Class

*Actinobacteria*

Subclass

*Actinobacteridae*

Order

*Actinomycetales*

Suborder

*Micromonosporineae*

Family

*Micromonosporaceae*

Genus

*Dactylosporangium*

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# The Genus Dactylosporangium

To the genus *Dactylosporangium* belong 6 species *Dactylosporangium aurantiacum, fulvum, matsuzakiense, roseum, thailandense* and *vinaceum.*

Finger shaped to claviform sporangia (0,6-1,4 x 2,5-6,0 µm) are formed on short sporangiophores on the substrate mycelium. They are developed singly or in clusters above the surface of the substrate. Each sporangium contains a single row of normally three to four spores. The spores are oblong, ellipsoidal, ovoid, or slightly pyriform (0,4-1,3 x 0,5-1,8 µm) and motile by means of a polarly inserted tuft of flagella. True aerial mycelium is not formed. Hyphae of the substrate mycelium are 0,5-1,0 µm in diameter, branched and rarely septate. Large globose spores (1,7-2,8 µm in diameter) are formed on short branches on substrate mycelium. Colonies grow on various agar media. They are compact, somewhat tough and leathry, and mostly flat or sometimes elevated with a smooth to slightly wrinkled surface. The substrate mycelium is pale to deep orange, rose or winecolored to brown.

The peptidoglycan of the cell walls contains meso-diaminopimelic acid (meso-DAP) and glycine, with xylose and arabinose as characteristic sugars of whole-cell hydrolysates. Characteristic phospholipids are phosphatidylinositol mannosides, phosphatidylinositol, phosphatidylethanolamine, and diphosphatidylglycerol. Branched iso- and anteiso- fatty acids are main components. Characteristic fatty acids are 15 : 0 iso, 15 : 0 anteiso, 16 : 0 iso,
16 : 0, 17 : 0, 18 : 1 cis 9 and 18 : 0.

Optimal growth temperature is 25-37℃ and the pH op timum is 6,0-7,0. Found in soil, plant debris, and lake sediments

Type species is *Dactylosporangium aurantiacum.*

Lit.: Thiemann, J. E., H. Pagani and G. Beretta. 1967.
A new genus of the *Actinoplanaceae*. *Dactylosporangium*, gen. nov.
Arch. Microbiol. 58: 42-52

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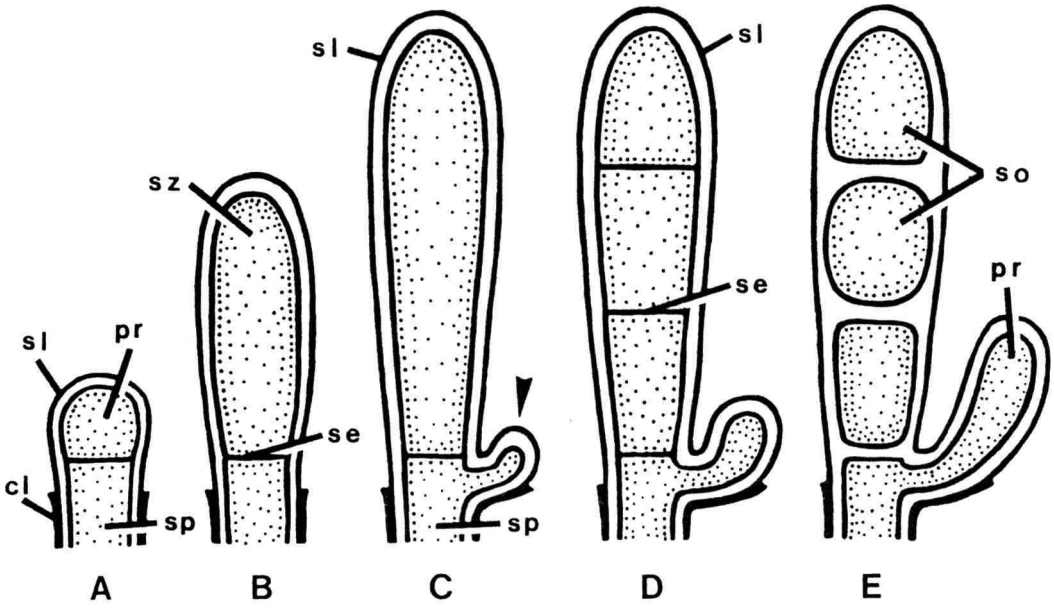
Scheme of the sporangial ontogeny in *Dactylosporangium*




