



รายการอ้างอิง

ภาษาไทย

สุนันทา คzechสนันท์ "สภาวะที่เหมาะสมสำหรับการเดินหมู่ไชครอกซึ่งนกรดลิโหโคลิก โดย *Absidia* sp. BA 16," วิทยานิพนธ์สกุตรปริญญาวิทยาศาสตร์ธรรมชาติวิทยา ภาควิชาจุลชีววิทยา บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย, 2530.

ภาษาอังกฤษ

- Ambrus, G., and Buki, K.G., "Degradation of Saponins by *Mycobacterium phlei*," Steroids, 13, 623-625, 1969.
- Arima, K., Nagasawa, M., Bac, M., and Tamura, G., "Microbial Transformation of Sterols Part I. Decomposition of Cholesterol by Microorganisms," Agri. Biol. Chem., 33, 1636-1643, 1969.
- Arima, K., Nakamatsu, T., and Beppu, T., "Microbial Production of 3-oxo-bisnorchola-1,4-dien-22-oic Acid," Agric. Biol. Chem., 42, 411-416, 1978.
- Bar R., "Cyclodextrin-aided Microbial Transformation of Aromatic aldehydes by *Saccharomyces cerevisiae*," Appl. Microbiol. Biotechnol. 31, 25-28, 1989.
- Chang, F.N., and Sih, C.J., "Mechanisms of Steroid Oxidation by Microorganisms. VII. Properties of the 9 α -Hydroxylase," Biochemistry, 3, 1551-1557, 1964.
- Clark, T.A., Maddox, I.S., and Chong, R., "The Effect of Glucose on 11 - and 19-Hydroxylation of Reichstein's Substance S by *Pellicularia filamentosa*," Eur. J. Appl. Microbial. Biotechnol., 17, 211-215, 1983.

- Conner, A.N., Nagaoka, M., Rowe, J.W., and Perlman, D., "Microbial Conversion of Tall Oil Sterols to C₁₉ Steroids," Appl. Environ. Microbiol., 32, 310-311, 1976.
- Crueger, W., and Crueger, A., "Microbial Transformation," Biotechnology A Textbook of Industrial Microbiology, pp. 254-259, McGraw-Hill Inc., New York, 1984.
- Dodson, R.M., and Muir, R.D., "Microbiological Transformations. IV. The Microbiological Aromatization of Steroids," J. Am. Chem. Soc., 83, 4627-4631, 1961.
- Fieser, L.F., Johnson, K., Fieser, F., Cook, R.P., Gwynne, J.T., Strauss, J.F., "Cholesterol," The Merck Index (Windholz, M. ed.), 10th ed. p. 2178, Merck I Co., Inc., New Jersey, 1983.
- Gower, D.W., "Structure of Steroid Hormones," Steroid Hormones, pp. 11-18, Croom Helm, London, 1979.
- Hesselink, P.G.M., Vliet, S.V., Vries, H.D., and Witholt, B., "Optimization of Steroid Side Chain Cleavage by *Mycobacterium* sp. in the Presence of Cyclodextrins," Enz. Microb. Technol., 11, 398-404, 1989.
- Hill, F.F., Schindler, J., Schmid, R.D., Wagner, R., and Voelter, W., "Microbial Conversion of Sterols," Eur. J. Appl. Microbiol. Biotechnol., 15, 25-32, 1982.
- Horvath, J., and Kramli, A., "Microbiological Oxidation of Cholesterol with *Axotobacter*," Nature (London).., 160, 639, 1947.
- Iizuka, H., and Naito, A., "Microbial Conversion of Sterols," Microbial Conversion of Steroid and Alkaloids pp. 307-323, University of Tokyo press, Tokyo, 1981.
- Kieslich, K., "Industrial Aspects of Biotechnological Production of Steroids," Biotechnology Letters, 2, 211-217, 1980.

