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Collection of the proteus-type amoebae at the Institute of Cytology, Russian Academy of Sciences. II. Index of strains and list of publications

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Summary

Previously, in the first part of publication (Goodkov et al., 2014) we had presented and described the collection of free living freshwater amoeba strains of *Amoeba proteus*-type (family Amoebidae), the collection being for a long time maintained in the Institute of Cytology RAS, Saint-Petersburg, Russia. This collection is named Amoebae Culture Collection at the Institute of Cytology (ACCIC). In the second part of collection description (the present publication) we quote the full list of amoebae strains maintaining today in the Collection with their passports containing the date of the strain acceptance, whom it was received from, when and where the strain was isolated from, notes, and the full register of articles where these strains were used as research objects (bibliography).

Key words: *Amoeba*, bibliography, free living freshwater amoebae, strains collection

Introduction

Today the Amoebae Culture Collection at the Institute of Cytology RAS in St. Petersburg, Russia (ACCIC) is the unique collection containing numerous strains (=clones) of free living freshwater amoebae of *Amoeba proteus*-type (family Amoebidae). In the first part of our publication (Goodkov et al., 2014) we have briefly described the history of Collection creation since 1960 year, the methods of amoebae strains cultivation, and the main goals and application of the Collection in different scientific research fields.

In the present publication we quote the full list of amoebae strains maintaining today in the Collection with their passports which include the date of the strain acceptance, whom it was received from, when and where the strain was isolated from, notes, and the full register of articles where these strains were used as research objects (bibliography), with the exception of secondary importance publications, such as abstracts, etc.

As we had already mentioned earlier (Goodkov et al., 2014), some strains which have been formerly actively used in various experimental works were irretrievably lost, some strains having been removed from the Collection rather meaningly – in the cases if any suspicion of contamination by another strain has arose. We do not include such strains in the list given below.

List of strains

Amoeba proteus strain B

Date 1959

From M. Müller (Medical University, Budapest, Hungary).

Origin Established at the King's College (London, UK) in 1950th.

Bibliography Afon'kin, 1983, 1984, 1986a, 1986b, 1989; Afon'kin and Goodkov, 1989; Gromov, 1985; Goodkov et al., 2010; Kalinina, 1964, 1965a, 1965b, 1967, 1969a, 1969b; Kalinina and Goryunova, 1975a, 1975b; Kalinina and Yudin, 1964; Kalney, 1967, 1969; Kalney et al., 1974, 1978; Karpov et al., 1991; Kovan'ko and Sopina, 1977a, 1977b; Makhlin, 1971, 1981; Marakhova et al., 1993; Podlipaeva, 1992; Podlipaeva and Goodkov, 2009; Podlipaeva and Yudin, 2001; Podlipaeva et al., 2013; Poljansky et al., 1967; Semenova, 1967; Sopina, 1968a, 1968b, 1968c, 1973, 1976a, 1976b, 1976c, 1977, 1978, 1979, 1980, 1983, 1986, 1987, 1989a, 1989b, 1991, 1993, 1994, 1995a, 1995b, 1996, 1997, 1998, 2001a, 2001b, 2002, 2003, 2004, 2005, 2006, 2007, 2009; Sopina and Afon'kin, 1994; Sopina and Belyaeva, 2000; Sopina and Fokin, 1993; Sopina and Podlipaeva, 1984, 1989; Sopina and Yudin, 1965, 1979, 1992, 1993a, 1993b, 1993c; Sopina et al., 1982a, 1982b; Yudin, 1961, 1962, 1963, 1964, 1967, 1973a, 1975, 1979a, 1982; Yudin and Neyfakh, 1973; Yudin and Nikolaeva, 1970; Yudin and Sopina, 1970; Demin et al., 2015.

Amoeba proteus strain MGU

Date 1960

From G.V. Nikolaeva (Institute of Cytology, St. Petersburg (Leningrad), Russia).

Origin Isolated in Moscow region, Russia.

Bibliography Sikora and Kalinina, 1975; Yudin, 1982.

Amoeba proteus strain P (POL)

Date 1962

From L.N. Seravin (Biological Institute of St. Petersburg (Leningrad) Universirty, Russia).

Origin Cells of this strain were delivered from Poznan (Poland), where they were maintained in one of protozoological laboratories.

