

Legionella pneumophila

(2006/5/31 , 2006/1/3)

Legionella pneumophila

2004

2004

DNase β -lactamase

.IMViC

Isolation and Identification of *Legionella pneumophila* from cooling towers

May A. AL-Allaf
*Environmental and Pollution
Control Research Center
Mosul University*

Amera M. Al-Rawi
*Department of Biology
College of Science
Mosul University*

ABSTRACT

The study included isolation of *Legionella pneumophila* from cooling water during March 2004 –September 2004. The bacterium was identified depending on ability to grow on selective media and microscopical examination which revealed that it is gram negative as well as biochemical tests were done and showed its variation reaction for oxidase and positive reactions for catalase, motility, gelatinase, hippurate hydrolysis and starch hydrolysis as well as it was positive for β -lactamase, DNase, Lipase and protease and it was negative for urease, carbohydrate fermentation, nitrate reductase and IMViC test .

Legionella

(Mathews and Roy, 2000) *L.pneumophila*

L.pneumophila

(Addiss et al., 1989) ° 42-25

Legionellaceae

L.pneumophila

0.9-0.3

20-2

Rodgers and Pasculle, 1991 ; Brooks et al ., 2001)

(Baker and Breach, 1980;

L-Cysteine HCl

Bufferd Charcoal Yeast Extract Agar (BCYE)

7-3

L.

(Tierney et al., 2003)

pneumophila

L. pneumophila

Cooling towers

(70)

.3 250

(Thornsberry & Kirven , 1978) β - Lactamase

IMViC

.(Collee *et al* ., 1996 ; Koneman *et al.*, 1997)

- Nutrient Gelatin medium •
 - Sulfide-Indol Motility medium SIM •
 - Starch Hydrolysis medium •
 - Hippurate Hydrolysis medium •
 - DNase Agar medium •
 - Egg Yolk Agar •
 - Casein Hydrolysis medium •
 - Phenol Red Peptone Water medium •
 - Nitrate Broth medium •
 - Christensens Urea Agar medium •
 - Peptone Water medium •
 - Glucose Phosphate Peptone Water medium •
 - Simmon's Citrate Agar medium •
- .(MacFaddin, 1985 ; Collee et al., 1996)

21 120
 %17.5 *L. pneumophila*
 (1993) Koid
 % 50 *L. pneumophila*
 (1997) Heng
 Hadgson % 36
 % 60 (1998) Casey
 200 Industrial Water Society (IES)

..... *Legionella pneumophila*

(2000) Wahala .

4 *L.pneumophila*
. % 93.7

L. pneumophila

% 80

.% 52

(1981) Bopp .% 40

% 45

(1982) Edelstien .% 36

% 83

.% 71

L.pneumophila

° 42-25

° 35

.(Reinthalder et al., 1993; Ta et al., 1995) 7.2-6.6 6.9

L. pneumophila

BCYE

(1)

FG .(Collee et al., 1996 ; Forbes et al., 2002)

(2)

.(1978) Feeley

(3)

(1988) Taylor Harrison

Charcoal Yeast Extract Hemoglobin Agar Medium

(4) 10

.(1978) Weaver

Edelstein

(5)

MWY

(1982)

Vickers

(6)

(1981)

(7)

Ristroph

(1980)

.1996

Collee

L. pneumophila

.(8)

1

Tetramethyl-P-

Phenyl Diamin Dihydro Chloride

(2001)

Brooks

L.pneumophila

(2002)

Forbes

L.pneumophila

(9)

. (1981)

Hebert

Weaver

(10)

β -

(1978)

Lactamase

Kirven Thornsberry (11)
 . β - Lactamase (1978)
 ()
 (12)
 (2001) Brooks
 DNase
 .DNase
 Nitrate Reductase
 (1985) Brenner
 IMViC

