

PRIMARY AMOEBIC MENINGO-ENCEPHALITIS.
A SELECTED BIBLIOGRAPHY AND TABULAR SURVEY OF CASES

compiled
by

E. WILLAERT

Department of Protozoology
Prins Leopold Instituut voor Tropische Geneeskunde
Nationalestraat 155, B-2000 Antwerpen, Belgium.

Preface — This bibliography contains 251 references and covers the literature from 1948 to January 1974. No attempt has been made to include all material pertaining to the order Amoebida. Only papers considered of specific interest with regard to the disease potential of amoebae or engaged in general experimentation with amoebae belonging to the genera *Naegleria* or *Acanthamoeba* and believed causing disease in man and other vertebrates, have been selected.

The tabular survey of cases is a completed and updated edition of the non-published survey compiled by Professor J. B. Jadin and Dr S. R. Das. All cases found in the literature are listed, including the suspected cases. They are referred to by numbers which correspond to those used in the bibliography, which is arranged in alphabetical order by authors' names. Russian, Czechoslovakian and Polish titles have been translated into English. Journal abbreviations conform to the standards set by «World Medical Periodicals», New York, World Medical Association, 1961 + Suppl. 1968.

Thanks are due to Mr G. Roelants (Librarian) for his helpful advice and to Miss M. M. Gillis for preparing the typescript.

1. Adam, K. G. M. (1973) : Genetic variation in *Acanthamoeba*. Progr. Protozool. (Clermont-Ferrand), 4.
2. Anderson, K. & Jamieson, A. (1972) : Primary amoebic meningoencephalitis. Lancet, i, 902-903.
3. Anderson, K. & Jamieson, A. (1972) : Primary amoebic meningoencephalitis. Lancet, ii, 379-
4. Anderson, K. & Jamieson, A. (1972) : Agglutination test for the investigation of the genus *Naegleria*. Pathology, 4, 273-278.
5. Anderson, K. & Jamieson, A. (1974) : Bacterial suspensions for the growth of *Naegleria* species, Pathology, 6, 79-84.
6. Anderson, K., Jamieson, A., Jadin, J. B. & Willaert, E. (1973) : Primary amoebic meningoencephalitis. Lancet, i, 672.
7. Apley, J., Clarke, S. K. R., Roome, A. P., Sandry, S. A., Saygi, G., Silk, B. & Warhurst, D. C. (1970) : Primary amoebic meningoencephalitis in Britain. Brit. med. J., 1, 596-599.
8. Armstrong, J. & Pereira, M. (1967) : Identification of « Ryan virus » as an amoeba of the genus *Hartmannella*. Brit. med. J., 1, 212-214.
9. Ayers, K. M., Billups, L. H. & Garner, F. M. (1972) : Acanthamoebiasis in a dog. Vet. Path. 9, 221-226.
10. Band, R. N. (1970) : Physiology of *Acanthamoeba* : possible relationship to disease potential. J. Parasit., 56 (4, Sect. II, Pt. 1), 13.
11. Bartak, F. & Schrottenbaum, M. (1968) : Meningoencephalitis Acanthamoebica. Cs. Patol., 4, 198.
12. Bedi, H. K., Devapura, J. C. & Bomb, B. S. (1972) : Primary amoebic meningoencephalitis. J. Indian med. Ass., 58, 13-14.
13. Blattner, R. (1967) : Primary amoebic meningoencephalitis : infection with *Hartmannella* (*Acanthamoeba*). J. Pediat., 70, 298-300.
14. Bosch, J. & Deichsel, G. (1972) : Morphologische Untersuchungen auf pathogenen und potentiell-pathogenen Amöben der Typen « *Entamoeba* » und « *Hartmannella-Acanthamoeba* » aus Reptilien. Z. Parasitenk., 40, 107-129.
15. Bovee, E., Bovee, G., Wilson, D. & Telford, S. jr. (1961) : Amebiasis of tissues induced in mice and rats by inoculation with *Acanthamoeba* and *Entamoeba* spp. Amer. Zool., 1, 439.
16. Bovee, E. C., Wilson, D. E. & Telford, S. R. (1961) : Some amebas and amoeboflagellates inquilinic in Florida reptiles. J. Protozool., 8 (suppl.), 15.
17. Bovee, E. C., Wilson, D. E. & Telford, S. R. (1961) : Entozoic amebas from feral reptiles. Amer. Zool., 1, 439.
18. Brass, K. (1972) : Primäre Amöben-Meningoencephalitis. Dtsch. med. Wschr., 97, 1983-1985.
19. British Medical Journal (1970) : Primary amoebic meningoencephalitis Brit. med. J., 1, 581.
20. Butt, C. (1964) : Primary amoebic meningoencephalitis. Amer. J. clin. Path., 42, 513.
21. Butt, C. (1966) : Primary amebic meningoencephalitis. New Engl. J. Med., 274, 1473-1476.
22. Butt, C., Baro, C. & Knorr, R. W. (1968) : Pathologic progress in amebic encephalitis. Amer. J. clin. Path., 50, 568-574.
23. Callicot, J. H. (1968) : Amebic meningoencephalitis due to free-living amebas of the *Hartmannella* (*Acanthamoeba*) *Naegleria* group. Amer. J. clin. Path., 49, 84-91.
24. Callicot, J. H. (1970) : Pathology of human infections caused by free-living amebas. J. Parasit., 56 (4, Sect. II, Pt. 1), 44.
25. Callicot, J. H., Jones, M. M., Nelson, E. C. dos Santos, J. C. Utz, J. P., Duma, R. J. & Morris, J. V. (1968) : Meningoencephalitis due to pathogenic free-living amoeba. J. Amer. med. Ass., 206, 579-582.
26. Carter, R. F. (1968) : Primary amoebic meningoencephalitis : clinical, pathological and epidemiological features of six fatal cases. J. Path. Bact., 96, 1-25.