A primordial cell (pr) is separated at the tip of the future sporangiophore (sp); the whole hyphal apex is surrounded by an envelope (sl) and a collar (cl) in *D. thailandense.*
The sporogenous cell (sz) extends, further on separated by the basal cross-wall (se)
A subterminal outgrowth occurs at the end of the sporangiophore (sp)-(arrow).
The completely stretched sporogenous cell is separated (se) into spore-size segments, held together by the sporangial envelope (sl).
A new sporangial primordium (pr) is growing laterally to the mature sporangium, which contains a single row of rounded-off spores (so)
(by Vobis 1986)

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# Genus Identity Card

| **Genus** | ***Dactylosporangium*** |
|---|---|
| Wall chemotype | meso-DAP, glycine (type I) |
| Whole cell sugar pattern | xylose, arabinose |
| Fatty acid pattern | iso C 15:0, anteiso C 15:0, iso C 16:0, C 16:0, C 17:0 |
| Major menaquinone (MK) | -9($H_4$,$H_6$,$H_8$) |
| Phospholipidtype | phosphatidylinositol, phosphatidylethanolamine, diphosphatidylglycerol, phosphatidylinositol mannoside |
| Mol% G+C of DNA | 71-73 |
| Morphology | branched substrate mycelium, finger shaped to claviform sporangia on short sporangiophores |
| Type species | *Dactylosporangium aurantiacum* |

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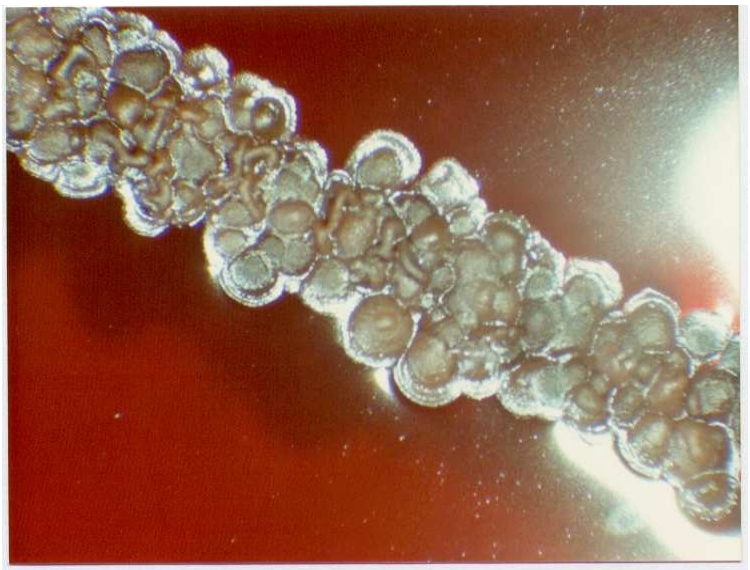
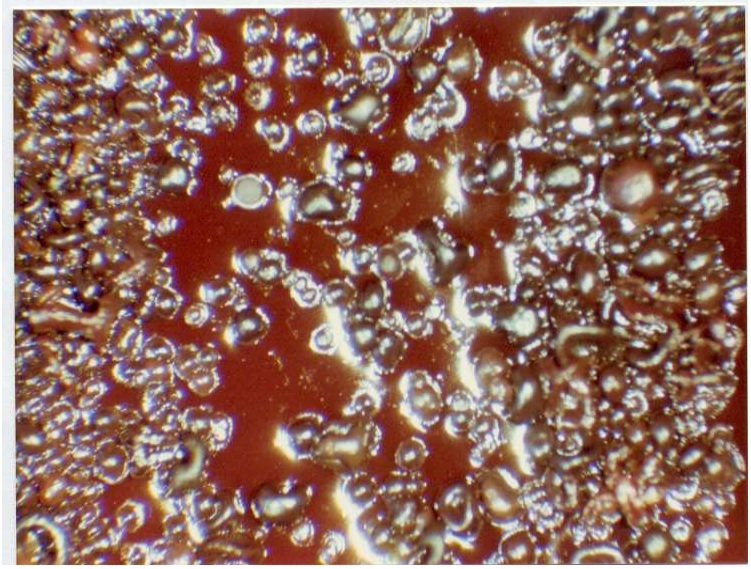
# *Dactylosporangium vinaceum*