L. pneumophila

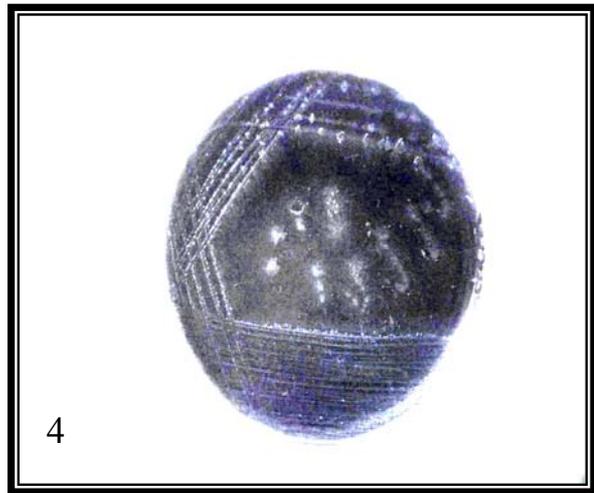
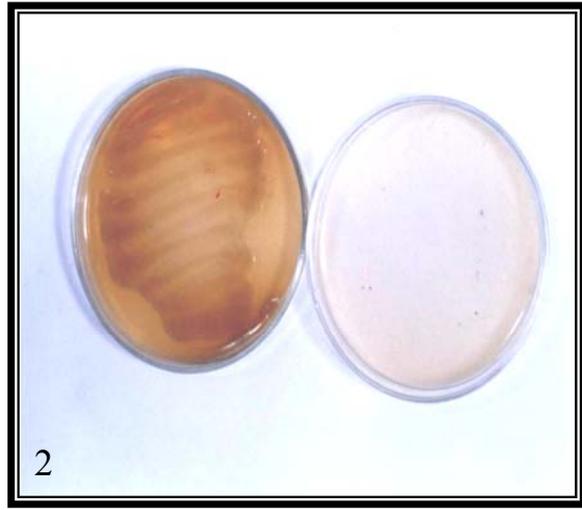
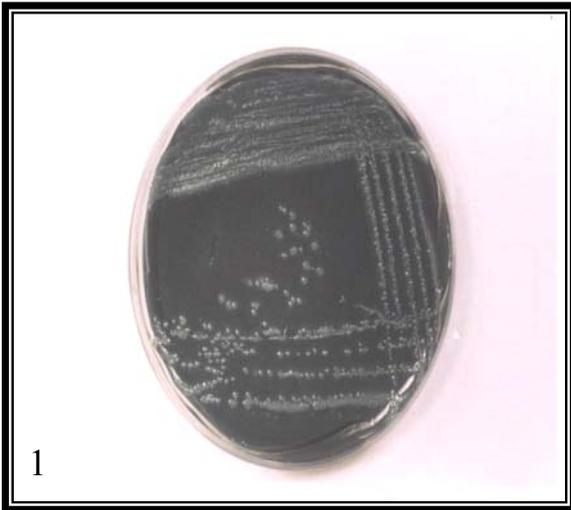
:1

	Tests	
±	Oxidase test	
+	Catalase test	
+	Motility test	
+	Gelatinase test	
+	Hippurate hydrolysis test	
+	Starch hydrolysis test	
+	β – Lactamase test	
+	Lipase test	
+	DNase test	
+	Protease test	
-	Urease test	
-	Carbohydrate Fermentation	
-	Nitrate reductase	
-	IMViC tests	IMViC