27. Carter, R. F. (1969) : Sensitivity to Amphotericin B of a *Naegleria* sp. isolated from a case of primary amoebic meningo-encephalitis. J. clin. Path., **22**, 470-474.
28. Carter, R. F. (1970) : Description of a *Naegleria* species isolated from two cases of primary amoebic meningo-encephalitis, and of the experimental pathological changes induced by it. J. Path., **100**, 217-244.
29. Carter, R. F. (1972) : Primary amoebic meningoencephalitis. An appraisal of present knowledge. Trans. roy. Soc. trop. Méd. Hyg., **66**, 193-213.
30. Casemore, D. P. (1969) : Contamination of virological tissue culture with a species of free-living soil amoeba. J. clin. Path., **22**, 254-257.
31. Casemore, D. P. (1970) : Sensitivity of *Hartmannella (Acanthamoeba)* to 5-fluorocytosine, hydroxystilbamidine and other substances. J. clin. Path., **23**, 649-652.
32. Cerva, L. (1965) : Pathogenetical study of *Hartmannella sp.*, Lilly strain. Progr. Protozool. (London), **50**.
33. Cerva, L. (1965) : Immunological studies of Hartmannellid amoebae. Progr. Protozool. (London), **225**.
34. Cerva, L. (1966) : Use of fluorescent antibody technique to identify pathogenic *Hartmannellae* in tissues of experimental animals. Folia Parasit. (Praha) **13**, 326-331.
35. Cerva, L. (1967) : Immunological studies on Hartmannellid amoebae. Folia Parasit. (Praha) **14**, 19-25.
36. Cerva, L. (1967) : Intracerebral inoculation of experimental animals in pathogenetical studies of *Hartmannella castellanii*. Folia Parasit. (Praha) **14**, 171-176.
37. Cerva, L. (1967) : Intranasal, intrapulmonary, and intracardial inoculation of experimental animals with *Hartmannella castellanii*. Folia parasit. (Praha), **14**, 207-215.
38. Cerva, L. (1968) : A survey of the most important literature on pathogenic strains of the ameba *Hartmannella castellanii* and the diseases of man caused by the amebae of the Limax group (in Czech.). Cs. Epidem., **17**, 249-256.
39. Cerva, L. (1969) : Amoebic meningoencephalitis : Axenic cultures of *Naegleria*. Science, **163**, 576.
40. Cerva, L. (1969) : The effect of some drugs on the growth of the pathogenic strain of *Hartmannella (Acanthamoeba) castellanii* *in vitro*. Folia Parasit. (Praha), **16**, 357-360.
41. Cerva, L. (1970) : Growth of the pathogenic A1 strain of *Acanthamoeba castellanii* in the chick embryo. Folia Parasit. (Praha), **17**, 315-318.
42. Cerva, L. (1971) : An attempt at selective cultivation of pathogenic *Naegleria gruberi* strains. J. Protozool., **18** (suppl.) 44.
43. Cerva, L. (1971) : Studies of Limax amoebae in a swimming pool. Hydrobiologia, **38**, 141-161.
44. Cerva, L. (1971) : Experimental infection of laboratory animals by the pathogenic *Naegleria gruberi* strain Vitek. Folia Parasit. (Praha), **18**, 171-176.
45. Cerva, L. (1973) : Problems of the identity of pathogenic and free-living *Naegleria*. Progr. Protozool. (Clermont-Ferrand), **83**.
46. Cerva, L. (1973) : Sensitivity of pathogenic *Naegleriae* to chemotherapeutics. J. Protozool., **20** (suppl.), 535.
47. Cerva, L., Ferdinandova, M., Novak, K., Ptackova, V., Schrottenbaum, M. & Zimak, V. (1969) : Meningoencephalitis durch Amoebida *Naegleriidae*. Einer weiteren Fall in der Tschechoslowakei. Isolierung des Erregers. Münch. med. Wschr., **111**, 2090-2094.
48. Cerva, L., Ferdinandova, M., Novak, K. & Zimak, V. (1969) : Eitrige Amoeben-meningoencephalitis. Tödliche verlaufende Fälle in Nordböhmen. Münch. med. Wschr., **110**, 1364-1368.
49. Cerva, L. & Kramar, J. (1973) : Antigenic relationships among several limax amoebae isolates assessed with the indirect fluorescent antibody test (IFAT). Folia Parasit. (Praha), **20**, 113-118.
50. Cerva, L. & Novak, K. (1968) : Amebic meningoencephalitis in Czechoslovakia. Preliminary report on the first 16 detected cases. (in Czech.). Cesk. Epidem., **17**, 65-66.

51. Cerva, L. & Novak, K. (1968) : Amoebic meningoencephalitis : sixteen fatalities. *Science*, **160**, 92.
52. Cerva, L. & Novak, K. (1968) : Epidemic occurrence of amoebic meningoencephalitis (in Czech.). *Cas. Lek. ces.*, **107**, 873-876.
53. Cerva, L. & Novak, K. (1968) : An outbreak of amoebic meningoencephalitis. *Amer. J. Epidem.*, **160**, 92.
54. Cerva, L., Novak, K. & Culbertson, C. G. (1968) : An outbreak of acute, fatal amoebic meningoencephalitis. *Amer. J. Epidem.*, **88**, 436-444.
55. Cerva, L., Serbus, C. & Skocil, V. (1973) : Isolation of *Limax* amoebae from the nasal mucosa of man. *Folia Parasit. (Praha)*, **20**, 97-103.
56. Cerva, L., Zimak, V. & Novak, K. (1969) : Amoebic meningoencephalitis. A new amoeba isolate. *Science*, **163**, 575-576.
57. Cervova, H., Cerva, L., Macek, J. & Johnova, V. (1972) : Quantitative follow up study of the frequency of *Limax* group amoebae in the Podoli swimming pool (in Czech.). *Cs. Epidem.*, **21**, 203-210.
58. Chang, R. (1964) : An immunologic study of the « Lipovirus ». *J. Immunol.*, **92**, 305-312.
59. Chang, R., Geyer, R. & Andrus, S. (1962) : A lipogenic toxin released through the interaction of a new cytopathic agent (Lipovirus) and cultured human cells. *J. exp. Med.*, **115**, 959-966.
60. Chang, R., Goldhaber, P. & Dunnebacke, T. (1964) : The continuous multiplication of Lipovirus-infected human cells. *Proc. nat. Acad. Sci. (Wash.)*, **52**, 709-715.
61. Chang, R. & Humes, M. (1962) : The biological immunological, and physicochemical agent capable of inducing DNA and thymine degradation in cultured human cells. *J. exp. Med.*, **115**, 937-958.
62. Chang, R. & Liepens, H. (1961) : Appearance of marked DNA-degrading and thymine catabolic activities in a human cell infected with a transmissible agent. *Proc. Soc. exp. Biol. (N. Y.)*, **107**, 138-141.
63. Chang, R. & Liepens, H. (1962) : A study of the mechanisms of DNA and thymine degradation in cultured human cells infected with a Lipovirus. *J. exp. Med.*, **115**, 967-976.
64. Chang, R., Pan, I. & Rosenau, B. (1966) : On the nature of Lipovirus. *J. exp. Med.*, **124**, 1153-1166.
65. Chang, R. & Owens, S. (1964) : Patterns of Lipovirus antibody in human populations. *J. Immunol.*, **92**, 313-319.
66. Chang, R., Shiomi, T. & Franz, D. (1964) : Temperature-induced cellular resistance to the « Lipovirus ». *Proc. Soc. exp. Biol. (N. Y.)*, **115**, 646-649.
67. Chang, S. L. (1971) : Small, free-living amoebae: cultivation, quantitation, identification, classification, pathogenesis and resistance. *Curr. Top. comp. Pathobiol.*, **1**, 201-254.
68. Chang, S. L. (1972) : Pathogenic free-living amoebae and recreational waters. *Proc. Water Pollution Research (Israël)*, **13**, 1-12.
69. Childs, G. E. (1972) : Identification of peroxisomes in *Hartmannella culbertsoni*. Ph. D. Thesis. Louisiana State University Medical Center, New Orleans.
70. Childs, G. E. (1973) : Diaminobenzidine reactivity of peroxisomes and mitochondria in a parasitic amoeba, *H. culbertsoni*. *J. Histochem. Cytochem.*, **21**, 26-33.
71. Childs, G. E. (1973) : *Hartmannella culbertsoni* : Enzymatic ultrastructural and cyto-chemical characteristics of peroxisomes in a density gradient. *Exp. Parasit.*, **34**, 44-55.
72. Ciplea, A. G., Proca, M. & Milcu, M. (1973) : Recherches histochimiques sur les modifications des acides nucléiques chez la souris blanche infectée par *A. castellanii*. *Arch. roum. Path. exp.*, **32**, 373.
73. Culbertson, C. G. (1961) : Pathogenic *Acanthamoeba (Hartmannella)*. *Amer. J. clin. Path.*, **35**, 195-202.
74. Culbertson, C. G. (1970) : Pathogenic free-living amoebae. *Industry & Trop. Health*, **7**, 118-123.