- Kieslich, K., "Microbial Enzyme and Bioconversion." Economic Microbiology (Rose, A.H. ed.), vol. 5, pp. 436-447, Academic Press Inc., London, 1980.
- Kulprecha, S., Nikira, T., Yamada, K., Yoshida, T., Nilubol, N., and Taguchi, H., "Transformation of Lithocholic Acid to a New Bile Acid, 3 α , 15 β -Dihydroxy-5-Cholanic Acid by *Cunninghamella blakesleeana* ST-22," Appl. Microbiol Biotechnol., 22, 211-216, 1985.
- Lee, B.K., Brown, W.E., Ryn, D.Y., Jacobson, H., and Thoma, R.W., "Influence of Mode of Steroid Substrate Addition on Conversion of Steroid and Growth Characteristics in a Mixed Culture Fermentation," J. Gen. Microbiol., 17, 211-215, 1983.
- Leuenberger, H.G.W., "Methodology," Biotechnology (Rehm, H.J., and Reed, G. eds.), vol. 8, pp. 2-29, Verlag Chemie, Florida. Basel, 1984.
- Marsheck, W.J., Heights, A., and Kraychy, S., "Selective Microbiological Preparation of Androst-4-ene-3, 17-dione," U.S. Pat, 3,759,791, Sept. 18, 1973.
- Marsheck, W.J., Kraychy, S., and Muir, R.D., "Microbial Degradation of Sterols," Appl. Microbiol., 23, 72-77, 1972.
- Martin, C.K.A., "Sterols," Biotechnology (Rehm, H.J., and Reed, G. eds.), Vol. 6a, pp. 2-19, Verleg Chemie, Florida. Basel, 1984.
- Martin, C.K.A., and Wagner, F., "Microbial Transformation of β -Sitosterol by *Nocardia* sp. M29," Eur. Appl. Microbiol. 2, 243-255, 1976.
- Murray, H.C., "Microbiology of Steroids," Industrial Microbiology (Miller, B.M., and Litsky, W. eds.), pp. 79-105, McGraw-Hill Inc., New York, 1976.
- Nagasawa, M., Bae, M., Tamura, G., and Arima, K., "Microbial Transformation of Sterols Part II. Cleavage of Sterol Side

Chains by Microorganisms," Agri. Biol. Chem., 33, 1644-1650,
1969.

Nagasawa, M., Watanabe, N., Hashiba, H., Tamura, G., and Arima, K.,
"Microbial Transformation of Sterols Part III. Substrate
Specificity for Cleaving Steroid Side Chains by *Arthrobacter
simplex*," Agri. Biol. Chem. 34, 798-800, 1970.

Nagasawa, M., Watanabe, N., Hashiba, H., Murakami, M., Bae, M., Tamura,
G., and Arima, K., "Microbial Transformation of Sterols Part
V. Inhibitors of Microbial Degradation of Cholesterol," Agric.
Biol. Chem., 34, 838-844, 1970.

Nagasawa, "Microbial Transformation of Sterols Part IV. C₁₉-
Steriod Intermediates in the Degradation of Cholesterol by
Arthrobacter simplex," Agri. Biol. Chem., 34, 801-804, 1970.

Nakamatsu, T., Beppu, T., and Arima, K., "Microbial Degradation of
Steroids to Hexahydroindanone Derivatives," Agric. Biol. Chem.,
44, 1469-1474, 1980.

Owen, R.W., Mason, A.N., and Bilton, R.F., "The Degradation of
Cholesteral by *Pseudomonas* sp. NCIB 10590 under aerobic
Conditions," J. Lipid Res., 24, 1500-1511, 1983.

Peterson, D.H., "Microbialtransformations of Steroids and their
Application to the Preparation of Hormones and Derivatives,"
Biochemistry of Industrial Microorganism. (Rainbow, R. ed.),
pp. 537-606, Academic Press Inc., New York, 1963.

Phillips, G.T., and Ross, F.P., "Stereochemistry of C-1,2-Dehydrogena-
tion during Cholesterol Degradation by *Mycobacterium phlei*,"
Eur. J. Biochem., 44, 603-610, 1974.