Bibliography Sopina and Yudin, 1965; Yudin, 1982; Yudin and Sopina, 1970.

Amoeba proteus strain TD (T_1D)

Date 1963

From M. Müller (Medical University, Budapest, Hungary).

Origin Established at King's College (London, UK) in 1948.

Notes Cells of this strain were passed to Medical University (Budapest, Hungary) by S.E. Hawkins.

These amoebae initially were determined as *A. discoides* Shaeffer, 1916 (strain T_1D); later this species was synonymized with *A. proteus* (Pallas) Leidy, 1878 (Jeon and Lorch, 1973).

This is the same strain which was intensively used in experimental studies by many investigators in 1960th–1980th (Lorch and Danielli, 1953; Wilson, 1958; Cole and Danielli, 1963a, 1963b; Hawkins and Danielli, 1961; Hawkins and Cole, 1965; Hawkins and Wolstenholme, 1966; Wolstenholme, 1966; Hawkins, 1969, 1973a, 1973b; Hawkins and Willis, 1969b, 1969c; Lorch, 1969; Lorch and Jeon, 1969; Friz, 1972, 1975; Jeon and Lorch, 1973; Jarlstedt and Friz, 1974; etc.).

Bibliography Afon'kin, 1983, 1989; Goodkov et al., 2010; Makhlin, 1971; Podlipaeva and Goodkov, 2009; Sopina, 1993; Sopina and Fokin, 1993; Yudin, 1982.

Amoeba proteus strain C

Date 1964

From M.M. Isakova-Keo (Department of Invertebrate Zoology, St. Petersburg (Leningrad) State University, Russia).

Origin Isolated by A.V. Yankowsky from the pond located in Mozhaiskaya village (St. Petersburg (Leningrad) province, Russia) in 1962.

Bibliography Afon'kin, 1983, 1984, 1986b, 1989; Andrejeva et al., 1976; Bychkovskaya et al., 1980a, 1980b; Goryunova and Kalinina, 1977; Grebecki et al., 2001; Jeon and Lorch, 1973; Kalinina, 1968, 1969a, 1969b, 1969c, 1993; Kalinina and Goryunova, 1973, 1975a; Kalinina and Yudin, 1964; Kalney, 1969; Kalney et al., 1974, 1978; Karpov et al., 1991; Lazowski and Kuznicki, 1991; Makhlin, 1971, 1974, 1977, 1981a, 1981b, 1983, 1984; Makhlin and Yudin, 1969, 1970; Makhlin et al., 1979a, 1979b; Nikolaeva and Selivanova, 1979; Nikolaeva et al., 1980; Opas and Kalinina, 1980; Poljansky et al., 1967; Sopina, 1968a, 1968c, 1973; 1976a, 1976b, 1976c, 1977, 1978, 1980, 1983, 1989a, 1989b, 1993, 1994, 1995a, 1998; Sopina and Fokin,

1993; Sopina and Yudin, 1980, 1993a, 1993b, 1993c; Yudin, 1967, 1970, 1973a, 1973b, 1875, 1979a, 1979b, 1979c, 1979d, 1982; Yudin and Nikolaeva, 1968, 1970; Yudin and Sopina, 1970; Yudin et al., 1966, 1971.

Amoeba proteus strain A

Date 1964

From M. Taylor (Notre Dame Training College, Glasgow, Scotland).

Origin The place of isolation and date of establishing are unknown.

Notes According to Sister Monica Taylor, the history of this amoebae isolate extends back to 1916-1917 (Taylor, 1925).

Bibliography Afon'kin, 1983, 1989; Grebecki et al., 1978, 2001; Kalinina, 1969a, 1969b; Karpov ey al., 1991; Makhlin, 1971, 1974, 1977, 1981a; Sikora and Kalinina, 1975; Sopina, 1989a, 1989b, 1993, 1994, 1998, 2000; Sopina and Fokin, 1993; Yudin, 1973a, 1975, 1979d, 1982.

Amoeba proteus strain Pet (Petrozavodsk)

Date 1968

From G.V. Nikolaeva (Institute of Cytology, St. Petersburg (Leningrad), Russia).

Origin Isolated in 1968 from the pond in the neighbourhood of Petrozavodsk (Karelia, Russia).