75. Culbertson, C. G. (1971) : The pathogenicity of soil amebas. *Ann. Rev. Microbiol.*, **25**, 231-254.
76. Culbertson, C. G., Ensminger, P. & Overton, W. (1965) : Experimental hartmannellosis. *Progr. Protozool.* (London), **1965**, 126.
77. Culbertson, C. G., Ensminger, P. & Overton, W. (1965) : The isolation of additional strains of pathogenic *Hartmannella* sp. (*Acanthamoeba*). Proposed culture method for application to biological material. *Amer. J. clin. Path.*, **43**, 383-387.
78. Culbertson, C. G., Ensminger, P. & Overton, W. (1966) : *Hartmannella* (*Acanthamoeba*). Experimental chronic granulomatous brain infections produced by new isolates of low virulence. *Amer. J. clin. Path.*, **46**, 305-314.
79. Culbertson, C. G., Ensminger, P. & Overton, W. (1968) : Pathogenic *Naegleria* sp. Study of a strain isolated from human cerebrospinal fluid. *J. Protozool.*, **15**, 353-363.
80. Culbertson, C. G., Ensminger, P. & Overton, W. (1972) : Amebic cellulocutaneous invasion by *Naegleria aerobia* with generalised visceral lesions after subcutaneous inoculation. *Amer. J. clin. Path.*, **57**, 375-386.
81. Culbertson, C. G., Holmes, D. & Overton, W. (1965) : *Hartmannella castellanii* (*Acanthamoeba* sp.). Preliminary report on experimental chemotherapy. *Amer. J. clin. Path.*, **43**, 361-364.
82. Culbertson, C. G., Smith, J. Cohen, H. & Minner, J. (1959) : Experimental infection of mice and monkeys by *Acanthamoeba*. *Amer. J. Path.*, **35**, 185-187.
83. Culbertson, C. G., Smith, J. & Minner, J. (1958) : *Acanthamoeba* : observations on animal pathogenicity. *Science*, **127**, 1506.
84. Das, S. R. (1970) : Virulence and identification of free-living soil amoeba of the *Naegleria-Hartmannella* type. *Trans. roy. Soc. trop. Med. Hyg.*, **64**, 20.
85. Das, S. R. (1971) : Virulence of free-living soil amoebae and identification of pathogenic *Naegleria-Hartmannella* types of amoebae which cause meningo-encephalitis in man and woman. *J. Protozool.*, **18** (suppl.) 43.
86. Das, S. R. (1971) : Chemotherapy of experimental amoebic meningoencephalitis in mice infected with *Naegleria aerobia*. *Trans. roy. Soc. trop. Med. Hyg.*, **65**, 106-107.
87. Das, S. R. (1972) : Isolation of *Naegleria* and *Hartmannella* amoebae from Beckenham (London) soils and their pathogenicity in mice. *Trans. roy. Soc. trop. Med. Hyg.*, **66**, 663-664.
88. Das, S. R. (1972) : Soil amoebae that affect brain. *Science Reporter*, **9**, 516-519.
89. Das, S. R. & Singh, B. N. (1970) : Disease potential of free-living amoebae : virulence and chemotherapy of free-living amoebae. *J. Parasit.*, **56** (4, Sect. II, Pt. 1), 67.
90. Das, S. R. & Singh, B. N. (1973) : Epidemiology of primary amoebic meningo-encephalitis caused by *Naegleria aerobia*. *Progr. Protozool.* (Clermont-Ferrand), 104.
91. Das Gupta, A. (1970) : Primary amoebic meningo-encephalitis. *J. Indian med. Ass.*, **54**, 429.
92. De Carneri, I. (1970) : Sensibilita ai farmaci di amebe del suolo dei generi *Hartmannella* E *Naegleria*, agenti etiologici di meningoencefaliti. *Riv. Parassit.* **31**, 1-8.
93. Derrick, E. (1948) : A fatal case of generalized amoebiasis due to a protozoan closely resembling if not identical with *Iodoamoeba butschlii*. *Trans. roy. Soc. trop. Med. Hyg.*, **42**, 191-198.
94. Donoho, J. H. & Donoho, C. R. (1972) : Primary amoebic meningoencephalitis. *Delaware med. J.*, **44**, 197-198.
95. Dos Santos, J. G. N. (1970) : Fatal primary amoebic meningoencephalitis. A retrospective study in Richmond, Virginia. *Amer. J. clin. Path.*, **54**, 737-742.
96. Dos Santos, J. G. N. (1973) : Primary amoebic meningoencephalitis in Richmond, Virginia U. S. A. *Progr. Protozool.* (Clermont-Ferrand), 122.
97. Duma, R. J. (1968) : Primary amoebic meningoencephalitis. *Morbid. Mortal. Wkly. Rep.*, **17**, 330.
98. Duma, R. J. (1970) : In vitro susceptibility of pathogenic *Naegleria gruberi* to amphotericin B. *Antimicrob. Agents Chemoter.*, **10**, 109-111.

99. Duma, R. J. (1972) : Primary amebic meningoencephalitis. Rev. Clin. Lab. Sci., **3**, 163-192.
100. Duma, R. J., Ferrell, H. W., Nelson, E. and Jones, M. (1969) : Primary amebic meningoencephalitis. New Engl. J. Med., **281**, 1315-1323.
101. Duma, R. J., Rosenblum, W., McGehee, R. F., Jones, M. & Nelson, E. C. (1971) : Primary amebic encephalitis caused by *Naegleria*. Two new cases, response to amphotericin B and a review. Ann. intern. Med., **74**, 923-931.
102. Duma, R. J., Shumacker, J. B. & Callicott, J. H. (1971) : Primary amebic meningoencephalitis. A survey in Virginia. Arch. environm. Hlth, **23**, 43-47.
103. Dunnebacke, T. (1963) : Electron microscope observations of liver cells inoculated with Lipovirus. Virology, **21**, 203-209.
104. Dunnebacke, T. & Williams, R. (1967) : A reinterpretation of the nature of lipovirus cytopathogenicity. Proc. nat. Acad. Sci. (Wash.), **57**, 1363-1370.
105. Dunnebacke, T. & Schuster, F. L. (1971) : Infectious agent from a free-living soil amoeba, *Naegleria gruberi*. Science, **174**, 516-518.
106. Dvorak, R. & Skocil, V. (1972) : Amoeba of the Limax group in the nasal mucous membrane (in Czech). Cs. Otolaryng., **21**, 279-284.
107. Dwivedi, J. (1965) : Pulmonary lesions in an Indian buffalo associated with *Acanthamoeba* sp. Indian J. Microbiol., **5**, 31-34.
108. Eldridge, A. & Tobin, J. (1967) : Ryan virus. Brit. med. J., **1**, 299.
109. Ensminger, P. & Culbertson, C. (1966) : *Hartmannella (Acanthamoeba)* experiments in preservation and detection of trophozoites and amebic cysts in infected tissue. Techn. Bull. Reg. med. Technol., **36**, 234-237.
110. Ensminger, P. & Culbertson, C. (1966) : *Hartmannella (Acanthamoeba)*. Experiments in preservation and detection of trophozoites and amebic cysts in infected tissue. Amer. J. clin. Path., **46**, 496-499.
111. Fowler, M. & Carter, F. (1965) : Acute pyogenic meningitis probably due to *Acanthamoeba* sp. Brit. med. J., **2**, 740-742.
112. Frank, W. & Bosch, I. (1972) : Isolierung von Amöben des Typs « *Hartmannella-Acanthamoeba* » und « *Naegleria* » aus Kaltblütern. Z. Parasitenk., **40**, 139-150.
113. Fulton, C. (1970) : Amebo-flagellates as research partners : the laboratory biology of *Naegleria* and *Tetramitus*. Meth. Cell Physiol., **4**, 341-476.
114. Ghosh, T. N. (1973) : Parasitism in some free-living amoebae. Progr. Protozool. (Clermont-Ferrand), **151**.
115. Gordeeva, L. M. (1970) : Primary amoebic meningoencephalitis caused by free-living amoebae of the genus *Hartmannella*, *Acanthamoeba* and *Naegleria* (A review of the literature) (in Russian). Med. Parasit. (Mosk.), **39**, 227-237.
116. Gordeeva, L. M. (1973) : Isolation and cultivation of Limax amoebae capable to grow at 37 °C. Progr. Protozool. (Clermont-Ferrand), **159**.
117. Griffin, J. L. (1968) : Facultatively pathogenic amoebae : A survey on nomenclature with a bibliography. Armed Forces Inst. Path. (Washington).
118. Griffin, J. L. (1972) : Temperature tolerance of pathogenic and non pathogenic free-living amoebas. Science, **178**, 869-870.
119. Griffin, J. L. (1973) : Environmental sampling for pathogenic *Naegleria*. J. Protozool., **20** (suppl.), 497-498.
120. Grundy, R. & Blowers, R. (1970) : A case of primary amoebic meningoencephalitis treated with chloroquine. E. Afr. med. J., **47**, 153-158.
121. Hecht, R. H., Cohen, A., Stoner, J. & Irwin, C. (1971) : Primary amebic meningoencephalitis, California. Morbid. Mortal. Wkly Rep., **20**.
122. Hecht, R. H., Cohen, A., Stoner, J. & Irwin, C. (1972) : Primary amebic meningoencephalitis in California. Calif. Med., **117**, 69-73.
123. Hermanne, J., Jadin, J. B. & Martin, J. (1972) : Méningo-encéphalite ambiennne primitive en Belgique. A propos de deux cas. Ann. Pédiat., **19**, 425-436.

