:

GRAM REACTION:

18 hrs: 100% POSITIVE.
24 hrs: 100% POSITIVE.
48 hrs: 100% POSITIVE.

NIGROSIN:



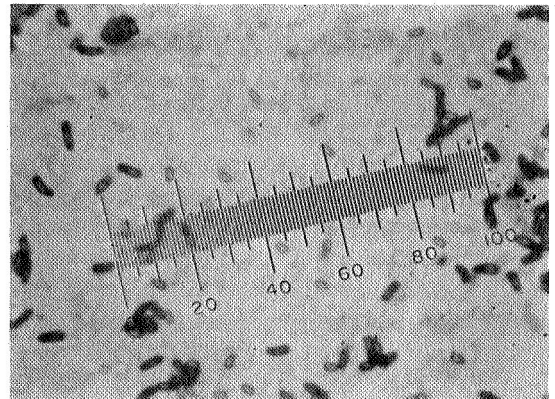
PASTEURIZATION SURVIVAL (85°C, 10 minutes): POSITIVE.

Sporangia: none, rods, spindles, elliptical, clavate, drumstick.
Endospores: swollen, not swollen.
Position: central to excentric, terminal, subterminal.
Shape: spherical, ellipsoidal, cylindrical, oval.
size: average - 1.11 x 2.30 μ.
range - 1.04-1.22 x 1.72-3.19 μ.

MOTILITY: age 1 DA. NEGATIVE.

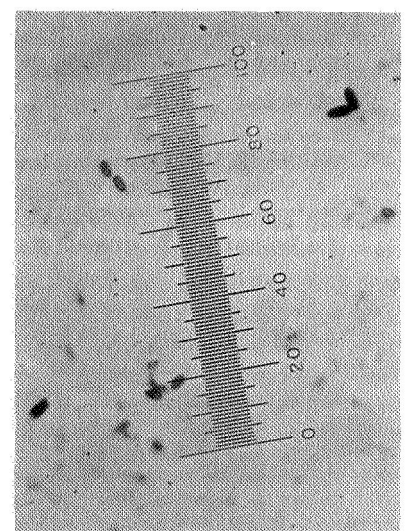
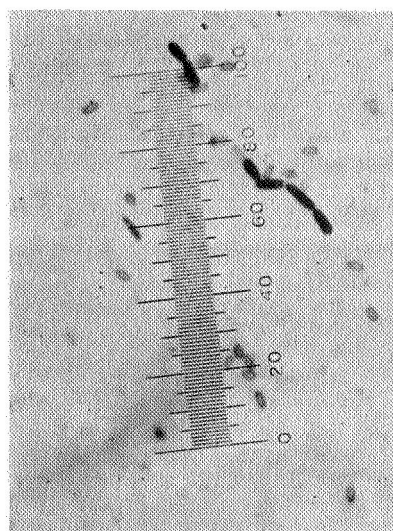
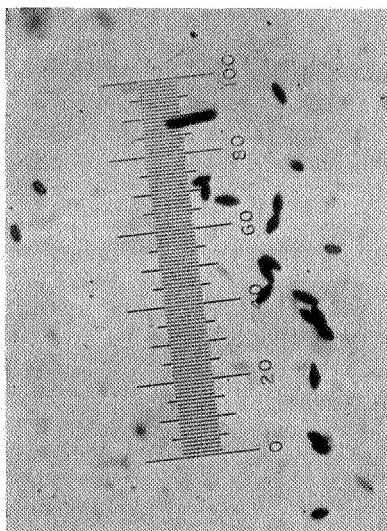
Flagella:

SPORE:



OTHER STAINS:

~~Acid-fast:~~ 18; 24; 48 GRAM:



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 3 DA.

Amount of growth: abundant, moderate, scant.
Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.
Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 3 DA.

Macroscopic
Size: 3 mm.
Shape: filamentous, irregular, oval, puntiform, round.
Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.
Topography: contoured, rough, smooth, striated, wrinkled.
Habit: compact, spreading.
Microscopic (100x)
Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.
Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.
Optical properties
Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.
Appearance by transmitted light: opaque, translucent, transparent.
Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.
Chromogenesis:
(medium) (color) (CHM No.)
Trypticase soy agar PEARL 3ba
Potato slant LT. IVORY 3ca

NUTRIENT BROTH: age 4 DA.

Amount of growth: abundant, moderate, scant.
Surface growth: none, flocculent, membranous, pellicle, ring.
Subsurface growth: none, granular, turbid.
Sediment: none, compact, flaky, flocculent, granular, viscid.
Odor: resembling NONE.

GELATIN STAB: age 12 DA.

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.
Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: GOOD.
Fat agar:
Glucose-nitrate agar: GOOD.
GLUCOSE-NUTRIENT AGAR: EXCELLENT.
NUTRIENT AGAR: GOOD.
ANAEROBIC NITRATE BROTH: NO GAS.
ANAEROBIC GLUCOSE BROTH: POSITIVE GROWTH.
PH 6.8.

DNA

G:C _____
G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age 3 DA.
Growth at 10°C. +, 20°C. +, 28°C. +, 37°C. +, 45°C. +, 55°C. +.

SOLE CARBON SOURCE: age 7 DA.

Glucose: positive, negative. 7 DA.
Sucrose: positive, negative. 7 DA.
Xylose: positive, negative. 7 DA.
Citrate: positive, negative. 7 DA.
NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative.

MANNITOL: POSITIVE. 7 DA.
LACTOSE: POSITIVE. 7 DA.

REDUCTIONS:
Nitrate: NO₂⁻ +, NH₄⁺ _____, gas _____, negative. 1 DA.
Methylene blue: positive, negative. 16 DA.
Selenite: positive, negative.
Tellurite: positive, negative.

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid +, alkaline _____, neutral, gas. 7 DA.
Sucrose: acid +, alkaline _____, neutral, gas. 7 DA.
Lactose: acid +, alkaline _____, neutral, gas. 7 DA.
Xylose: acid +, alkaline _____, neutral, gas. 7 DA.
Mannitol: acid +, alkaline, neutral, gas. 7 DA.

