

New Species of Dictyostelid in Mt. Seorak, Korea

— *Dictyostelium caudabasis* —

Shim, Kew-Cheol and Nam-Kee Chang*

Center for Educational Research, Seoul National University

Department of Biology Education, Seoul National University*

설악산에서의 세포성 점균의 신종

— *Dictyostelium caudabasis* —

심 규 철 · 장 남 기*

서울대학교 교육종합연구원

서울대학교 사범대학 생물교육과*

ABSTRACT

One new species of cellular slime molds, *Dictyostelium caudabasis* sp. nov. Shim et Chang, is isolated from soils in the *Quercus mongolica* forest of Seorak mountain, South Korea. *D. caudabasis* is characterized by small sorophores, scarcely phototrophic, irregularly or sparsely branched, capitate-simple or capitate-compound and sometimes obtuse-simple tips, and conical and sometimes clavate bases. Spores are elliptical, $6.52\sim 4.82 \times 3.40\sim 2.83\mu\text{m}$ (avg. $5.72 \times 3.17\mu\text{m}$), L/W index 1.70~1.92 (avg. 1.80) without polar granules.

Key words: *Dictyostelium caudabasis* sp. nov., *Quercus mongolica* forest, Seorak mountain.

INTRODUCTION

Dictyostelid cellular slime molds are habitated in the decomposed litter layers of surface soils that bacteria grow rapidly (Hagiwara 1989, Hong and Chang 1990, Raper 1984). They have been isolated from not only various vegetation types such as turfgrass land, coastal area, cultivated field, alpine meadow, desert and riverside littoral zone (Chang *et al.* 1996a, 1996b, Hagiwara 1991, 1992, 1993, Hong and Chang 1991, Kwon and Chang 1996, Shim and Chang 1997) but bark of tree and animal dungs (Choi and Chang 1996, Hagiwara 1989).

More than sixty dictyostelid cellular slime molds were identified and classified in the world (Raper 1984, Hagiwara 1989, Hong and Chang 1992a, 1992b, Vadell *et al.* 1995, Shim and Chang 1996, Shim 1998). Until now, three species, *D. flavidum*, *D. floridum* and *D. valenstemmum*, were isolated from mountain forest soils in Korea (Hong and Chang 1992a, 1992c, Shim and Chang 1996).

New one dictyostelid cellular slime mold that resembled *D. crassicaule* was found and isolated from the fermentation layer of *Quercus mongolica* forest soils in Mt. Seorak, South Korea. The characteristics of this species, *D. caudabasis*, is described in the present paper.

MATERIALS AND METHODS

Isolation of dictyostelids was performed according

to clonal isolation technique. Inoculation of dictyostelids was at the center of cross streaks made with a suspension of bacteria and incubated at 20~25°C. Characteristics observed were aggregation patterns,