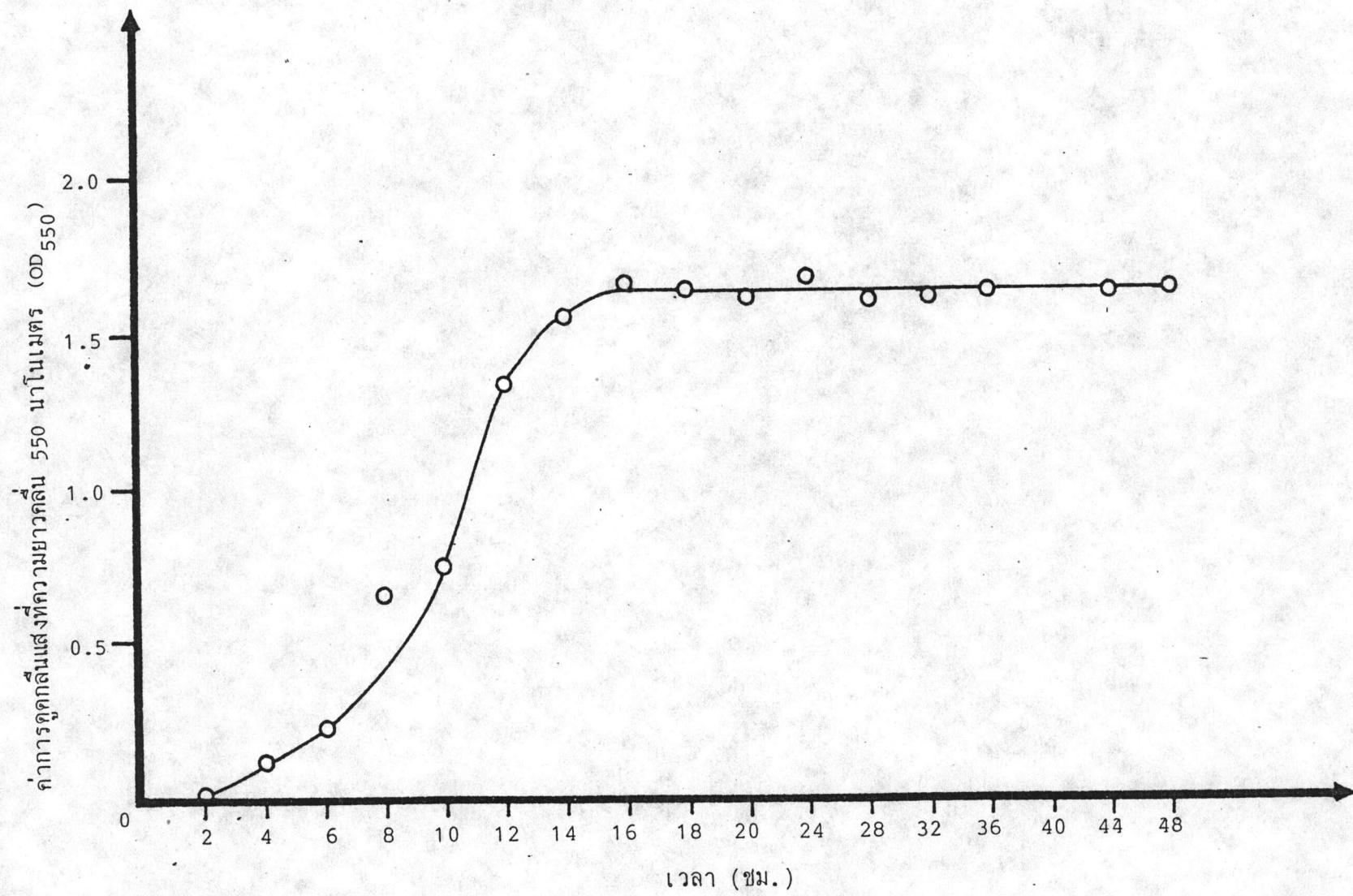
Prome, D., Clave, C., Escoffier, B., and Prome, J.C., "Conversion of
Sterols and Triterpenes by *Mycobacteria*. II. Transformation