Variable ±

Positive +

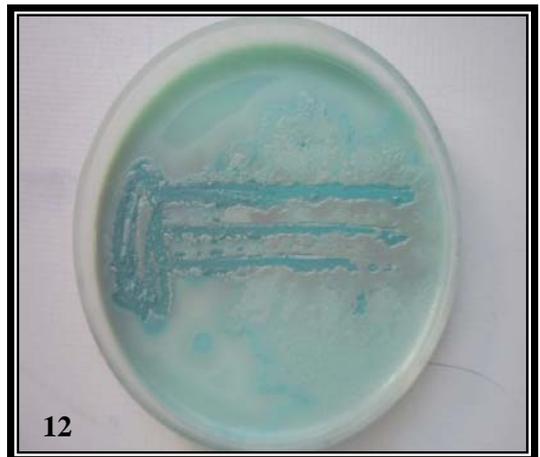
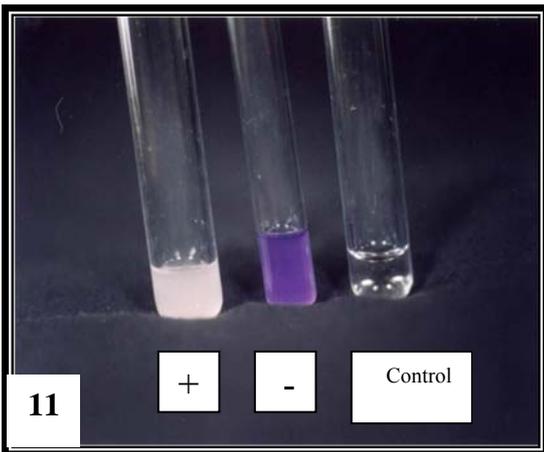
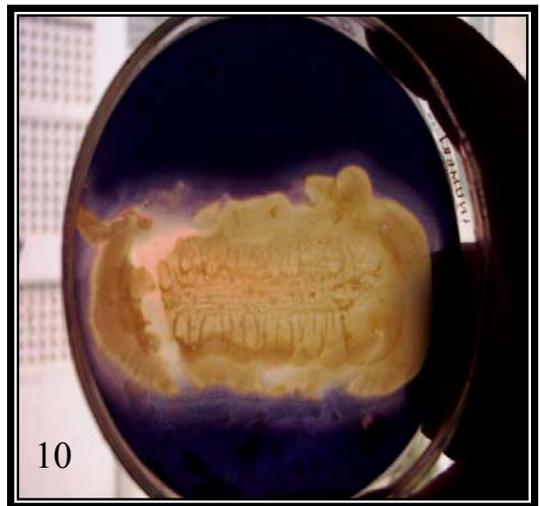
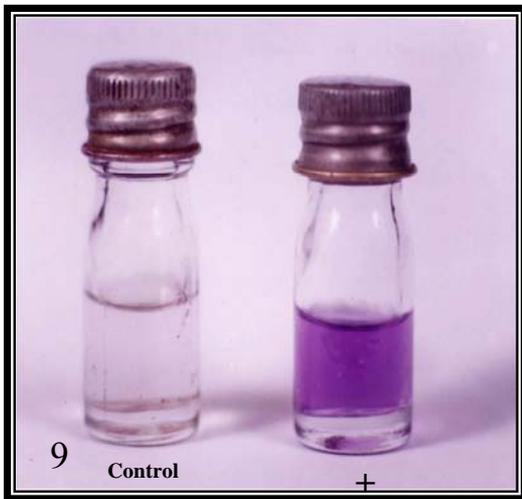
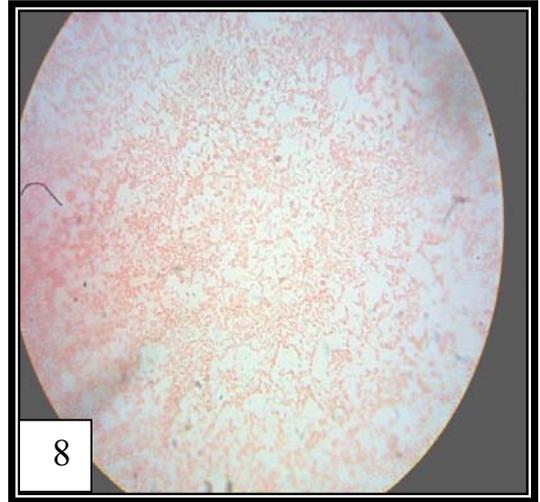
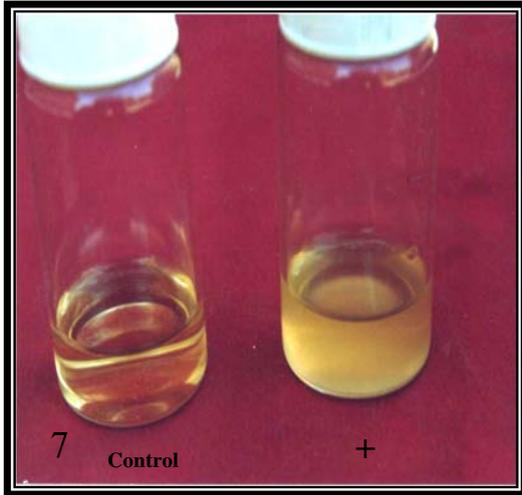
Negative