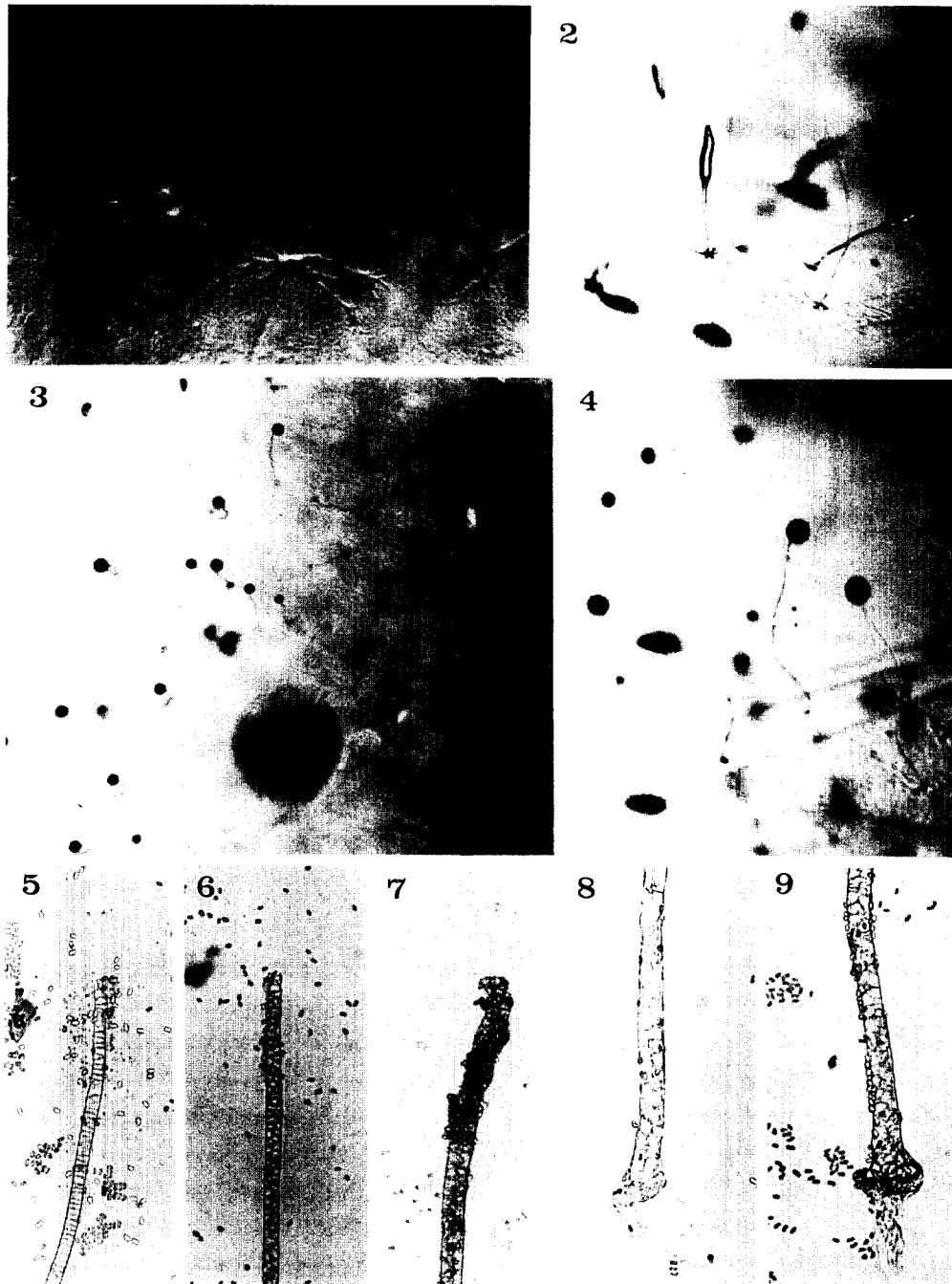


Fig. 1. *Dictyostelium caudabasis* Shim et Chang.

1. Aggregation stage($\times 30$)

2. Rising sorogen($\times 30$)

3. Sorocarps($\times 20$)

4. Branches of sorocarps($\times 30$)

5~7. Tips of sorophores($\times 176$)

8~9. Bases of sorophores($\times 176$)