HYDROLYSIS:

Gelatin: positive, negative. 7 DA.
Casein: positive, negative. 12 DA.
Fat: positive, negative. 7 DA.
Starch: positive, negative. 7 DA.
Cellulose: positive, negative.
Urea: positive, negative.

TOLERANCES:

Salt: 2% positive, negative. 7 DA.
7% positive, negative.
10% positive, negative.
pH: acid _____, alkaline _____.

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 20 DA.
Curd: acid, alkaline, absent, gas. 20 DA.
Peptonization: positive, negative. 20 DA.
Reduction: positive, negative. 20 DA.

OTHER REACTIONS:

H₂S from _____: positive, negative.
NH₄⁺ from peptone: positive, negative. 7 DA.
Acetylmethylcarbinol: positive, negative. 15 DA.
Indol: positive, negative. 23 DA.
Methyl red: positive, negative. 15 DA.

Descriptive Chart

197Ab Trypticase Soy Agar Little Lake, California
(code number) (medium) (source)

Bacillus megaterium 28°C. W.B. Bollen
(name of organism) (temperature) (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends ROUND,
filaments, cocci, spirals,
branching _____

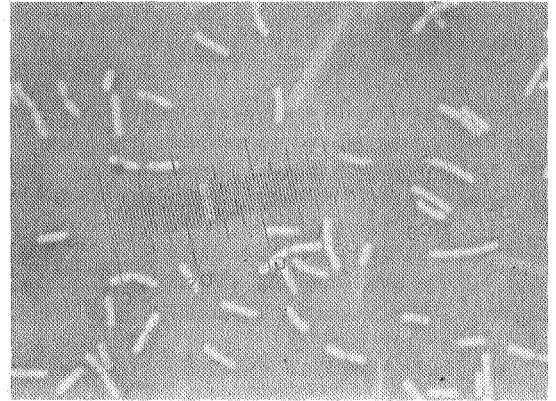
Size: average - 0.92 x 3.27 μ.
range - 0.72 - 1.04 x 2.56 - 3.32

Irregular forms:

GRAM REACTION:

18 hrs: 100% POSITIVE.
24 hrs: 100% POSITIVE.
48 hrs: 100% POSITIVE.

MAROSIN:



PASTEURIZATION SURVIVAL (85°C, 10 minutes): POSITIVE.

Sporangia: none, rods, spindles, elliptical, clavate, drumstick.

Endospores: swollen, not swollen.

Position: central to excentric, terminal, subterminal.

Shape: spherical, ellipsoidal, cylindrical, oval.

size: average -

range -

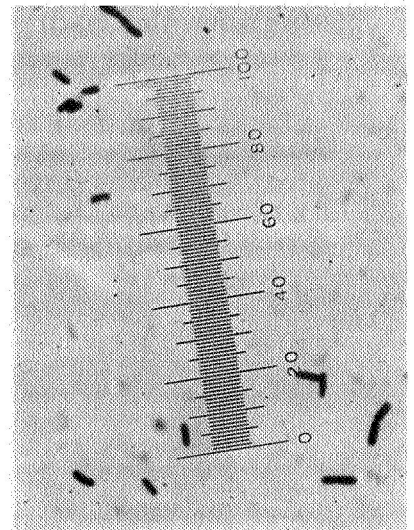
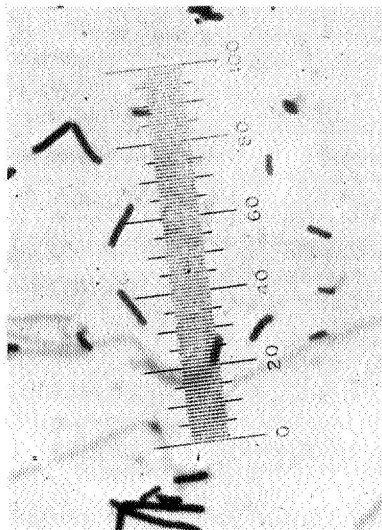
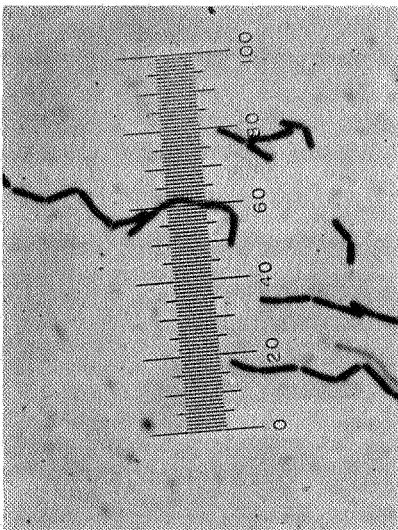
MOTILITY: age 2 DA. NEGATIVE.

Flagella:

OTHER STAINS:

~~Acid fast~~

18, 24, 48 HR. GRAM:



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 3 DA

Amount of growth: abundant, moderate, scant.
Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.
Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 1 DA

Macroscopic
Size: 2 mm.
Shape: filamentous, irregular, oval, puntiform, round.
Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.
Topography: contoured, rough, smooth, striated, wrinkled.
Habit: compact, spreading.

Microscopic (100x)
Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.
Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties
Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.
Appearance by transmitted light: opaque, translucent, transparent.
Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.
Chromogenesis:
(medium) (color) (CHM No.)
Trypticase soy agar CREAM 1 1/2 cl
Potato slant NO GROWTH.

NUTRIENT BROTH: age 4 DA

Amount of growth: abundant, moderate, scant.
Surface growth: none, flocculent, membranous, pellicle, ring.
Subsurface growth: none, granular, turbid.
Sediment: none, compact, flaky, flocculent, granular, viscid.
Odor: resembling NONE.