L. pneumophila

:1

BCYE	<i>L. pneumophila</i>	(1)
FG	<i>L. pneumophila</i>	(2)
	<i>L. pneumophila</i>	(3)
	<i>L. pneumophila</i>	(4)
MWY	<i>L. pneumophila</i>	(5)
	<i>L. pneumophila</i>	(6)



()
(1000x)

β -Lactamase

- L. pneumophila* (7)
- L. pneumophila* (8)
- L. pneumophila* (9)
- L. pneumophila* (10)
- L. pneumophila* (11)
- L. pneumophila* (12)

- Addiss, D.G., Davis, J.P. and Laventure, M., 1989. Community acquired Legionnaires' disease associated with a cooling tower. Evidence for longer-distance transport of *Legionella pneumophila*. *Am. J. Epidemiol.* 130: pp.557-568.
- Baker, F.J. and Breach, M.R., 1980. *Medical Microbiological Techniques* 1sted., Butterworths, London . pp.146-147.
- Behrman, R.E., Kliegman, R.M. and Jenson, H.B., 2004. *Nelson, Textbook of Pediatrics.* 17th ed. Saunders. An Imprint of Elsevier Science. pp.941-943.
- Bopp, C.A., Sumner, J.W., Morris, G.K. and Wells, J.G., 1981. Isolation of *Legionella* spp. from environmental water samples by low-pH treatment and use of a selective medium. *J. Clin. Microbiol.* 13: pp.714-719.
- Brenner, D.J., 1985. Ten new species of *Legionella*. *Intern. J. Syst. Bacteriol.* 35: pp.50-59.
- Brooks, G.F., Butel, J.S. and Morse, S.A., 2001. *Jawetz, Melnick, and Adclberg's, Medical Microbiology.* 22nd ed., Appetton and Lange, New York. pp.270-272.
- Collee, J.G., Fraser, A.G., Marmion, B.P. and Simmons, A., 1996. *Mackie and McCartney Practical Medical Microbiology.* 14th ed., Churchill Livingstone Inc. New York. pp.489-499.
- Edelstein, P.H., 1982. Comparative study of selective media isolation of *Legionella pneumophila* from potable water. *J. Clin. Microbiol.* 16: pp.697-699.
- Feely, J.C., Gipson, R.J. and Gorman, G.W., 1979. Charcoal yeast extract agar: Primary isolation media for *Legionella pneumophila* . *J.Clin. Microbiol.* 10: pp.437-441.
- Feeley, J.C., Gorman, G.W., Weaver, R.E., Mackel, D.C. and Smith, H.W., 1978. Primary isolation media for Legionnaires' disease bacterium. *J. Clin. Microbiol.* 8: pp.320-325.
- Forbes, A.B., Sahn, D.F. and Weissfeld, A.S., 2002. *Bailey and Scott's Diagnostic Microbiology.* 9thed., Mosby. pp.482-486.
- Hadgson, J.M. and Casey, B.J., 1998. Prevalence of *Legionella* bacteria in building water systems, article. Clayton Group Services. New York. 10: pp.68-75 .
- Hebert, G.A., 1981. Hippurate hydrolysis by *Legionella pneumophila* . *J. Clin. Microbiol.* 13: pp.240-242.
- Heng, B.H., Goh, K.T., Ng, D.L. and Ling, A.E., 1997. Surveillance of Legionellosis and *Legionella* bacteria in the built environment in Singapore. *Ann. Acad. Med. Singapore* 26: pp.557-565.
- Joklik, W.K., Willett, H.P. and Amos, D.B., 1980. *Zinsser Microbiology.* 17thed. Appleton Century Crofts. New York. pp.913-917
- Koid, M., Saito, A., Kusano, N. and Higa, F., 1993. Detection of *Legionella* spp. in cooling tower water by the polymerase chain reaction method. *Appl. Environ. Microbiol.* 59: pp.1943-1946.
- Koneman, E.W., Allen, S.D., Janda, W.M., Srechenberger, D.C. and Winn, W.C., 1997. *Color Atlas and Textbook of Diagnostic Microbiology* 5th ed., Lippincott-Raven Publishers, Philadelphia, USA. pp.369-489.
- MacFaddin, J.F., 1985. *Biochemical Tests for Identification of Medical Bacteria.* 2nd Ed., Waverly Press. Inc. Baltimore. USA.