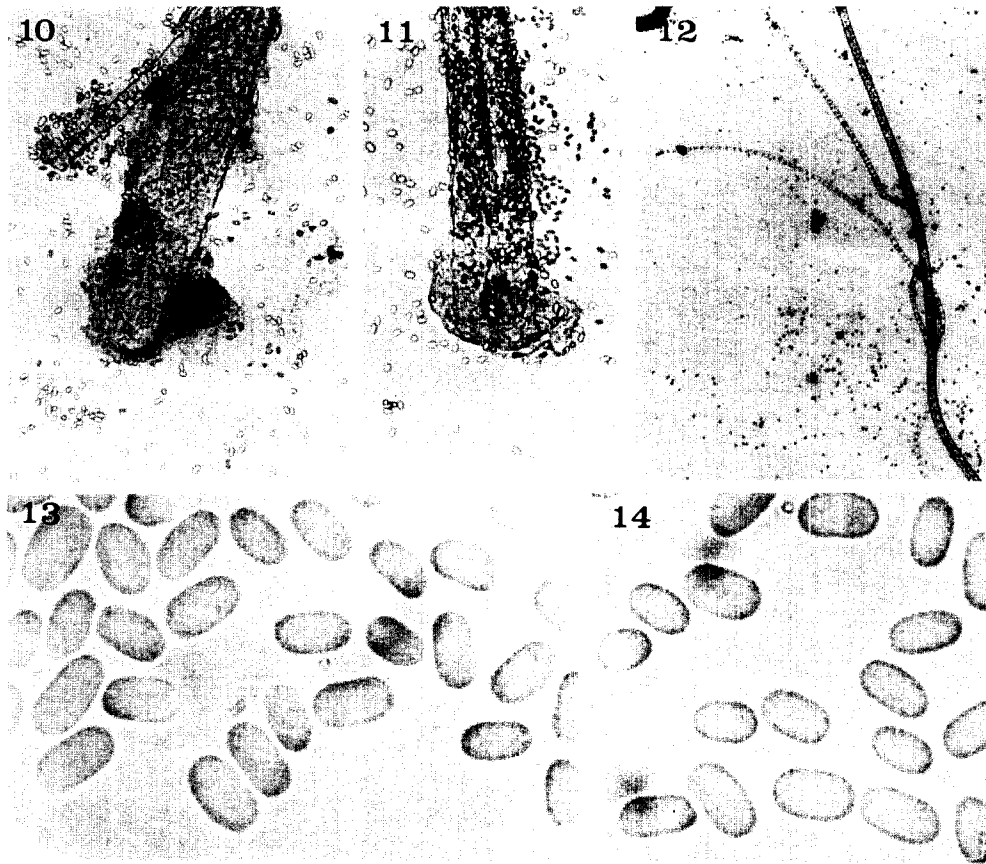


Fig. 1. Continued

10. Round type base of sorophore($\times 176$) 11. Conical type base of sorophore($\times 176$)
 12. Branches of sorophore($\times 176$) 13~14. Spores($\times 1760$)

color of sorophore and sori, tips and bases of sorophore, spore size, polar granule present or absent and sorophore formation. To identify and classify them was based on the dichotomy systems of Raper (1984), Hagiwara (1989), Hong and Chang (1992b) and Shim(1998).

The characteristics of dictyostelid were photographed with microscope (Olympus Vanox) and stereo-microscope (Seoul Selopt). Measurements of bases, tips, spores, sorophores were with pictures.

RESULTS AND DISCUSSIONS

One new dictyostelid, *D. caudabasis* sp. n. (SKC-SAI), was isolated in *Quercus mongolica* forest in Mt. Seorak and classified on the base of the dichotomy systems of dictyostelid cellular slime molds

(Raper 1984, Hagiwara 1989, Hong 1992b).

Dictyostelium caudabasis Shim et Chang (꼬리구슬팡이)

Cultum ad 20~25°C in 0.1% lactose-peptone et non-nutricio agar plates cum *Escherichia coli*, sorocarpiis solitarius, raro phototrophics, prostratis, exigue vel inaequaliter ramosi; sorophoreis et soriis hyalinis; aggregationes mucoroides-typice; sorophoreis 1.0~2.4 mm (non saepe 3~4 mm) longis, prope apicem 10~20 μm crassis, apicibus aliquantum capitatis interdum obtusus, prope basem 17~27 μm crassis, basi typice conus interdum clavatis; soriis globosis vel citrififormes; sporiis ellipticase, 6.52~4.82 \times 3.40~2.83 μm (mediae 5.72 \times 3.17 μm), index

longitudinis per latitudinem 1.70~1.92 (mediae 1.80), sine granulis polaribus.

Holotypus-Stirpes typicae SKC-SA1 e solo Mt. Seorak, Kangwon-do, Korea.

Cultivated at 20~25°C on 0.1% lactose-peptone and non-nutrient agar plates with *Escherichia coli*; sorocarps solitary, scarcely phototrophic, irregularly or sparsely branches, prostrate; sori and sorophore colorless or milky white. Aggregates mound in form with mucoroides-type stream. Sorogens without stalk-free migration. Sorophore tapering from base to apex, 1.0~2.4 mm in length, scarcely 3~4cm; tips usually capitate-simple or capitate-compound, sometimes obtuse-simple, a level 50 µm below the top 10~20 µm in diam.; basal disks usually conical, if prostrate sometimes clavate, 17~27 µm in diam. with the thickest part, 39~63µm in diam. at a level 100µm above the bottom. Sori globose to citriform; Spore elliptical, 6.52~4.82×3.40~2.83µm (avg. 5.72×3.17µm), L/W index 1.70~1.92 (avg. 1.80) without polar granules.

Holotypes- Type SKC-SA1 was isolated 1997 by Shim, K.C. and N.K. Chang from the fermentation layers collected in soils of forests with *Quercus mongolica* in Seorak mountain, Kangwon-do, Korea.

D. caudabasis was characterized by small sorocarps, colorless sori and sorophores, and no polar granules, *D. capitatum*, *D. clavatum*, *D. mucoroides*, and *D. crassicaule* have those, too. But *D. caudabasis* was distinguished from *D. capitatum* in base type and spore size, and from *D. mucoroides* and *D. clavatum*, in tips type. *D. caudabasis* was mostly similar to *D. caudabasis* in such as base type, spore size, and sorocarps size, but distinguished from it in sparsely branches, simple-capitate and obtuse tips, diam of sorophore tips, and clavate bases if prostrate (Hagiwara 1989).