124. Hermanne, J., Jadin, J. B. & Martin, J. J. (1973) : Méningoencéphalite ambiennne primitive en Belgique. Quatre premiers cas. Acta paed. Belg., **27**, 348-365.
125. Hermanne, J., Jadin, J. B., Martin, J. J. & Willaert, E. (1974) : La méningo-encéphalite ambiennne primitive. Considérations à propos des cas belges. Rev. Prat. (Paris), **24**, 1241-1253.
126. Hermanne, J., Robyn, G., Jadin, J. B., Tverdy, G., Martin, J., Willaert, H., Timmesch, M., Dierckx, L. & Alleman, J. J. (1971) : Méningo-encéphalite ambiennne aiguë mortelle (2 cas). Arch. franç. Pédiat., **28**, 458.
127. Howells, R. E., Saygi, G. & Warhurst, D. C. (1970) : Observations on ageing cultures of amoebae. Trans. roy. Soc. trop. Med. Hyg., **64**, 19.
128. Hull, R., Minner, J. & Mascoli, C. (1958) : New viral agents recovered from tissue cultures of monkey kidney cells. III. Recovery of additional agents both from monkey tissues and directly from tissues and excreta. Amer. J. Hyg., **68**, 31-44.
129. Jadin, J. B. (1973) : Hypothèses au sujet de l'adaptation des amibes du groupe Limax à l'homme et aux animaux. Ann. Parasit. (Paris), **48**, 199-204.
130. Jadin, J. B. (1973) : De la méningo-encéphalite ambiennne et du pouvoir pathogène des amibes « Limax ». Ann. Biol., **12**, 305-342.
131. Jadin, J. B. (1974) : Les amibes dans les eaux. Path. Biol., **22**, 81-87.
132. Jadin, J. B., Hermanne, J., Robijn, G. & Willaert, E. (1971) : Trois cas de méningo-encéphalite ambiennne primitive en Europe occidentale, à Anvers. Bull. Acad. nat. Méd. (Paris), **155**, 232-238.
133. Jadin, J. B., Hermanne, J., Robyn, G., Willaert, E., Van Maercke, Y. & Stevens, W. (1971) : Trois cas de méningo-encéphalite ambiennne primitive observés à Anvers (Belgique). Ann. Soc. belge Méd. trop., **51**, 255-266.
134. Jadin, J. B., Hermanne, J. & Willaert, E. (1972) : La méningo-encéphalite ambiennne primitive. Méd. Mal. Infec., **2**, 205-210.
135. Jadin, J. B. & Willaert, E. (1971) : Trois cas de méningo-encéphalite ambiennne à *N. gruberi* observés à Anvers (Belgique). J. Protozool., **18**, (suppl.), 49.
136. Jadin, J. B. & Willaert, E. (1971) : Au sujet des amibes du genre *N. gruberi* isolées à partir du cerveau de trois sujets morts de méningo-encéphalite ambiennne primitive à Anvers. Multicoll. Eur. Parasit. (Rennes), 294-296.
137. Jadin, J. B. & Willaert, E. (1972) : Au sujet de la dispersion des amibes du groupe « Limax ». J. Protozool., **19** (suppl.), 68.
138. Jadin, J. B. & Willaert, E. (1972) : Trois cas de méningo-encéphalite ambiennne primitive à *N. gruberi* observés à Anvers (Belgique). Protistologica, **8**, 95-100.
139. Jadin, J. B. & Willaert, E. (1972) : Au sujet des méningites ambiennnes. Piscine, **34**, 54-56.
140. Jadin, J. B. & Willaert, E. (1972) : Au sujet de la dispersion des amibes du groupe « Limax ». Protistologica, **8**, 505-508.
141. Jadin, J. B., Willaert, E. & Compère, F. (1972) : De la nécessité du contrôle biologique des eaux potables. Bull. Acad. Nat. Méd. (Paris), **156**, 995-999.
142. Jadin, J. B., Willaert, E. & Hermanne, J. (1973) : Présence d'amibes limax dans l'intestin de l'homme et des animaux. Arsom Bull. Séances, **3**, 520-526.
143. Jadin, J. M., Creemers, J. & Van der Schueren, B. (1971) : Contribution à l'étude de l'endocytose chez les formes ambiennnes des *Naegleria*. J. Protozool., **18** (suppl.) 49.
144. Jager, B. V. & Stamm, W. P. (1972) : Brain abscess caused by free-living amoeba probably of the genus *Hartmannella* in a patient with Hodgkins disease. Lancet, 1343-1345.
145. Jahnes, W., Fullmer, H. & Li, C. (1957) : Free-living amoebae as contaminants in monkey kidney tissue culture. Proc. Soc. exp. Biol. (N.Y.), **96**, 484-488.
146. Jakovljevic, R. & Talis, B. (1969) : Recovery of a Hartmannellid ameba in the purulent discharge from a human ear. J. Protozool., **16** (suppl.), 36.
147. Jamieson, A. (1973) : The epidemiology of primary amoebic meningo-encephalitis in South Australia. Progr. Protozool. (Clermont-Ferrand), 198.