- of 7-Oxygenated Sterols into Androstane Derivatives via a 7-Deoxygenation," Biochim. Biophys. Acta., 921, 559-566, 1987.
- Saunders, R., Cheetham, P.S. J., and Hardman, R., "Microbial Transformation of Crude Fenugreek Steroids," Enz. Microb. Technol., 9, 549-555, 1986.
- Sih, C.J., Tai, H.H., and Tsong, Y.Y., The Mechanism of Microbial Conversion of Cholesterol into 17-Ketosteroids," J. Am. Chem. Soc., 89, 1957-1958, 1967.
- Sih, C.J., Tai, H.H., Tsong, Y.Y. Lee, S.S., and Combe, R.G., Mechanisms of Steroid Oxidation by Microorganisms. XIV. Pathway of Cholesterol Side-Chain Oxidation," Biochemistry, 7, 808-818, 1968.
- Sonomoto, K., "Part II Hydroxylation of Steroids by Gel-Entrapped Microbial Cells in Water-Organic Cosolvent Systems. (Chapter I)," Bioconversion of Steroids by Immobilized Biocatalysts in Water-Organic Cosolvent Systems. (Department of Industrial Chemistry Faculty of Engineering, Kyoto University), pp. 88-120, Japan, 1982.
- Sonomoto, K., Usui, N., Tanaka, A., and Fukui, S., "9 α -Hydroxylation of 4-Androstene-3, 17-Dione by Gel-Entrapped *Corynebacterium* sp. Cells," Eur. Appl. Microbiol. Biotechnol., 17, 203-210, 1983.
- Srivastava, S.K., Srivastava, R.A.K., and Mathur, S.N., "Biotransformation of Sugar-Cane Sterols into Androsta 1,4-dione (ADD) by *Anthrobacter globiformis* Str. Oxydans," J. App. Bacteriol., 59, 399-402, 1985.
- Turfitt, G.E., "The Microbiological Degradation of Steroids. 4. Fission of the Steroid Molecule," J. Biochem., 42, 376-838, 1948.

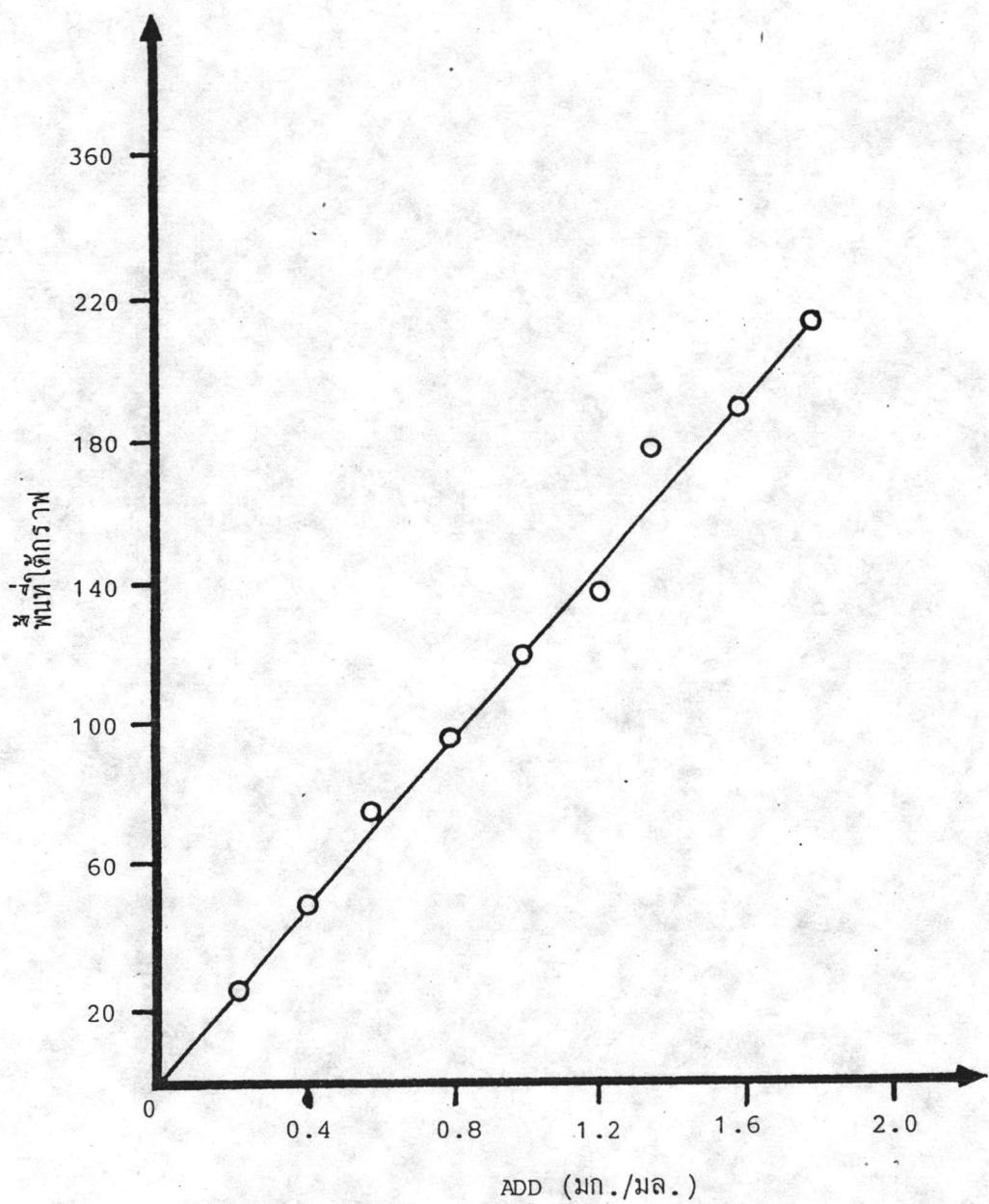
- Watanabe, K., Aihara, H., Tachi, N., and Nakamuka, R., "Degradations of Cholesterol-Degrading Bacteria," J. Appl. Bacteriol., 62, 151-155, 1987.
- Watanabe, K., Shimizu, H., Aihara, H., Nakamura, R., Suzuki, K.I., and Komagata, K., "Isolation and Identification of Cholesterol-Degrading *Rhodococcus* Strains from Food of Animal Origin and their Cholesterol Oxidase Activities," J. Gen. Appl. Microbiol., 32, 137-147, 1986.
- Whitmarsh, J.M., "Intermediates of Microbiological Metabolism of Cholesteral," J. Biochem., 90, 23, 1964.
- Wix, G., Buki, K.G., Tomorkeny, E., and Ambrus, G., "Inhibition of Steroid Nucleus Degradation in Mycobacterial Transformations," Steroids, 11, 401-413, 1967.
- Wovcha, M.G., and Brooks, K.E., "Microorganisms and their Use in Producing Androst-4-ene-3, 17-dione," Eur. Pat. A1, 0,008,214, Aug. 6, 1979.
- Wovcha, M.G., Antosz, F.J., Knight, J.C., Kominek, L.A., and Pyke, T.R., "Bioconversion of Sitosterol to Useful Steroidal Interme diates by Mutants of *Mycobacterium fortuitum*," Biochim. Biophys. Acta., 308-321, 1978.