Bibliography Podlipaeva, 1994; Podlipaeva and Yudin, 2001; Sikora and Kalinina, 1975; Sopina, 1993; Yudin, 1982.

Amoeba proteus strain Bk

Date 1969

From D.M. Prescott (Department of Molecular, Cell and Developmental Biology, University of Colorado, Boulder, Colorado, USA).

Origin The strain was established at the Zoological Department, University of California (Berkley, USA) in 1952.

Notes In 1960 cells of this strain were passed to the Department of Biology, University of Pennsylvania (Philadelphia), then to the Department of Molecular, Cell and Developmental Biology, University of Colorado (Boulder, Colorado).

This is the same strain which was intensively used in experimental studies by many investigators in 1970th–80th (Byers et al., 1963; Kates and Goldstein, 1964; Goldstein and Ron, 1969; Spear and Prescott, 1980; etc.).

Bibliography Afon'kin, 1983, 1989; Jeon and Lorch, 1973; Kalinina et al., 1980; Karpov et al., 1991; Makhlin, 1971, 1981a; Sikora and Kalinina, 1975; Sopina, 1973, 1989a, 1989b, 1993, 1994, 1998, 2006; Sopina and Fokin, 1993; Yudin, 1973a, 1975, 1979a, 1982; Yudin and Neyfakh, 1973.

Amoeba proteus strain Da

Date 1970

From M.J. Ord (University of Southampton, UK).

Origin The strain was established at the Woods Hole School, Massachusetts, USA.

Notes In 1950 cells of this strain were passed (through J.A. Dawson) to the King's College, London, and then (S.E. Hawkins) to M.J. Ord, University of Southampton.

Bibliography Afon'kin, 1983, 1989; Goodkov et al., 2010; Kalinina et al., 1980; Karpov et al., 1991; Makhlin, 1981a, 1983, 1984, 1985, 1987, 1988; Podlipaeva, 1992, 1994, 2001, 2003; Podlipaeva and Goodkov, 2009; Podlipaeva and Yudin, 2001; Podlipaeva et al., 2006; Sopina, 1986, 1989a, 1989b, 1993, 1994, 1995a, 1995b, 1998; Sopina and Podlipaeva, 1984; Yudin, 1973a, 1975, 1979a, 1982.

Amoeba proteus strain F

Date 1971

From M. Tuffrau (Laboratoire de Zoologie II, Orsay, France).

Origin The place of isolation and date of establishing are unknown.

Bibliography Afon'kin, 1983, 1989; Sopina, 1989a, 1989b, 1993, 1994, 1998; Sopina and Fokin, 1993; Yudin, 1973a, 1975, 1982.

Amoeba proteus strain Murino

Date 1974

From N.N. Bobyleva (Institute of Cytology, St. Petersburg (Leningrad), Russia).

Origin Isolated in 1974 from the pond in the Murino village, St. Petersburg (Leningrad) region, Russia.

Bibliography Sopina, 1993.

Amoeba proteus strain TP (T_1P)

Date 1975

From M.J. Ord (Universirty of Southampton, UK).

Origin Isolated in Glasgow (Scotland) in 1948 by M. Taylor (Notre Dame Training College, Glasgow, Scotland).

Notes Culture of this strain was kept at the King's College (London, UK).

This is the same strain which was intensively used in experimental studies by many investigators in 1960th –1980th (Lorch and Danielli, 1953; Wilson, 1958; Danielli, 1959; Cole and Danielli, 1963a, 1963b; Hawkins and Danielli, 1961; Hawkins and Cole, 1965; Hawkins and Wolstenholme, 1966; Hawkins, 1973a, 1973b; Hawkins and Willis, 1969a, 1969b, 1969c; Jeon and Lorch, 1973; Friz, 1972, 1975; Jarlstedt and Friz, 1974; etc.).

Bibliography Afon'kin, 1983, 1989; Goodkov et al., 2010; Makhlin, 1981a, 1983, 1984; Podlipaeva and Goodkov, 2009; Sopina, 2000.

Amoeba proteus strain C4

Date 1978

From L.V. Kalinina (Institute of Cytology, St. Petersburg (Leningrad), Russia).

Origin The strain was established by L.B. Goryunova (Institute of Cytology, St. Petersburg (Leningrad), Russia) by cloning of *A. proteus* strain C amoebae which were treated with ribonuclease.