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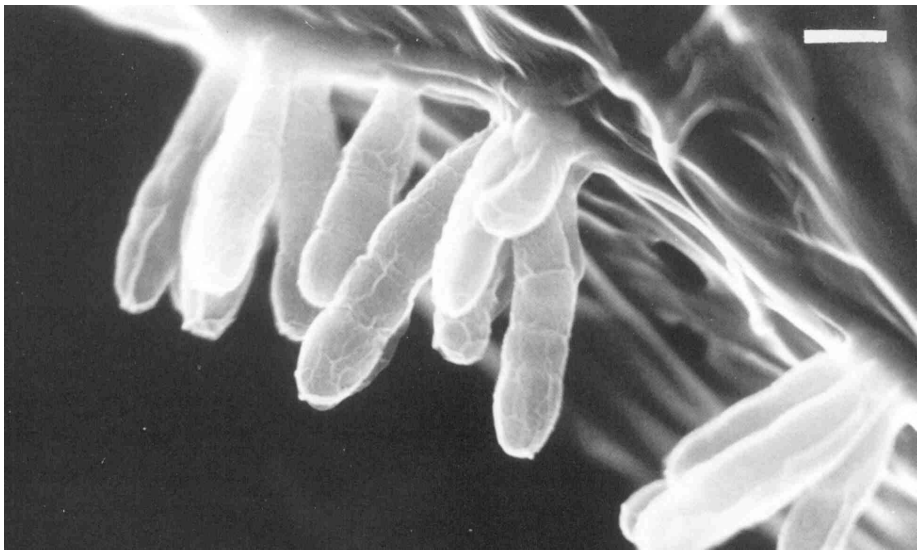
# *Dactylosporangium roseum* Shomura et al. 1985