148. Jamieson, A. & Anderson, K. (1972) : A simple method for studying nuclear division in free-living soil amoebae. *J. clin. Path.*, **25**, 271.
149. Jamieson, A. & Anderson, K. (1973) : A method for the isolation of *Naegleria* species from water samples. *Pathology*, **5**, 55-58.
150. Jamieson, A. & Anderson, K. (1974) : Primary amoebic meningoencephalitis. *Lancet*, **i**, 261.
151. Jirovec, O. (1967) : Parasitisme artificiel des Protozoaires libres. *Ann. Parasit. (Paris)*, **42**, 133-140.
152. Jirovec, O. (1969) : Les amibes du type « Limax » comme agent vecteur des méningo-encéphalites chez l'homme. *J. Méd. Lyon*, **50**, 1701-1710.
153. Jirovec, O. (1970) : Amöben der Limax-Gruppe als Erreger von tödlichen Meningoencephaliden des Menschen. *C. R. V^e Congr. Int. Mal. Inf., A IV/1*, 81-91.
154. Jirovec, O. & Kneiflova-Jirovcova (1970) : La résistance des amibes du type Limax vers quelques facteurs externes. *J. Parasit.*, **56** (4, Sect. II, Pt. 1), 172-173.
155. Kasprzak, W. (1971) : Primary amoebic meningo-encephalitis caused by *Naegleria* sp. A new problem in medical parasitology (in Polish). *Wiad. Parazyt.*, **17**, 273-285.
156. Kasprzak, W. & Mazur, T. (1972) : Free-living amoebae isolated from waters frequented by people in the vicinity of Poznan, Poland. Experimental studies in mice on the pathogenicity of the isolates. *Z. Tropenmed. Parasit.*, **23**, 391-398.
157. Kasprzak, W. & Mazur, T. (1973) : Method of isolation of free-living amoebae from their natural habitat. (in Polish). *Wiad. Parazyt.*, **19**, 855-864.
158. Kasprzak, W., Mazur, T. & Rucka, A. (1973) : Pathogenic strains of free-living amoebae isolated from lakes in the environs of Poznan, Poland. *Progr. Protozool. (Clermont-Ferrand)*, **213**.
159. Kenney, M. (1970) : Detection of Hartmannelloid amoebic infection by the micro-Kolmer complement fixation test. *C. R. V^e Congr. Int. Mal. Inf., A IV/1*, 93-98.
160. Kenney, M. (1971) : The micro-Kolmer complement fixation test in routine screening for soil amoeba infection. *Health Lab. Sci.*, **8**, 5-10.
161. Kernohan, J., Magath, T. & Schloss, G. (1960) : Granuloma of brain probably due to *Endolimax williamsi (Iodamoeba butschlii)*. *Arch. Path.*, **70**, 576-580.
162. Kingston, D. & Warhurst, D. C. (1969) : Isolation of amoebae from the air. *J. med. Microb.*, **2**, 27-36.
163. Krishna Prasad, B. N. (1972) : In vitro effect of drugs against pathogenic and nonpathogenic free-living amoebae and on anaerobic amoebae. *Indian J. exp. Biol.*, **10**, 43-45.
164. Lamy, L. & Fromentin, H. (1973) : Intérêt particulier de la culture pour la mise en évidence des amibes libres susceptibles de s'installer chez l'homme et de devenir pathogène. *C. R. Acad. Sci. (Paris) Serie D* **277**, 1205-1209.
165. Lastovica, A. J. & Elsdon-Dew, R. (1971) : Primary amoebic meningoencephalitis caused by *Naegleria* sp. *S. Afr. J. Sci.*, **67**, 464-466.
166. Maitra, S. C., Krishna Prasad, B. N., Das, S. R. & Agarwala, S. C. (1974) : Study of *Naegleria aerobia* by electron microscopy. *Trans. roy. Soc. trop. Med. Hyg.*, **68**, 56-60.
167. Mandal, B. N., Gudex, D. J., Fitchett, M. R., Pullon, D. H., Maldoch, J. A., David, C. M. & Apthorp, J. (1970) : Acute meningo-encephalitis due to amoeba of the order Myxomycetale (slime mould). *N. Z. med. J.*, **71**, 16-23.
168. Mariani, G. (1962) : *Hartmannella castellanii* : Pathogenic or saprophytic amoeba ? *Boll. Soc. Med. Clin. Cremonia*, **16**, 213-220.
169. Martinez, A. J., Duma, R. J., Nelson, E. C. & Moretta, Fl. (1973) : Experimental *Naegleria* meningoencephalitis in mice. Penetration of the olfactory mucosal epithelium by *Naegleria* and Pathologic changes produced : a light and electron microscope study. *Lab. Invest.*, **29**, 121-134.
170. Martinez, A. J., Nelson, E. C. & Duma, R. J. (1973) : Animal model : primary amoebic (*Naegleria*) meningoencephalitis in mice. *Amer. J. Path.*, **73**, 545-548.

171. Martinez, A. J., Nelson, E. C., Jones, M. M., Duma, R. J. & Rosenblum, W. I. (1971) : Experimental *Naegleria* meningoencephalitis in mice. An electron microscope study. Lab. Invest., **25**, 465-475.
172. McConnell, E., Garner, F. & Kirk, J. (1968) : Hartmannellosis in a bull. Path. Vet., **5**, 1-6.
173. McCowen, M. & Galloway, R. (1959) : Studies on pathogenic strains of *Acanthamoeba* sp. J. Protozool., **6**, 22.
174. McCroan, J. E. & Patterson, J. (1970) : Primary amebic meningoencephalitis. Georgia. Morbid. Mortal. Wkly Rep., **19**, 413-414.
175. Medical Journal of Australia (1969) : Amoebic meningo-encephalitis. Med. J. Austr., **1**, 1036-1038.
176. Moore, A. & Hlinka, J. (1968) : *Hartmannella* sp. (*Acanthamoeba*) as a tissue culture contaminant. J. nat. Cancer Inst., **40**, 569-581.
177. Muller, R. (1973) : Nachweis von Amoeben in herdförmigen Organnekrosen bei einem kanadischen Biber (*Castor canadensis*). Acta Tropica, **30**, 373-376.
178. Nelson, E. C. & Jones, M. (1970) : Culture isolation of agents of primary amebic meningoencephalitis. J. Parasit., **56**, (4, Sect. II, Pt. 1), 248.
179. Neva, F. A. (1970) : Amoebic meningoencephalitis. A new disease ? New Engl. J. Med., **19**, 450-453.
180. New Zealand Medical Journal (1969) : Primary amoebic meningo-encephalitis in New-Zealand. N. Z. Med. J., **69**, 164.
181. Nicoll, A. M. (1973) : Fatal primary amoebic meningoencephalitis. N. Z. Med. J., **78**, 108-112.
182. O'Dell, W. D. & Stevens, A. R. (1973) : Quantitative growth of *Naegleria* in axenic culture. Appl. Microbiol., **25**, 621-627.
183. Page, F. C. (1970) : Taxonomy and morphology of free-living amoebae causing meningoencephalitis in man and other animals. J. Parasit., **56**, (4 Sect. II, Pt. 1), 257.
184. Page, F. C. (1970) : Taxonomic and ecological distribution of potentially pathogenic free-living amoebae. J. Parasit., **56**, (4, Sect. II, Pt. 1), 257.
185. Pan, N. R. & Ghosh, T. N. (1971) : Primary amoebic meningoencephalitis in two Indian children. J. Indian med. Ass., **56**, 134-137.
186. Pant, K. D., Prasard, B. N. & Singh, L. M. (1968) : Antigenic relationship among fifteen strains of pathogenic *Hartmannella*. Indian J. exp. Biol., **6**, 227-229.
187. Patras, D. & Andujar, J. (1966) : Meningoencephalitis due to *Hartmannella* (*Acanthamoeba*). Amer. J. clin. Path., **46**, 226-233.
188. Payne, J. I. (1968) : Amoebic meningoencephalitis. Science, **161**, 189.
189. Pennisi, L., Mento, G. & Todaro, F. (1971) : Sulla diffusione di anticorpi anti-*Acanthamoeba castellanii* in soggetti provenienti da varie regioni Italiana. Parassitologia, **13**, 299-308.
190. Pereira, M., Marsden, H., Corbitt, G. & Tobin, J. (1966) : Ryan virus : a possible new human pathogen. Brit. med. J., **1**, 130-132.
191. Proca, M. & Ciplea, A. G. (1973) : Infection expérimentale à *A. castellanii* chez les souris blanches. Arch. roum. Path. exp., **32**, 457-458.
192. Proca-Ciobanu, M. & Ciplea, A. (1973) : Contributions to the study of the experimental infection with *Acanthamoeba castellanii* at white mice : histopathological and histochemical data. Progr. Protozool., (Clermont-Ferrand), **330**.
193. Proca-Ciobanu, M., Lupascu, G. H. & Petrovici, A. (1973) : Electron microscopy of a pathogenic strain of *Acanthamoeba castellanii* : the presence of endosymbionts. Progr. Protozool. (Clermont-Ferrand), **331**.
194. Proca, M. I., Lupascu, G. H. & Steriu, D. (1973) : Isolation of a pathogenic strain *A. castellanii* in Roumania. Arch. roum. Path. exp., **32**, 205-210.
195. Raizada, M. K. & Krishna-Murti, C. R. (1971) : Changes in the activity of certain enzymes of *Hartmannella* (Culbertson strain A-1) during encystment. J. Protozool., **18**, 115-119.