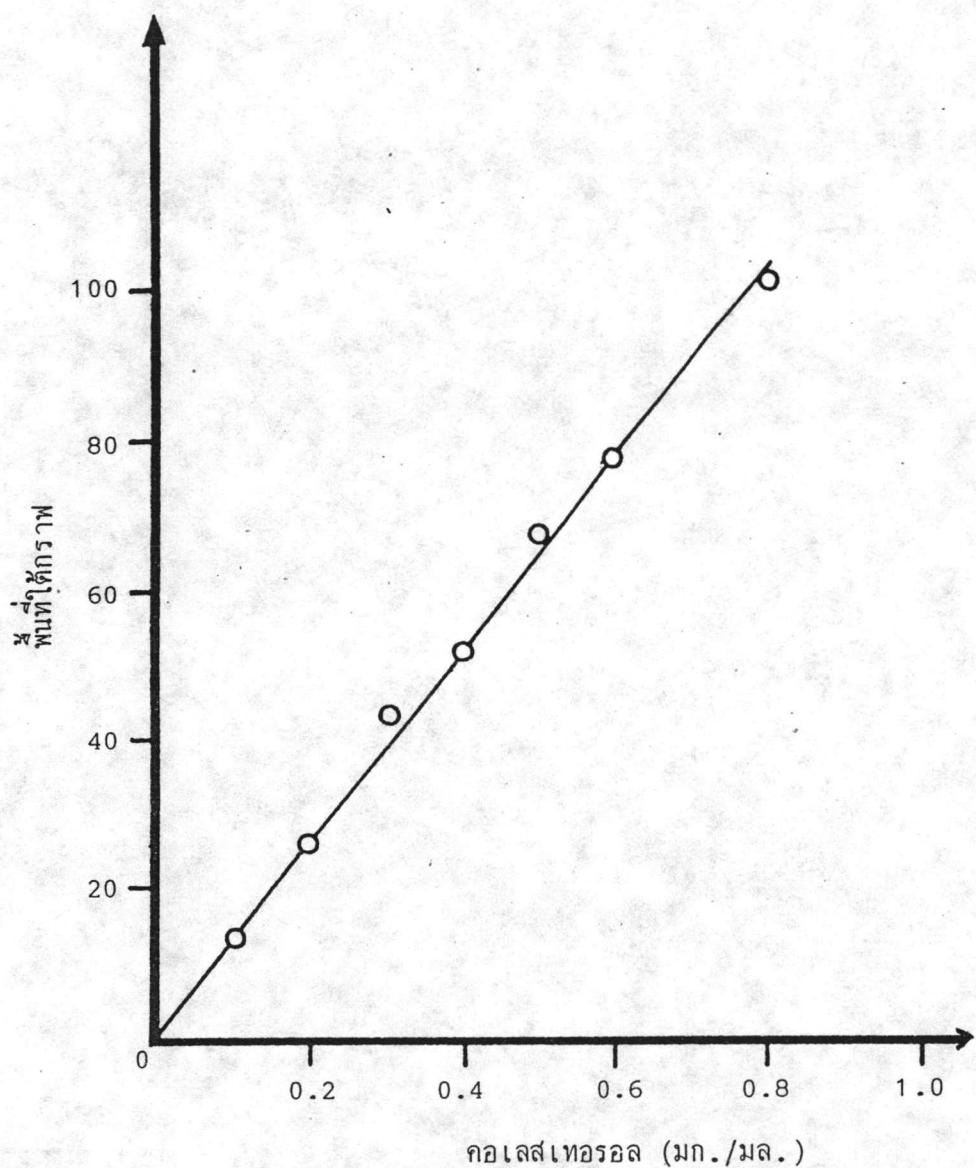
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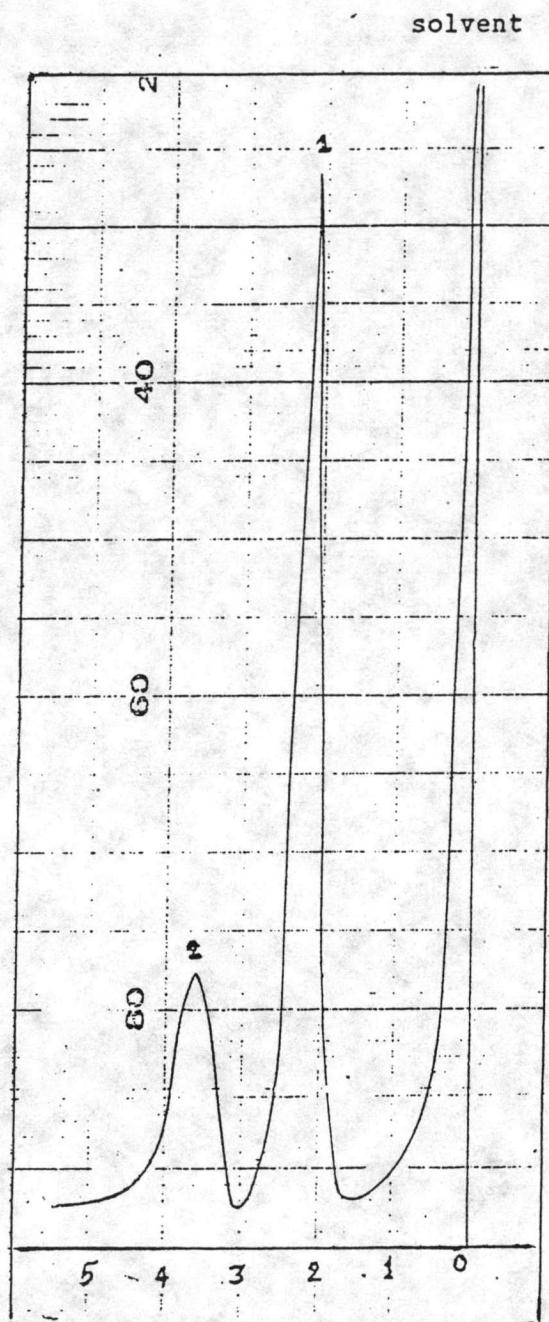
ภาคผนวกที่ 1 รูปแบบการเจริญของ *Mycobacterium* sp. BJ-157 เมื่อเสียบในอาหารเหลว
สายรับหัวเชื้อสูตรที่ 2 ที่อุณหภูมิ 30°C เป็นระยะเวลา 48 ชม.