**(by T. Schomura, H. Tohyama & S. Amano)**



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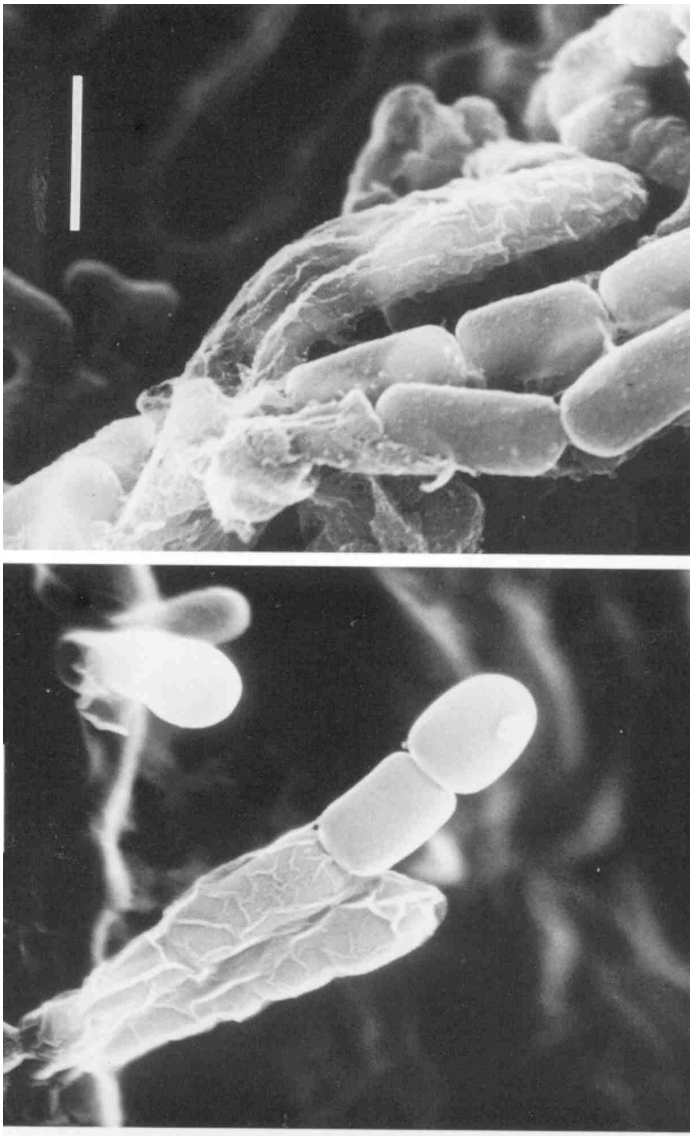
# Dactylosporangium matsuzakiense (upper)
# Dactylosporangium fulvum (lower)
## (by T. Shomura)



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# *Dactylosporangium roseum*
# Shomura et al. 1985
## (by T. Shomura, H. Tohyama & S. Amano)

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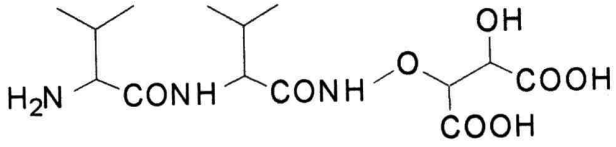
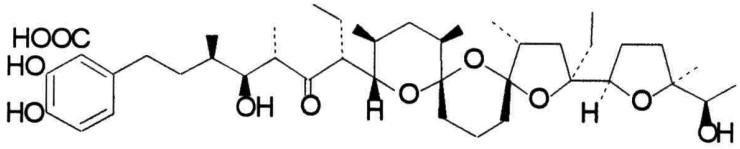
Secondary metabolites of *Dctylosporangium* species

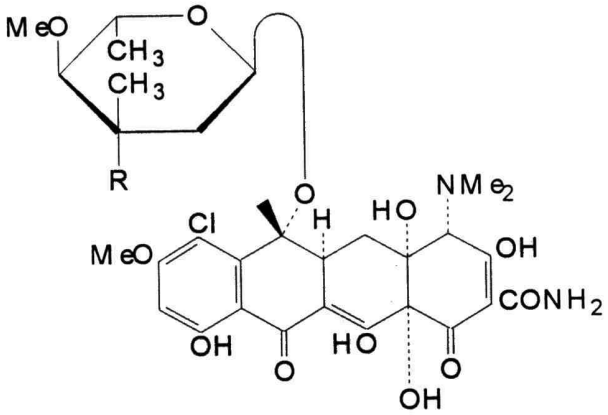
SF 2339, oligopeptide antibiotic, active against gram-positive and –negative bacteria




44161, polyether antibiotic

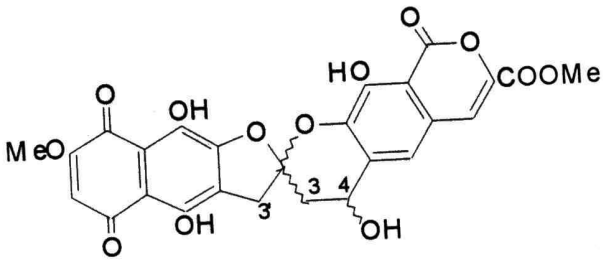



Dactylocycline, tetracycline antibiotic, active against gram positive bacteria




R = NHOH

Purpuromycin, quinone antibiotic, active against gram-positive bacteria

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Name: DACTYLOSPORANGIUM
Authors: Thiemann et al. 1967
Status: Approved Lists
Type species: D. aurantiacum
Literature: Int. J. Syst. Bacteriol. 30:289 (AL)