196. Raizada, M. K. & Krishna Murti, C. R. (1972) : Synthesis of RNA, protein, cellulose and mucopolysaccharide and changes in the chemical composition of *H. culbertsoni* during encystment under axenic conditions. *J. Protozool.*, **19**, 691-695.
197. Raizada, M. K. & Krishna Murti, C. R. (1973) : Binding of taurine to *H. culbertsoni* and the synthesis of cyclic AMP. *Curr. Sci.*, **42**, 202-204.
198. Raizada, M. K. & Mohan, Rao (1972) : L-Threonine dehydratase activity of axenically grown *H. culbertsoni*. *Arch. Microb.* **85**, 119-128.
199. Raizada, M. K., Saxena, K. C. & Murti, C. R. (1972) : Serologic changes associated with the encystment of axenically grown *Hartmannella culbertsoni*. *J. Protozool.*, **19**, 98-102.
200. Robert, V. B. & Rorke, L. B. (1973) : Primary amebic encephalitis, probably from *Acanthamoeba*. *Ann. intern. Med.*, **79**, 174-179.
201. Rondanelli, E. G., Carosi, G., Filice, G. & De Carneri, I. (1971) : Rilievi critici sull'organizzazione ultrastrutturale di un ceppo patogeno (A-1 di Culbertson) di *H. castellanii* coltivato in vitro. *Parassitologia*, **13**, 339-343.
202. Rorke, L., Fish, S. & Faris, D. (1971) : Primary amoebic meningoencephalitis. *Pennsylvania. Morb. Mort. Wkly. Rep.*, **20**, 453.
203. Sandground, J. & Hutner, S. (1962) : Defined media for 2 small amoebae, one potentially pathogenic and growing at 37°, the other not growing above 32°. *J. Protozool.* **9** (suppl.), 10.
204. Saygi, G. (1969) : *Naegleria gruberi*. A pathogen ? *Lancet*, ii, 273.
205. Saygi, G. (1969) : Pathogenic and serological studies of Ryan and Neff strain of *Hartmannella castellanii*. *Trans. roy. Soc. trop. Med. Hyg.*, **63**, 11.
206. Saygi, G. (1969) : An amoeba-agglutination test with *Acanthamoeba (Hartmannella)*. *Trans. roy. Soc. trop. Med. Hyg.*, **63**, 426-427.
207. Saygi, G. (1971) : Studies on free-living amoebae. Ph. D. Thesis, Liverpool.
208. Saygi, G. & Warhurst, D. C. (1970) : Greensteins five dye stain. A rapid and simple differential stain for amoebae. *Trans. roy. Soc. trop. Med. Hyg.*, **64**, 19.
209. Saygi, G., Warhurst, D. C. & Roome, A. (1973) : A study of amoebae isolated from the Bristol cases of primary amoebic encephalitis. *Proc. roy. Soc. Med.*, **66**, 277-282.
210. Schuster, F. L. (1969) : Virus-like bodies in *Naegleria gruberi*. *J. Protozool.*, **16**, 724-727.
211. Schuster, F. L. & Dunnebacke, T. H. (1971) : Formation of bodies associated with virus-like particles in the amoeba flagellate *Naegleria gruberi*. *J. Ultrastruct. Res.*, **36**, 659-668.
212. Schuster, F. L. & Dunnebacke, T. H. (1971) : Virus-like particles in *N. gruberi*. E. G. Transmission and infectivity. *J. Protozool.*, **18** (suppl.), 21.
213. Science News (1970) : Amoebic killers. *Science News*, **98**, 245.
214. Shookhoff, H. B. (1969) : Meningo-encephalitis due to free-living amoebas normally found in soil. *Ann. intern. Med.*, **70**, 1276-1277.
215. Shumaker, J. B. (1970) : Primary amebic meningoencephalitis. *J. Inf. Dis.*, **121**, 89-90.
216. Shumaker, J. B., Healy, G. R., English, D., Schulz, M. & Page, F. (1971) : *Naegleria gruberi* isolation from nasal swab of a healthy individual. *Lancet*, ii, 602-603.
217. Singh, B. N. (1972) : Classification of amoebae belonging to the order Amoebida with special reference to pathogenic free-living forms. *Curr. Sci.*, **41**, 395-403.
218. Singh, B. N. & Das, S. R. (1970) : Studies on pathogenic and non pathogenic small free-living amoebae and the bearing of nuclear division on the classification of the order Amoebida. *Phil. Trans. roy. Soc. Lond., B.*, **259**, 435-476.
219. Singh, B. N. & Das, S. R. (1970) : Taxonomy of amoebae placed in the order Amoebida, Kent, 1880, *J. Parasit.*, **56**, (4, Sect. II, Pt. 1), 319.
220. Singh, B. N. & Das, S. R. (1972) : Intra-nasal infection of mice with flagellate stage of *Naegleria aerobia* and its bearing on the epidemiology of human meningo-encephalitis. *Curr. Sci.*, **41**, 625-628.
221. Sing, B. N. & Das, S. R. (1972) : Occurrence of pathogenic *Naegleria aerobia*, *H. culbertsoni* and *H. rhysodes* in sewage sludge samples of Lucknow. *Curr. Sci.*, **41**, 277-281.