GELATIN STAB: age 8 DA

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.
Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: GOOD.
Fat agar:
Glucose-nitrate agar: FAIR GROWTH.
GLUCOSE-NUTRIENT AGAR: EXCELLENT.
NUTRIENT AGAR: EXCELLENT.
ANAEROBIC NITRATE BROTH: NO GAS.
ANAEROBIC GLUCOSE BROTH: GROWTH.

DNA
G:C _____
G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age 3 DA
Growth at 10°C +, 20°C +, 28°C +, 37°C +,
48°C +, 58°C +.

SOLE CARBON SOURCE: age 7 DA

Glucose: positive, negative. 7 DA.
Sucrose: positive, negative. 7 DA.
Xylose: positive, negative. 7 DA.
Citrate: positive, negative. 2 DA.

NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative. 7 DA.

MANNITOL: POSITIVE. 7 DA.
LACTOSE: POSITIVE. 7 DA.

REDUCTIONS:
Nitrate: NO₂⁻ _____, NH₄⁺ _____, gas _____, negative. 11 DA.
Methylene blue: positive, negative. 16 DA.
Selenite: positive, negative. _____
Tellurite: positive, negative. _____

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid +, alkaline _____, neutral, gas. 7 DA.
Sucrose: acid +, alkaline _____, neutral, gas. 7 DA.
Lactose: acid _____, alkaline +, neutral, gas. 7 DA.
Xylose: acid _____, alkaline +, neutral, gas. 7 DA.
Mannitol: acid +, alkaline, neutral, gas. 7 DA.

HYDROLYSIS:

Gelatin: positive, negative. _____
Casein: positive, negative. 7 DA.
Fat: positive, negative. 7 DA.
Starch: positive, negative. NARROW 7 DA.
Cellulose: positive, negative. _____
Urea: positive, negative. _____

TOLERANCES:

Salt: 2% positive, negative. 7 DA.
7% positive, negative.
10% positive, negative.
pH: acid _____, alkaline _____

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 20 DA.
Curd: acid, alkaline, absent, gas. 20 DA.
Peptonization: positive, negative. 20 DA.
Reduction: positive, negative. 4 DA.

OTHER REACTIONS:

H₂S from _____: positive, negative. _____
NH₄⁺ from peptone: positive, negative. 7 DA.
Acetylmethylcarbinol: positive, negative. 17 DA.
Indol: positive, negative. 23 DA.
Methyl red: positive, negative. 17 DA.

Descriptive Chart

197Bc Trypticase Soy Agar Little Lake, California.
(code number) (medium) (source)

Bacillus megaterium 28°C. W.B. Bollen
(name of organism) (temperature) (studied by)

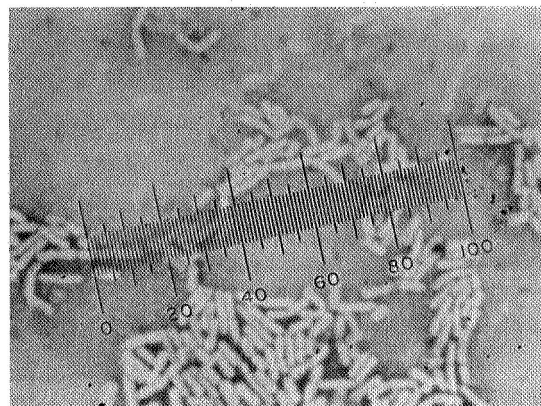
I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends ROUND,
filaments, cocci, spirals,
branching

Size: average - 1.26 x 3.33µ.
range - 1.03-1.65 x 2.71-4.07µ.

Irregular forms:



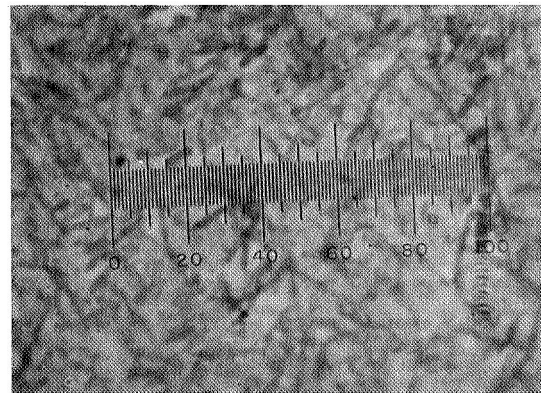
GRAM REACTION:

18 hrs: 100% POSITIVE.
24 hrs: 100% POSITIVE.
48 hrs: 100% POSITIVE.

NIGROSIN:

PASTEURIZATION SURVIVAL (85°C, 10 minutes): POSITIVE.

Sporangia: none, rods, spindles, elliptical, clavate, drumstick.
Endospores: swollen, not swollen.
Position: central to excentric, terminal, subterminal.
Shape: spherical, ellipsoidal, cylindrical, oval.
size: average - 0.87 x 1.51µ.
range - 0.68-1.02 x 1.35-1.69µ.



MOTILITY: age 1 DA.

NEGATIVE.

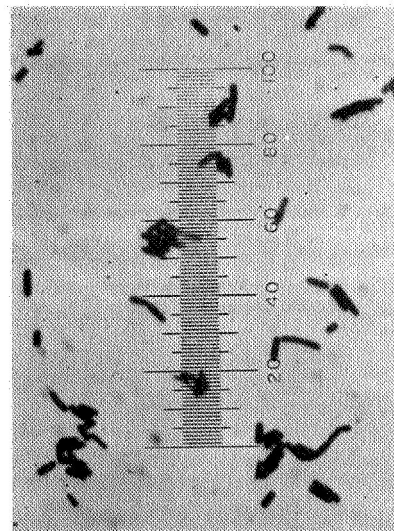
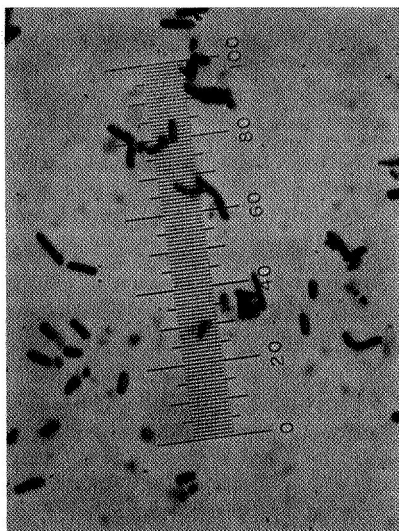
SPORE:

Flagella:

OTHER STAINS:

Acid fast:

18; 24; 48 hr. GRAM:



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 3 DA.