Name: *Dactylosporangium aurantiacum* **(Type species)**
Authors: Thiemann et al. 1967
Status: Approved Lists
Literature: Int. J. Syst. Bacteriol. 30:289 (AL)
Risk group: 1 (German classification)
Type strain: ATCC 23491, DSM 43157, IFO 12592, IMET 9028

Name: *Dactylosporangium fulvum*
Authors: Shomura et al. 1986
Status: New Species
Literature: Int. J. Syst. Bacteriol. 36:166
Risk group: 1 (German classification)
Type strain: DSM 43917, IFO 14381, SF-2113

Name: *Dactylosporangium matsuzakiense*
Authors: Shomura and Niida 1983
Status: New Species
Literature: Int. J. Syst. Bacteriol. 33:672 (validation list)
Risk group: 1 (German classification)
Type strain: ATCC 31570, DSM 43810, FERM-P 4670, SF-2052

Name: *Dactylosporangium roseum*
Authors: Shomura et al. 1985
Status: New Species
Literature: Int. J. Syst. Bacteriol. 35:1
Risk group: 1 (German classification)
Type strain: DSM 43916, IFO 14352, SF-2186

Name: *Dactylosporangium thailandense*
Authors: Thiemann et al. 1967
Status: Approved Lists
Literature: Int. J. Syst. Bacteriol. 30:289 (AL)
Risk group: 1 (German classification)
Type strain: ATCC 23490, DSM 43158, IFO 12593, IMET 9029

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| | |
|---|---|
| Name: | *Dactylosporangium vinaceum* |
| Authors: | Shomura et al. 1983 |
| Status: | New Species |
| Literature: | Int. J. Syst. Bacteriol. 33:312 |
| Risk group: | 1 (German classification) |
| Type strain: | ATCC 35207, DSM 43823, IFO 14181, SF-2127 |

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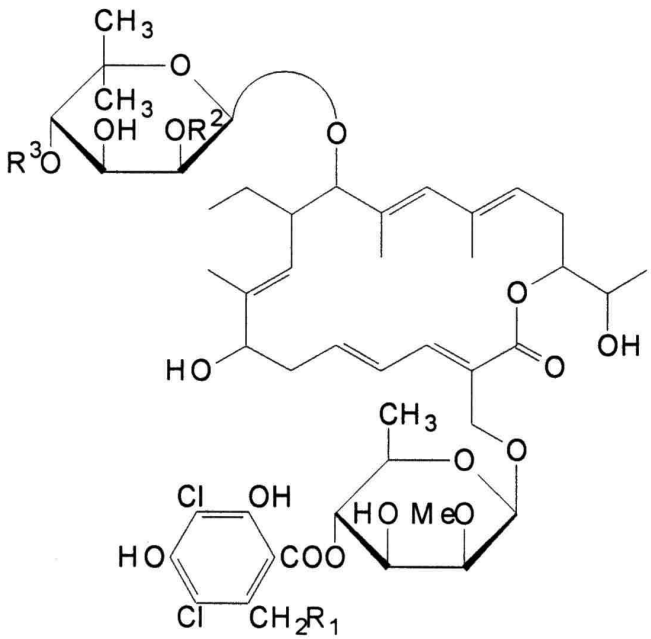
| | |
|---|---|
| Genus | *Dactylosporangium* |
| Species | *aurantiacum* |
| Subspecies | |
| Author | Thiemann et al. 1967 |
| Reclassification | |
| Status | Approved Lists |
| Type species | ATCC 23491, DSM 43157, IFO 12592, IMET 9028 |
| Hazard group | 1 |