222. Sixl-Voigt, B. & Sixl, H. (1971) : Specific complement fixation reaction for *Acanthamoeba*. Z. Immun. Forsch., **142**, 248-253.
223. Skocil, V., Cerva, L. & Serbus, C. (1970) : Epidemiological study of amoebas of the Limax group in military communities. First report. J. Hyg. Epidem. (Praha) **14**, 61-66.
224. Skocil, V., Cerva, L., Serbus, C. & Nejedlo, V. (1970) : Epidemiological study of amoebas of Limax group in military communities. II. Study of the military community (1968-1969). J. Hyg. Epidem. (Praha), **14**, 324-331.
225. Skocil, V., Cerva, L. & Serbus, C. (1971) : Epidemiological study of amoeba of the Limax group in military communities. IV. Relation between the findings of amoeba in the external environment and their incidence in the soldiers during the investigation into the community L. J. Hyg. Epidem. (Praha), **15**, 445-449.
226. Skocil, V., Serbus, C. Cerva, L. (1971) : Epidemiological study of incidence of amoebas of the Limax group in military communities. III. Investigation of the community of 3rd garnison L. I. Problems of contagion in the community. J. Hyg. Epidem. (Praha) **15**, 156-162.
227. Skocil, V., Dvorak, R., Sterba, J., Slajs, J., Serbus, C. & Cerva, L. (1972) : Epidemiological study of the incidence of amoebas of the Limax group in military communities. V. Relation between the presence of amoebas of the Limax group in nasal swabs and a pathological finding in nasal mucosa. J. Hyg. Epidem. (Praha), **16**, 101-106.
228. Skocil, V., Serbus, C. & Cerva, L. (1972) : Epidemiological study of the incidence of amoebas of the Limax group in military communities. VI. Relation between the finding of amoebas of the Limax group in nasal swabs and some epidemiological indices. J. Hyg. Epidem. (Praha), **16**, 226-230.
229. Stevens, A. R. & O'Dell, W. D. (1973) : The influence of growth medium on axenic cultivation of virulent and avirulent *Acanthamoeba*. Proc. Soc. exp. Biol. (N. Y.) **143**, 474-478.
230. Strauss, R. A. (1972) : Primary amebic meningoencephalitis. Chicago med. School Quart. **31**, 30-39.
231. Symmers, W. S. C. (1969) : Primary amoebic meningoencephalitis in Britain. Brit. med. J., **4**, 449-454.
232. Van den Driessche, E., Vandepitte, J., Van Dyck, P. J., De Jonckheere, J. & Van de Voorde, H. (1973) : Primary amoebic meningoencephalitis after swimming in stream water. Lancet, **ii**, 971.
233. Verstraete, J. (1971) : Primaire amoeben meningo-encephalitis (PAME), Laboratorium, **10**, 301-316.
234. Verstraete, J. (1973) : De microbiologie van het zwemwater. Laboratorium, **12**, 423-430.
235. Visvesvara, G. S. & Balamuth, W. (1973) : Comparative studies on related free-living and pathogenic amoebae, with special reference to *Acanthamoeba*. Progr. Protozool. (Clermont-Ferrand), **424**.
236. Visvesvara, G. S., Callaway, C. S. & Healy, G. R. (1973) : Light and electron microscopic studies on the mechanism of pathogenesis of *Naegleria fowleri* in mouse brain and tissue culture. J. Protozool., **20** (suppl.) 498.
237. Visvesvara, G. S. & Healy, G. R. (1973) : Comparative studies on pathogenic and free-living *Naegleria* species. 1. Gel diffusion and immunoelectrophoretic analysis. J. Protozool., **20** (suppl.) 522.
238. Wagner, W. P., Duma, R. J., McGehee, R. F., Suter, C. G. (1969) : Primary amebic meningoencephalitis. Virginia. Morb. Mortal. Wkly Rep., **18**, 241-242.
239. Wang, S. (1967) : Isolation of *Hartmannella* species from human throats. New Engl. J. Med., **277**, 1174-1179.
240. Wang, S. & Feldman, H., (1961) : Occurrence of *Acanthamoeba* in tissue cultures inoculated with human pharyngeal swabs. Antimicrob. Agents Chemoth., **1**, 50-53.
241. Warhurst, D. & Armstrong, J. (1968) : A study of a small amoeba from mammalian cell cultures infected with Ryan virus. J. gen. Microbiol., **50**, 207-215.
242. Warhurst, D. C., Roome, A. P. & Saygi, G. (1970) : *Naegleria* sp. from human cerebrospinal fluid. Trans. roy. Soc. trop. Med. Hyg., **64**, 19-20.

243. Weng, N. K., Wagner, W. & Parker, J. C. (1971) : Primary amebic meningoencephalitis a potential problem in the Southeastern United States. *Sth. med. J. (Bgham, Ala)*, **64**, 691-694.
244. White, P. C., Wagner, W. P. & Duma, R. J. (1968) : Primary amebic meningoencephalitis. *Virginia. Morb. Mortal. Wkly Rep.*, **7**, 330.
245. Willaert, E. (1971) : Isolement et culture in vitro des amibes du genre *Naegleria*. *Ann. Soc. belge Méd. trop.*, **51**, 701-708.
246. Willaert, E., Jadin, J. B. & Le Ray, D. (1972) : Structures immunochimiques comparées d'amibes du genre *Naegleria*. *J. Protozool.*, **19** (suppl.), 74.
247. Willaert, E., Jadin, J. B. & Le Ray, D. (1972) : Structures immunochimiques comparées d'amibes du genre *Naegleria*. *Protistologica*, **8**, 497-504.
248. Willaert, E., Jadin, J. B. & Le Ray, D. (1973) : Comparative antigenic analysis of *Naegleria* species. *Ann. Soc. belge Méd. trop.*, **53**, 59-61.
249. Willaert, E., Jadin, J. B., Anderson, K. & Jamieson, A. (1973) : *Naegleria fowleri* : étude immunochimique comparative de souches d'origine humaine et d'origine libre. *Progr. Protozool. (Clermont-Ferrand)*, 439.
250. Wilson, D., Bovee, E., Bovee, G. & Telford, S. (1967) : Induction of amebiasis of tissues of white mice and rats by subcutaneous inoculation of small free-living, inquiline, and parasitic with associated coliform bacteria. *Exp. Parasit.*, **21**, 277-286.
251. Zimak, V. & Ferdinandova, M. (1968) : Clinical picture of suppurative meningoencephalitis probably caused by an amoeba of the genus *Hartmannella* (in Czech). *Cas. Lek. ces.* **107**, 724-725.