Amount of growth: abundant, moderate, scant.

Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.

Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 1 DA.

Macroscopic

Size: 2 mm.

Shape: filamentous, irregular, oval, puntiform, round.

Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.

Topography: contoured, rough, smooth, striated, wrinkled.

Habit: compact, spreading.

Microscopic (100x)

Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.

Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties

Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.

Appearance by transmitted light: opaque, translucent, transparent.

Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.

Chromogenesis:

(medium) (color) (CHM No.)

Trypticase soy agar **BAMBOO** 2 fb

Potato slant **LT. BEIGE** 3 ec

NUTRIENT BROTH: age 4 DA.

Amount of growth: abundant, moderate, scant.

Surface growth: none, flocculent, membranous, pellicle, ring.

Subsurface growth: none, granular, turbid.

Sediment: none, compact, flaky, flocculent, granular, viscid.

Odor: resembling NONE.

GELATIN STAB: age 8 DA.

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.

Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: **MODERATE.**

Fat agar:

Glucose-nitrate agar: **SCANT.**

GLUCOSE-NUTRIENT AGAR: GOOD.

NUTRIENT AGAR: MODERATE.

ANAEROBIC NITRATE BROTH: NO GAS.

ANAEROBIC GLUCOSE BROTH: SLIGHT GROWTH.
PH 7.2.

DNA

G:C _____

G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age 3 DA.

Growth at 10°C. -, 20°C. +, 28°C. +, 37° +, 45°C. +, 55°C. +

SOLE CARBON SOURCE: age 7 DA.

Glucose: positive, negative. 7 DA.

Sucrose: positive, negative. 7 DA.

Xylose: positive, negative. 7 DA.

Citrate: positive, negative. 7 DA.

NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative. 7 DA.

MANNITOL: POSITIVE. 7 DA.

LACTOSE: POSITIVE. 7 DA.

REDUCTIONS:

Nitrate: NO₂⁻ _____, NH₄⁺ _____, gas _____, negative. 11 DA.

Methylene blue: positive, negative. 3 DA.

Selenite: positive, negative. _____

Tellurite: positive, negative. _____

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid +, alkaline _____, neutral, gas. 7 DA.

Sucrose: acid +, alkaline _____, neutral, gas. 7 DA.

Lactose: acid +, alkaline _____, neutral, gas. 7 DA.

Xylose: acid +, alkaline _____, neutral, gas. 7 DA.

Mannitol: acid +, alkaline, neutral, gas. 7 DA.

HYDROLYSIS:

Gelatin: positive, negative. 20 DA.

Casein: positive, negative. 7 DA.

Fat: positive, negative. 7 DA.

Starch: positive, negative. 7 DA.

Cellulose: positive, negative. _____

Urea: positive, negative. _____

TOLERANCES:

Salt: 2% positive, negative. 7 DA.

7% positive, negative.

10% positive, negative.

pH: acid _____, alkaline _____

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 9 DA.

Curd: acid, alkaline, absent, gas. 30 DA.

Peptonization: positive, negative. 12 DA.

Reduction: positive, negative. 7 DA.

OTHER REACTIONS:

H₂S from _____: positive, negative. _____

NH₄⁺ from peptone: positive, negative. 7 DA.

Acetylmethylcarbinol: positive, negative. 15 DA.

Indol: positive, negative. 23 DA.

Methyl red: positive, negative. 15 DA.

Descriptive Chart

300Aa Trypticase Soy Agar Little Lake, California.
(code number) (medium) (source)

Bacillus megaterium. 28°C. W.B. Bollen
(name of organism) (temperature) (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends ROUND,
filaments, cocci, spirals,
branching _____

Size: average - 1.18 x 3.21 μ.
range - 1.02-1.20 x 2.62-3.76 μ.

Irregular forms:

GRAM REACTION:

18 hrs: 100 % POSITIVE.
24 hrs: 100 % POSITIVE.
48 hrs: 100 % POSITIVE.

NIGROSIN:



PASTEURIZATION SURVIVAL (85°C, 10 minutes): POSITIVE.

Sporangia: none, rods, spindles, elliptical, clavate, drumstick.

Endospores: swollen, not swollen.

Position: central to excentric, terminal, subterminal.

Shape: spherical, ellipsoidal, cylindrical, oval.

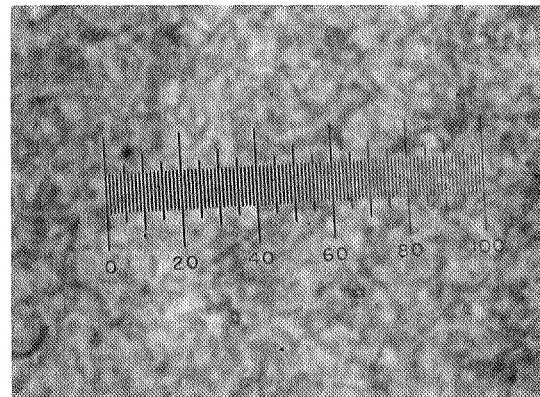
size: average - 0.77 x 1.22 μ.

range - 0.62-0.99 x 1.01-1.76 μ.

MOTILITY: age 1 OA. NEGATIVE.