Secondary metabolites of *Dactylosporangium aurantiacum*

Lipiarmycin, macrolide antibiotic complex, active against gram-positive bacteria




Lipiarmycin

$A_3$ $R^1$ = $CH_3$, $R^2$ = H, $R^3$ = $COCH(CH_3)_2$

$A_4$ $R^1$ = $R^2$ = H, $R^3$ = $COCH(CH_3)_2$

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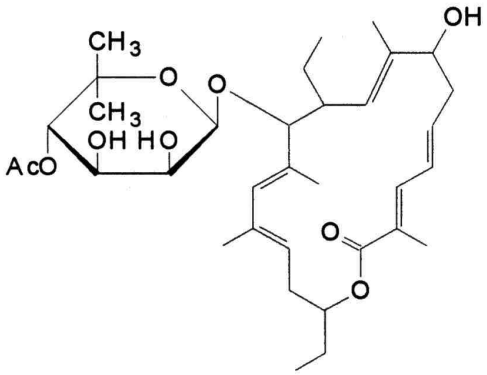
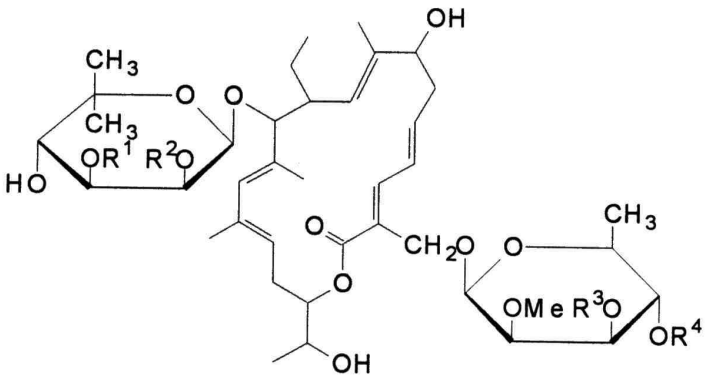
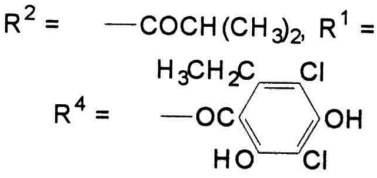
# Tiacumicins, a group of macrolide antibiotics, active against gram-positive bacteria







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**Genus:** ***Dactylosporangium*** **FH 2340**
**Species:** ***aurantiacum***
**Numbers in other collections: ATCC 23491**

Morphology:

| | | |
|---|---|---|
| | G | R |
| ISP 2 | good | orange |
| | A | SP |
| | none | none |
| | G | R |
| ISP 3 | good | pastel orange |
| | A | SP |
| | none | none |
| | G | R |
| ISP 4 | good | bright orange |
| | A | SP |
| | none | none |
| | G | R |
| ISP 5 | good | bright orange |
| | A | SP |
| | none | none |
| | G | R |
| ISP 6 | sparse | bright orange |
| | A | SP |
| | none | none |
| | G | R |
| ISP 7 | good | bright orange |
| | A | SP |
| | none | none |

Spore chains: Spore surface: smooth
Sporangia: + Fragmentation:

**Melanoid pigment: - - - -**
**NaCl resistance:** 0 - 2,5 %
**Lysozyme resistance:**
**pH:** Value- Optimum-
**Temperature :** Value- Optimum- 28 ℃

**Carbon utilization:**

| Glu | Ara | Suc | Xyl | Ino | Man | Fru | Rha | Raf | Cel |
|---|---|---|---|---|---|---|---|---|---|
| + | + | + | (+) | (+) | + | + | + | (+) | - |

**Enzymes:**

| Gel | Cit | Ure | Arg | Onp | Trp | Lys | Odc | VP | Ind | H2S |
|---|---|---|---|---|---|---|---|---|---|---|
| + | - | - | - | + | - | - | - | + | - | - |

**Comments:**

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***Dactylosporangium aurantiacum***
A and B – Agar plates medium 5006, 5315 and 5323

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***Dactylosporangium aurantiacum***
C and D – Agar plates medium 5318, 5322, 5337 with and without tyrosine

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