적 요

설악산의 신갈나무림에서 하나의 디티오형 세포성 접균 신종 (*Dictyostelium caudabasis* sp. nov. Shim et Chang, 한국명 장대구슬팡이)이 출현하였다. 이종의 특

징은 키가 작으면서 드물게 양극광성을 가지며, 불규칙하거나 드문 가지를 가지고 있다. 또한 단일형(simple) 혹은 복잡형(compound) 상의 두형의 정단을 가지나 때때로 단일형의 둔형이다. 대부분 원추형이나 때때로 곧본형 기부를 갖는다. 포자는 타원형이며, 크기는 6.52~4.82×3.40~2.83µm (평균 5.72×3.17µm), L/W 계수는 1.70~1.92 (평균 1.80) 으로 극낭은 없다.

LITERATURE CITED

- Chang, N.K., J.S. Hong and K.C. Shim. 1996a. Occurrence and distribution of cellular slime molds in relation to the vegetation of southern area in Korea- cellular slime molds in evergreen forests in the southern coastal area and islands. *Korean Turfgrass Sci.*, 10(1): 81-88.
- Chang, N.K., K.C. Shim and J.S. Hong. 1996b. Occurrence and distribution of cellular slime molds in southern mountains in Korea. *Korean Turfgrass Sci.*, 10(1): 89-101.
- Choi, S.Y. and N.K. Chang. 1996. A study on the distribution and the effect of *Torreya* fruit extract on cellular slime molds in *torreya* forest of Cheju island. *Korean Turfgrass Sci.*, 10(3): 187-194.
- Hagiwara, H. 1989. *The taxonomic study of Japanese dictyostelid cellular slime molds*. National science Museum, Tokyo. 131pp.
- Hagiwara, H. 1991. A new species and some new records of dictyostelid cellular slime molds from Oman. *Bull. Natn. Sci. Mus., Tokyo, Ser. B*, 17(3): 109-121.
- Hagiwara, H. 1992. Dictyostelid cellular slime molds of Pakistan I. Distribution and occurrence in soils of forests, cultivated fields and alpine pastures. *Crytogenic Flora of Pakistan*, 1: 87-98.
- Hagiwara, H. 1993. Altitudinal distributions of dictyostelids in the alpine zone of Mt. Gilipur in the Nanga Parbat Range, Parkistan. *Crytogenic Flora of Pakistan*, 2: 19-24.
- Hong J.S. and N.K. Chang. 1990. The Occurrence and distribution of cellular slime molds in major deciduous forests of South Korea. *Korean J. Bot.*, 33(3): 159-168.

- Hong J.S. and N.K. Chang. 1991. Occurrence and distribution of cellular slime molds in relation to the coastal plant communities of islands near Inch'on. *Korean J. Ecol.*, 14(4): 457-467.
- Hong J.S. and N.K. Chang. 1992a. A new species of cellular slime molds from Korea, *Dictyostelium flavidum* sp. nov. *Korean J. Bot.*, 35(2): 197-203.
- Hong J.S. and N.K. Chang. 1992b. Cellular slime molds of Halla mountain, III; Description of polar granule positive species. *Korean J. Bot.*, 35(4): 307-316.
- Hong J.S. and N.K. Chang. 1992c. A new species of cellular slime molds from Korea, *Dictyostelium floridum* sp. nov. *Korean J. Bot.*, 35(4): 393-401.
- Kwon, H.R. and N.K. Chang. 1996. The Distribution of Dictyostelids Cellular Slime Molds in Gokneung and Anyang Streamside and Effects of Environmental Factors on Its Distribution. *Korean Turfgrass Sci.*, 10(3):195-212.
- Raper, K.B. 1984. *The dictyostelids*. Princeton Univ., Princeton. 453pp.
- Shim, K.C. 1998. Dictyostelid Cellular Slime Molds in Korea. Thesis of EDD. Seoul National University, Republic of Korea.
- Shim, K.C. and N.K. Chang. 1996. New Dictyostelid in Mt. Surak, Korea; *Dictyostelium valenstemmum* sp. nov. *Korean Turfgrass Sci.*, 10(2): 117-124.
- Shim, K.C. and N.K. Chang. 1997. Cellular slime molds in the littoral grassland ecosystems in the Lake Paldanho. *Korean Turfgrass Sci.*, 11(2): 125-137.
- Vadell, E.M., M.T. Holmes and J.C. Cavender. 1995. *Dictyostelium citrinum*, *D. medusoides* and *D. granulophorum* Three new members of the dictyosteliaceae from forest soils Tikal, Guatemala, *Mycologia*, 87(4):551-559.

(Received May 10, 1998)