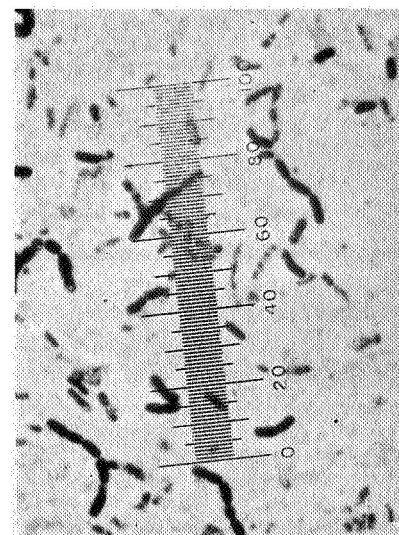
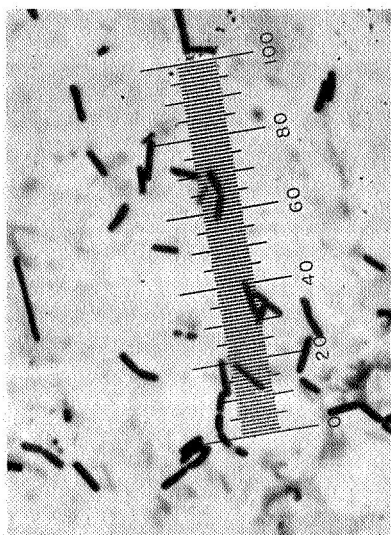
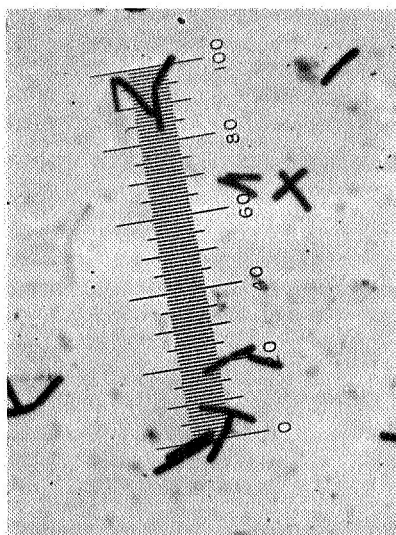
Flagella:

SPORE:



OTHER STAINS:

Acid-fast 18; 24; 48 hr. GRAM:



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 3 DA.

Amount of growth: abundant, moderate, scant.
Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.
Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 3 DA.

Macroscopic
Size: 4 mm.
Shape: filamentous, irregular, oval, puntiform, round.
Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.
Topography: contoured, rough, smooth, striated, wrinkled.
Habit: compact, spreading.
Microscopic (100x)
Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.
Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties
Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.
Appearance by transmitted light: opaque, translucent, transparent.
Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.
Chromogenesis:
(medium) (color) (CHM No.)
Trypticase soy agar CREAM 1 1/2 ca
Potato slant PEARL PINK 3 ca

NUTRIENT BROTH: age 4 DA.

Amount of growth: abundant, moderate, scant.
Surface growth: none, flocculent, membranous, pellicle, ring.
Subsurface growth: none, granular, turbid.
Sediment: none, compact, flaky, flocculent, granular, viscid.
Odor: resembling H₂S.

GELATIN STAB: age 4 DA.

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.
Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: **EXCELLENT.**
Fat agar:
Glucose-nitrate agar: **FAIR.**
GLUCOSE-NUTRIENT AGAR: EXCELLENT.
NUTRIENT AGAR: GOOD.
ANAEROBIC NITRATE BROTH: NO GAS.
ANAEROBIC GLUCOSE BROTH: SLIGHT GROWTH.
PH 7.0.

DNA
G:C _____
G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age 3 DA.
Growth at 10°C. -, 20°C. +, 28°C. +, 37° +, 45°C. +, 55°C. ±.

SOLE CARBON SOURCE: age 7 DA.

Glucose: positive, negative. 7 DA.
Sucrose: positive, negative. 7 DA.
Xylose: positive, negative. 7 DA.
Citrate: positive, negative. 7 DA.
NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative. 7 DA.

MANNITOL: POSITIVE. 7 DA.

LACTOSE: POSITIVE. 7 DA.

REDUCTIONS: 11 DA.

Nitrate: NO₂⁻ _____, NH₄⁺ _____, gas _____, negative. 6 DA.
Methylene blue: positive, negative. _____
Selenite: positive, negative. _____
Tellurite: positive, negative. _____

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid +, alkaline _____, neutral, gas. 7 DA.
Sucrose: acid +, alkaline _____, neutral, gas. 7 DA.
Lactose: acid _____, alkaline +, neutral, gas. 30 DA.
Xylose: acid _____, alkaline _____, neutral, gas. 30 DA.
Mannitol: acid _____, alkaline, neutral, gas. 30 DA.

HYDROLYSIS:

Gelatin: positive, negative. 7 DA.
Casein: positive, negative. 12 DA.
Fat: positive, negative. 7 DA.
Starch: positive, negative. 7 DA.
Cellulose: positive, negative. _____
Urea: positive, negative. _____

TOLERANCES:

Salt: 2% positive, negative. 7 DA.
7% positive, negative. _____
10% positive, negative. _____
pH: acid _____, alkaline _____.

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 10 DA.
Curd: acid, alkaline, absent, gas. 30 DA.
Peptonization: positive, negative. 10 DA.
Reduction: positive, negative. 7 DA.

OTHER REACTIONS:

H₂S from _____: positive, negative. _____
NH₄⁺ from peptone: positive, negative. 7 DA.
Acetylmethylcarbinol: positive, negative. 15 DA.
Indol: positive, negative. 23 DA.
Methyl red: positive, negative. 15 DA.