- Mathews, M. and Roy, C.R., 2000. Identification and subcellular localization of the *Legionella pneumophila*. Icm protein: a factor essential for establishment of a replicative organelle in eukaryotic host cells. *Infect. Immun.* 68: pp.3971-3982.
- Prescott, L.M., Harley, J.P. and Klein, D.A., 1996. *Microbiology*. 3rd ed., Wm C. Brown Communication, Inc. Iowa, USA.
- Reinthal, F.F., Sattler, J., Schaffler-Dulling, K., Weinmayr, B. and Marth, E., 1993. Comparative study of procedures for isolation and cultivation of *Legionella pneumophila* from tap water in hospitals. *J. Clin. Microbiol.* 31: pp.1213-1216.
- Ristroph, J.D., Hedlund, K.W. and Allen, R.G., 1980. Liquid medium for growth of *Legionella pneumophila*. *J. Clin. Microbiol.* 11: pp.19-21.
- Rodgers, F.G. and Pasculle, A.W., 1991. *Legionella*. In Balows A, Hausler, W.J. Jr., Herrmann, K.L. (eds.). *Manual of Clinical Microbiology*, Washington DC, Am. Soc. Microbiol. pp.442-453.
- Ta, A.C., Stout, J.E., Yu, V.L. and Wagener, M.M., 1995. Comparison of culture methods for monitoring *Legionella* species in hospital potable water systems and recommendations for standardization of such methods. *J. Clin. Microbiol.* 33: pp.2118-2123.
- Thornsberry, C. and Kirven, L.A., 1978. β -Lactamase of the Legionnaires' bacterium. *Curr. Microbiol.* 1: pp.51-54.
- Tierney, L.M., McPhee, S.J. and Papadakis, M.A., 2003. *Current Medical Diagnosis and Treatment* 42nd ed., Lange Medical Books. McGraw-Hill. New York. pp.1369-1370.
- Vickers, R.M., Brown, A. and Garrity, G.M., 1981. Dye-containing buffered charcoal yeast extract medium for the differentiation of members of the family Legionellaceae. *J. Clin. Microbiol.* 13: pp.380-382.
- Wahala, W.M., 2000. First isolation of *Legionella pneumophila* in Srilanka. *Ceylon J. Med.* 45 : pp.4-10.
- Weaver, R.E., 1978. Cultural and staining characteristics. In: Jones, G.L.; Hebert G.A. (eds.). *Legionnaires; the Disease Bacteriology and Methodology*. Centers for Disease, Control, Atlanta, Georgia, p. pp.39-43.