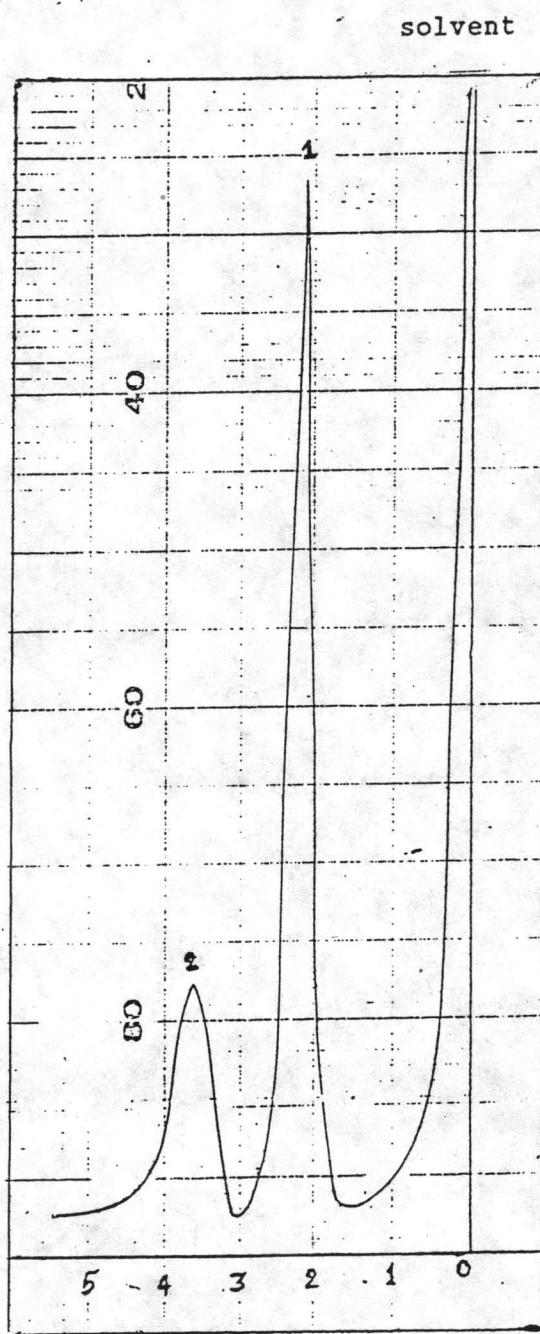
ภาคผนวกที่ 2 กราฟมาตรฐานส่าหรับหาปริมาณสาร ADD