DEFINITE AND POSSIBLE CASES OF PRIMARY AMOEBIC MENINGO-ENCEPHALITIS IN THE LITERATURE UP TO 1973

Country	Reference number	Number of cases	Year	Age of patients in years	Sex M. F.	Duration of illness in days	Organisms believed responsible	Diagnosis	Probable source of contamination	Time of the year	Treatment	Outcome of cases	Strains isolated
AFRICA													
Uganda	120	1	1968	23	1 —	several weeks	<i>Naegleria</i>	during life	unknown	November	Metronidazole - Emetine - Penicillin - Sulphane - Thioarole - Chloroquine	survived	—
AMERICA													
NORTH AMERICA													
U. S. A. :													
Arizona	161	1	1956	6	— 1	—	<i>Iodamoeba butschlii</i>	post-mortem	unknown	July-Nov.	not mentioned	died	—
California	121; 122	1	1971	16	— 1	4	<i>Naegleria</i>	post-mortem	hot spring	April	Ampicillin Dexamethasane	died	—
Florida	20; 21 21	2 1	1962 1965	10-18 18	2 — 1 —	6 6	<i>Acanthamoeba</i> <i>Acanthamoeba</i>	post-mortem post-mortem	lake lake	Aug.-Sept. August	Penicillin Gantrisin Chloramphenicol Erythromycin	died died	— —
	22 —	1 1	1966 1968	16	1 —	5	<i>Naegleria</i>	post-mortem	lake	July	Penicillin Chloramphenicol	died	1
							(Personal communication, 1970 from R. J. Poppiti to R. J. Duma)						
Georgia	174	1	1970	7	1 —	4	<i>Naegleria</i>	post-mortem	swimming-pool	August	Ampicillin	died	—
New York	160	1	1970	16	1 —	11	<i>Acanthamoeba</i>	post-mortem	unknown	November	Immunospressives Amphotericin B	died	—
	144	1	1971	57	1 —	2 months	<i>Acanthamoeba</i>	post-mortem	swimming-pool	—	Cerebro-vascular treatment	died	—
Pennsylvania	200; 202	1	1971	58	1 —	30	<i>Acanthamoeba</i>	post-mortem	unknown	June	Antituberculous drugs and Amphotericin B	died	—
Texas	187	1	1964	59	1 —	19	<i>Acanthamoeba</i>	post-mortem	water tank	September	not mentioned	died	—
Virginia	95	1	1937	13	— 1	5	<i>Naegleria</i>	post-mortem	freshwater lake	July	not mentioned	died	—
	95	1	1950	12	— 1	4	<i>Naegleria</i>	post-mortem	freshwater lake	September	not mentioned	died	—
	95	1	1951	14	1 —	3	<i>Naegleria</i>	post-mortem	freshwater lake	July	not mentioned	died	—
	95	2	1951	14-23	1 1	1-5	<i>Naegleria</i>	post-mortem	freshwater lake	July	Penicillin Streptomycin Chloramphenicol	died	—
	95	4	1952	8-25	1 3	2-6	<i>Naegleria</i>	post-mortem	freshwater lake	July	Penicillin Crystillin Sulphadiazin	died	—
	95	2	1957	11-13	2 —	4-7	<i>Naegleria</i>	post-mortem	freshwater lake	July-Aug.	not mentioned	died	—
	25	1	1966	14	1 —	3	<i>Naegleria</i>	post-mortem	freshwater lake	July	Chloramphenicol	died	—
	23	2	1967	8-27	2 —	5	<i>Naegleria</i> <i>A. astronyxis</i>	ante-mortem during life	lake, mud holes and pools	June-July	Ampicillin Penicillin-G	1 died 1 survived	2
	99; 100	1	1968	15	— 1	4	<i>Naegleria</i>	ante-mortem	freshwater lake	August	Ampicillin Chloroquine Emetine Tetracycline Metronidazole	died	1
	101	2	1969	14-25	2 —	5	<i>Naegleria</i>	ante-mortem	freshwater lake	July	Metronidazole Chloroquine Amphotericin B	died	2
	238	1	1969	17	1 —		<i>Naegleria</i>	post-mortem	river	May		died	—
SOUTH AMERICA													
Venezuela	18	1	1972	27	— 1	6	<i>Naegleria</i>	ante-mortem	bathing or water-ski	not mentioned	Antibiotics and sulfonamids	died	—
ASIA													
India	185	2	1970	6 months 3	2 —	3-5 months	<i>Naegleria</i>	during life	water puddle	May	Streptomycin - Isonicotinhydrosine P. A. S. - Sulphadexana- thasone Amphotericin-B	survived	—
	12	1	1971	45	— 1	23	<i>Naegleria</i>	ante-mortem	bathing in a well	April	Penicillin Sulphadiazine	died	—
	— —	3 1	1973 1974	Personal communication, (1974) from S. R. Das.			<i>N. aerobia</i> <i>N. aerobia</i>	during life ante-mortem				survived died	3 1
EUROPE													

	101	2	1969	14-25	2	—	5	<i>Naegleria</i>	ante-mortem	freshwater lake	July	Emetine Tetracycline Metronidazole	died	2
	238	1	1969	17	1	—		<i>Naegleria</i>	post-mortem	river	May	Metronidazole Chloroquine Amphotericin B	died	—
SOUTH AMERICA														
Venezuela	18	1	1972	27	—	1	6	<i>Naegleria</i>	ante-mortem	bathing or water-ski	not mentioned	Antibiotics and sulfonamids	died	—
ASIA														
India	185	2	1970	6 months 3	2	—	3-5 months	<i>Naegleria</i>	during life	water puddle	May	Streptomycin - Isonicotinhydrosine P. A. S. - Sulphadexana- thasone Amphotericin-B	survived	—
	12	1	1971	45	—	1	23	<i>Naegleria</i>	ante-mortem	bathing in a well	April	Penicillin Sulphadiazine	died	—
	—	3	1973 1974	Personal communication, (1974) from S. R. Das.				<i>N. aerobia</i> <i>N. aerobia</i>	during life ante-mortem				survived died	3 1
EUROPE														
Belgium	123; 133	3	1970	12-14	1	2	4-6	<i>N. gruberi</i>	post-mortem & ante-mortem	swimming-pool	Oct.-Nov.	Classical meningitis treatment	died	2
	124	1	1972	14	—	1	2	<i>N. fowleri</i>	post-mortem	swimming-pool	October	Classical meningitis treatment	died	1
	232	1	1973	14	1	—	4	<i>N. fowleri</i>	ante-mortem	warm brook	July	Ampicillin	died	1
Czechoslovakia	48	3	1962	12-16	2	1	3-4	<i>Hartmannella</i>	post-mortem	swimming-pool	August	Penicillin - sulfonamide	died	—
	48	6	1963	8-25	1	5	4-7	<i>Hartmannella</i>	post-mortem	swimming-pool	July	Tetracyclin - Aureomycin	died	—
	48	5	1964	10-20	2	3	4-12	<i>Hartmannella</i>	post-mortem	swimming-pool	November	Oxytetracyclin - Chloromycetin	died	—
	48; 50; 51; 53	2	1965	12-15	1	1	2-4	<i>Hartmannella</i>	post-mortem	swimming-pool	October	Chloramphenicol - Erythromycin	died	—
	47	1	1968	11	1	—	3	<i>Naegleria</i>	ante-mortem	swimming-pool	June	Oleandomycin	died	1
England	231	1	1909	8	1	—	unknown	<i>Naegleria</i>	post-mortem	unknown	April	unknown	died	—
	7	3	1969	3-4-6	3	—	8-16	<i>Naegleria</i>	during life	muddy puddle	August	Sulphonamides Antibiotics Amphotericin B	1 died 2 survived	2
Northern Ireland	231	1	1937	10	—	1	2	<i>Naegleria</i>	post-mortem	swimming-pool	no information	unknown	died	—
OCEANIA														
Australia	26	1	1961	7	1	—	6	<i>Acanthamoeba</i>	post-mortem	seawater pool	January	Penicillin	died	—
	26; 111	1	1963	37	1	—	6	<i>Acanthamoeba</i>	post-mortem	seawater pool	March	Oxytetracyclin	died	—
	26; 111	3	1965	8-28	1	2	3-6	<i>Acanthamoeba</i>	post-mortem	seawater pool horse manure, open sullage drain seawater pool	Feb.-March	Sulphadiazin Streptomycin Chloramphenicol Emetine Acetylsan Methotrexate	died	1
	26; 28	1	1966	10	1	—	5	<i>N. fowleri</i>	during life		January		died	1
	28	1	1969	9	1	—	6	<i>N. fowleri</i>	ante-mortem	domestic waste water	January	Sulphadiazine Emetine Amphotericin B	died	1
	29	1	1970	8	—	1	5	<i>N. fowleri</i>	ante-mortem	septic tank effluent	January	Emetine Amphotericin B	died	1
	29	1	1971	16	1	—	6	<i>N. fowleri</i>	ante-mortem		January	Emetine Amphotericin B	died	1
	2	1	1971	14	1	—	several weeks	<i>N. fowleri</i>	during life	swimming-pool	October	Amphotericin B	survived	1
	2	2	1972	5-7	1	1	2-5	<i>N. fowleri</i>	ante-mortem	bath & back- yard portable pool	February	Amphotericin B	died	2
New Guinea	93	1	1943	22	1	—	5	<i>Iodamoeba butschlii</i>	post-mortem	unknown	March	Anti-malarial and anti-dysenteric drugs	died	—
New Zealand	167	4	1968	7-17	4	—	2-5	<i>Myxomycetale</i>	post-mortem & ante-mortem	warm springs	June	Penicillin Ampicillin Chloramphenicol Dexamethazone Streptomycin Sulphadiazine	died	1
	181	1	1972	21	1	—	8	<i>N. fowleri</i>	post-mortem	pool of warm spring water	April	Penicillin Sulphadiazine Chloramphenicol Diazepam	died	1
World total		84			50	29	(5 unknown)						74 died 10 survived	26