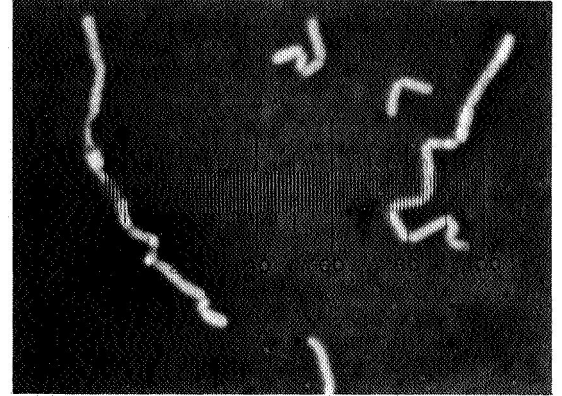
Descriptive Chart

<u>300Ae</u> (code number)	<u>Trypticase Soy Agar</u> (medium)	<u>Little Lake, California.</u> (source)
<u>Bacillus megaterium</u> (name of organism)	<u>28°C.</u> (temperature)	<u>W.B. Bollen</u> (studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends **ROUND**,
filaments, cocci, spirals,
branching _____
Size: average - **1.21 x 2.42 μ.**
range - **0.91 - 1.38 x 1.76 - 3.03 μ.**
Irregular forms:



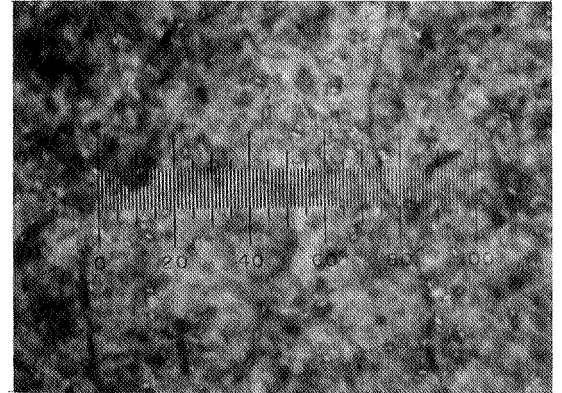
GRAM REACTION:

18 hrs: **100% POSITIVE.**
24 hrs: **100% POSITIVE.**
48 hrs: **100% POSITIVE.**

NIGROSIN:

PASTEURIZATION SURVIVAL (85°C, 10 minutes): **POSITIVE.**

Sporangia: none, rods, spindles, elliptical, clavate, drumstick.
Endospores: swollen, not swollen.
Position: central to excentric, terminal, subterminal.
Shape: spherical, ellipsoidal, cylindrical, oval.
size: average - **0.79 x 1.35 μ.**
range - **0.70 - 0.88 x 1.26 - 1.70 μ.**

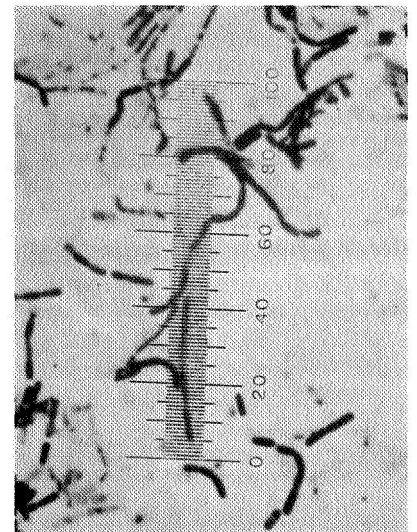
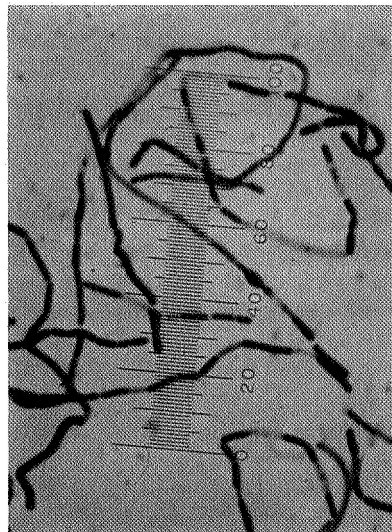
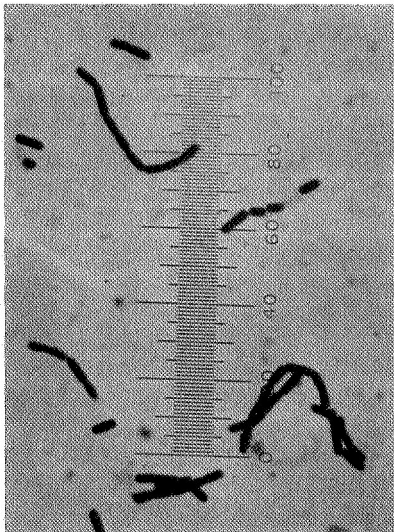


MOTILITY: age _____ **1 DA: NEGATIVE.**
Flagella: **4 DA: NEGATIVE.**

SPORE:

OTHER STAINS:

Acid fast: **18; 24; 48 hr. GRAM:**



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 5 DA.

Amount of growth: abundant, moderate, scant.

Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.

Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 3 DA.

Macroscopic

Size: 3 mm.

Shape: filamentous, irregular, oval, puntiform, round.

Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.

Topography: contoured, rough, smooth, striated, wrinkled.

Habit: compact, spreading.

Microscopic (100x)

Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.

Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties

Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.

Appearance by transmitted light: opaque, translucent, transparent.

Medium: blackened, blued, browned, grayed, greened, yellowed, unchanged.

Chromogenesis:

(medium) (color) (CHM No.)

Trypticase soy agar PEARL PINK 3CA

Potato slant

-

-

NUTRIENT BROTH: age 4 DA.

Amount of growth: abundant, moderate, scant.

Surface growth: none, flocculent, membranous, pellicle, ring.

Subsurface growth: none, granular, turbid.

Sediment: none, compact, flaky, flocculent, granular, viscid.

Odor: resembling NONE.

GELATIN STAB: age 6 DA.

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.

Rate: fast, moderate, slow.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: GOOD.

Fat agar:

Glucose-nitrate agar: SCANT.

GLUCOSE-NUTRIENT AGAR: SCANT.

NUTRIENT AGAR: FAINT.

ANAEROBIC NITRATE BROTH: NO GAS.

ANAEROBIC GLUCOSE BROTH: GROWTH.

DNA

G:C _____

G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

300/AE

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age 3 DA.