ภาคผนวกที่ 3 กราฟจำนวนสุ่มตัวอ่อนปริมาณยาเม็ดก่อเลส เทอร์อล



ภาพผ่านวิธี 4 สกัดพัฒนาของแก๊สโคลนาร์ตและการขูดสารมาตรฐาน ADD
และสารมาตรฐานคอลเลสเทอรอล
ศค 1 ได้แก่ สารมาตรฐาน ADD นาทีที่ 2.1
ศค 2 ได้แก่ สารมาตรฐานคอลเลสเทอรอล นาทีที่ 3.6



ภาคผนวกที่ 5 สเกลย์ของแก๊สโคลนาร์ตограмของสาร ADD

ที่ได้จากการแปลงรูปทางชีวภาพของคอลเลสเทอรอล

โดย *Mycobacterium sp. BJ-157*

ศค 1 ได้แก่ สาร ADD นาที 2.1

ศค 2 ได้แก่ คอลเลสเทอรอล นาที 3.6



ประวัติผู้เขียน

นางสาวจารุวรรณ วิมล เกิดเมื่อวันที่ 17 พฤษภาคม 2504 ที่จังหวัดพัทลุง ได้รับปริญญาศึกษาศาสตรบัณฑิต สาขาชีววิทยา จากมหาวิทยาลัยศรีนครินทรวิโรฒ สังขละ ในปีการศึกษา 2528