Growth at 30°C. -, 20°C. +, 28°C. +, 35°C. +, 45°C. -, 55°C. -.

SOLE CARBON SOURCE: age _____

Glucose: positive, negative. 7 DA.

Sucrose: positive, negative. 7 DA.

Xylose: positive, negative. 7 DA.

Citrate: positive, negative. 2 DA.

NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative. 5 DA.

MANNITOL: POSITIVE. 7 DA.

LACTOSE: POSITIVE. 7 DA.

REDUCTIONS: 15 DA.

Nitrate: NO₂⁻ _____, NH₄⁺ _____, gas _____, negative. 9 DA.

Methylene blue: positive, negative. _____

Selenite: positive, negative. _____

Tellurite: positive, negative. _____

- _____

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid +, alkaline _____, neutral, gas. 7 DA.

Sucrose: acid +, alkaline _____, neutral, gas. 7 DA.

Lactose: acid _____, alkaline +, neutral, gas. 7 DA.

Xylose: acid _____, alkaline _____, neutral, gas. 7 DA.

Mannitol: acid +, alkaline, neutral, gas. 7 DA.

- _____

HYDROLYSIS:

Gelatin: positive, negative. 7 DA.

Casein: positive, negative. 2 DA.

Fat: positive, negative. 14 DA.

Starch: positive, negative. 14 DA.

Cellulose: positive, negative. _____

Urea: positive, negative. _____

TOLERANCES:

Salt: 2%—positive, negative. 5 DA.

7%—positive, negative.

10%—positive, negative.

pH: acid _____, alkaline _____

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 20 DA.

Curd: acid, alkaline, absent, gas. 20 DA.

Peptonization: positive, negative. 20 DA.

Reduction: positive, negative. 20 DA.

OTHER REACTIONS:

H₂S from _____: positive, negative. _____

NH₄⁺ from peptone: positive, negative. 6 DA.

Acetylmethylcarbinol: positive, negative. 17 DA.

Indol: positive, negative. 23 DA.

Methyl red: positive, negative. 17 DA.

Descriptive Chart

304Aa

(code number)

Trypticase Soy Agar

(medium)

Little Lake, California.

(source)

Bacillus subtilis var. niger

(name of organism)

28°C.

(temperature)

W.B. Bollen

(studied by)

I. STAINING & MORPHOLOGICAL CHARACTERISTICS

MORPHOLOGY:

Form: rods, ends ROUND,
filaments, cocci, spirals,
branching _____

Size: average - 0.75 x 2.65 μ.
range - 0.62-0.82 x 2.19-3.18 μ.

Irregular forms:

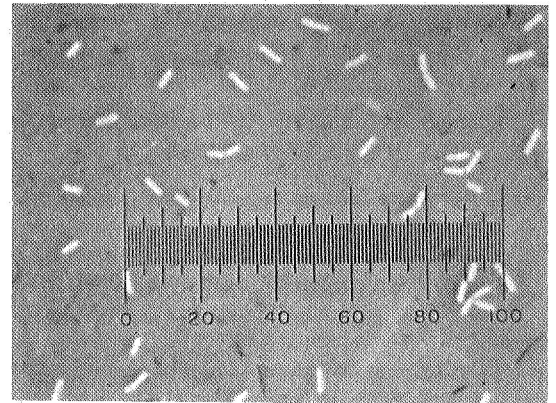
GRAM REACTION:

18 hrs: 100% POSITIVE.

24 hrs: 100% POSITIVE.

48 hrs: 100% POSITIVE.

NIGROSIN:



PASTEURIZATION SURVIVAL (85°C, 10 minutes): POSITIVE.

Sporangia: none, rods, spindles, elliptical, clavate, drumstick.

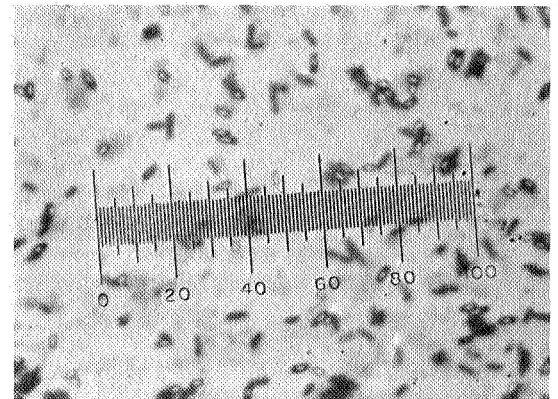
Endospores: swollen, not swollen.

Position: central to excentric, terminal, subterminal.

Shape: spherical, ellipsoidal, cylindrical, oval.

size: average - 0.99 x 1.94 μ.

range - 0.92-1.18 x 1.42-2.55 μ.



MOTILITY: age 1 DAY

NEGATIVE.

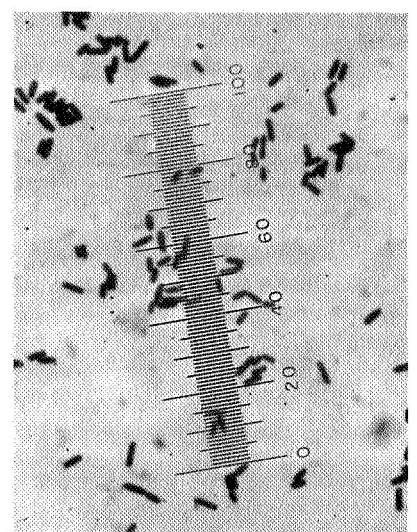
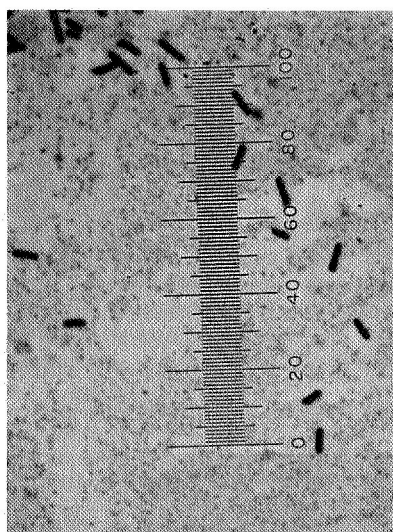
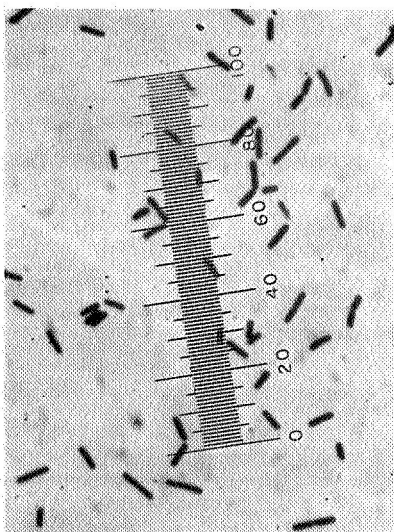
SPORE:

Flagella:

OTHER STAINS:

Acid fast

18; 24; 48 hr. GRAM:



II. CULTURAL CHARACTERISTICS

AGAR STROKE: age 3 DA.

Amount of growth: abundant, moderate, scant.

Form: aborescent, beaded, echinulate, effuse, filiform, rhizoid, spreading.

Consistency: adherent, brittle, butyrous, membranous, moist, slimy, soft, tough, viscid, waxy.

AGAR COLONIES: age 1 DA.

Macroscopic

Size: 2 mm.

Shape: filamentous, irregular, oval, puntiform, round.

Elevation: beveled, convex, effuse, flat, papillate, pulvinate, raised, rugose, umbonate.

Topography: contoured, rough, smooth, striated, wrinkled.

Habit: compact, spreading.

Microscopic (100x)

Margin: Ciliate, cleft, crenate, entire, erose, granular, lobed, rhizoid, undulate.

Internal structure: amorphous, dense, filamentous, granular (fine, coarse), interlaced, striated.

Optical properties

Appearance by reflected light: dull, fluorescent, glistening, iridescent, opalescent.

Appearance by transmitted light: opaque, translucent, transparent.

Medium: blackened, blue, browned, grayed, greened, yellowed, unchanged.

Chromogenesis:

(medium) (color) (CHM No.)

Trypticase soy agar PEARL 3ba

Potato slant BLACK PLUM 10 po

NUTRIENT BROTH: age 4 DA.

Amount of growth: abundant, moderate, scant.

Surface growth: none, flocculent, membranous, pellicle, ring.

Subsurface growth: none, granular, turbid.

Sediment: none, compact, flaky, flocculent, granular, viscid.

Odor: resembling NONE.

GELATIN STAB: age 3 DA.

Liquefaction: none, crateriform, infundibuliform, napiform, saccate, stratiform.

Rate: fast, moderate, low.

OTHER GROWTH CHARACTERISTICS:

Soybean infusion agar: EXCELLENT.

Fat agar:

Glucose-nitrate agar: MODERATE.

GLUCOSE-NUTRIENT AGAR: EXCELLENT.

NUTRIENT AGAR: EXCELLENT.

NUTRIENT AGAR + TYROSINE: BLACK GROWTH.

ANAEROBIC NITRATE BROTH: NO GAS.

ANAEROBIC GLUCOSE BROTH: GROWTH. pH 6.8.

DNA

G:C _____

G+C _____ moles %

III. PHYSIOLOGICAL CHARACTERISTICS

RELATIONSHIP TO O₂: aerobic, anaerobic, facultative, micro-aerophilic.

CATALASE: positive, negative.

TEMPERATURE RELATIONSHIPS: age 3 DA.

Growth at 55°C. +, 20°C. +, 28°C. +, 37°C. +, 45°C. +, 55°C. ±.

SOLE CARBON SOURCE: age _____

Glucose: positive, negative. 7 DA.

Sucrose: positive, negative. 7 DA.

Xylose: positive, negative. 7 DA.

Citrate: positive, negative. 7 DA.

NH₄⁺ AS SOLE NITROGEN SOURCE: positive, negative. 7 DA.

MANNITOL: POSITIVE. 7 DA.

LACTOSE: POSITIVE. 7 DA.

REDUCTIONS:

Nitrate: NO₂⁻ +, NH₄⁺ _____, gas _____, negative. 1 DA.

Methylene blue: positive, negative. 1 DA.

Selenite: positive, negative. _____

Tellurite: positive, negative. _____

OXIDATIVE-FERMENTATIVE REACTIONS

Glucose: acid +, alkaline _____, neutral, gas. 7 DA.

Sucrose: acid +, alkaline _____, neutral, gas. 7 DA.

Lactose: acid _____, alkaline +, neutral, gas. 7 DA.

Xylose: acid _____, alkaline +, neutral, gas. 7 DA.

Mannitol: acid +, alkaline, neutral, gas. 7 DA.

HYDROLYSIS:

Gelatin: positive, negative. 7 DA.

Casein: positive, negative. 7 DA.

Fat: positive, negative. 7 DA.

Starch: positive, negative. 7 DA.

Cellulose: positive, negative. _____

Urea: positive, negative. _____

TOLERANCES:

Salt: 2%—positive, negative. 7 DA.

7%—positive, negative.

10%—positive, negative.

pH: acid _____, alkaline _____

LITMUS MILK REACTIONS:

Reaction: acid, alkaline, neutral. 3 DA.

Curd: acid, alkaline, absent, gas. 30 DA.

Peptonization: positive, negative. 2 DA.

Reduction: positive, negative. 3 DA.

OTHER REACTIONS:

H₂S from _____: positive, negative.

NH₄⁺ from peptone: positive, negative. 7 DA.

Acetylmethylcarbinol: positive, negative. 15 DA.

Indol: positive, negative. 23 DA.

Methyl red: positive, negative. 15 DA.

Nigrosin stain of 24 hour culture of
isolant, 303Bb. Isolant, 300Bd is
the same.