Bibliography Goryunova and Kalinina, 1977.

Amoeba proteus strain D

Date 1983

From L.V. Kalinina (Institute of Cytology, St. Petersburg (Leningrad), Russia).

The cells of this strain were delivered through M.J. Ord (University of Southampton, UK).

Notes These amoebae initially were determined as *A. discoides* Shaeffer, 1916; later this species was synonymiszd with *A. proteus* (Pallas) Leidy, 1878 (Jeon and Lorch, 1973; Yudin, 1982).

Bibliography Karpov et al., 1991; Sopina, 1979, 1989b, 1993, 2000; Sopina and Fokin, 1993; Sopina and Yudin, 1965.

Amoeba proteus strain Dz

Date 1984

From M.V. Tavrovskaya (Institute of Cytology, St. Petersburg (Leningrad), Russia).

Origin The strain was established by M.V. Tavrovskaya in 1984 by cloning amoeba isolated from the pond in Lopuhinsky garden, St. Petersburg, Russia.

Bibliography Page, 1986; Sopina, 1993.

Amoeba proteus strain CCAP 1503/4

Date 1984

From F.C. Page (Institute of Terrestrial Ecology, Cambridge University, UK).

Origin Derivate of the corresponding strain which was deposited in the Culture Collection of Algae and Protozoa (CCAP, Scottish Marine Institute, Scotland, UK).

Bibliography Sopina, 1993.

Amoeba proteus strain Val

Date 1989

From A.S. Karpov (Institute of Cytology, St. Petersburg, Russia).

Origin The strain was established by Alexander S. Karpov in 1989. Amoebae were isolated from the Skitskyi gulf, Lake Sys'jarvi (Valaam Archipelago, Karelia, North-Western Russia), from the samples of bottom sediments near the coast line.

Bibliography Goodkov et al., 2009, 2010; Plekhanov et al., 2006; Podlipaeva and Goodkov, 2009.

Amoeba proteus strain Kan

Date 1989

From A.S. Karpov (Institute of Cytology, St. Petersburg, Russia).

Origin The strain was established by Alexander S. Karpov in 1989. Amoebae were isolated from the Lake Kanevskoe (Valaam Archipelago, Karelia, North-Western Russia), from samples of micro-fouling community.

Bibliography Goodkov et al., 2010; Podlipaeva and Goodkov, 2009; Podlipaeva et al., 2006.

Amoeba proteus strain Cont

Date 1989

From A.S. Karpov (Institute of Cytology, St. Petersburg, Russia).

Origin The strain was established by Alexander S. Karpov in 1989. Amoebae were isolated from the Kontrol'nyi Gulf, Lake Sys'jarvi (Valaam Archipelago, Karelia, North-Western Russia).

Amoeba proteus strain Vsk

Date 1990

From A.S. Karpov (Institute of Cytology, St. Petersburg, Russia).

Origin The strain was established by Alexander S. Karpov in 1990. Amoebae were isolated from the fire reservoir, Voskresensky monastery (Valaam Archipelago, Karelia, North-Western Russia).

Amoeba proteus strain CCAP 1503/8

Date 1991

From F.C. Page (Institute of Terrestrial Ecology, Cambridge University, UK).

Origin Derivate of the corresponding strain which was deposited in Culture Collection of Algae and Protozoa (CCAP, Scottish Marine Institute, Scotland, UK).

Amoeba proteus strain PADPY

Date 1991

From F.C. Page (Institute of Terrestrial Ecology, Cambridge University, UK).

Origin According to F.C. Page, this is the derivate of one of the strain which was deposited in Culture Collection of Algae and Protozoa (CCAP, Scottish Marine Institute, Scotland, UK).

Amoeba proteus strain Shapki

Date 1993

From M.V. Vladimirov (Institute of Cytology, St. Petersburg, Russia).

Origin Isolated from the pond in Shapki settlement (St. Petersburg province, Russia).

Amoeba proteus strain Neapol

Date 2005

From S.I. Fokin (St. Petersburg State University, St. Petersburg, Russia).

Origin Isolated by S.I. Fokin in 2005 from the pond in vicinities of Naples (Italy).

Bibliography Goodkov et al., 2010; Podlipaeva and Goodkov, 2009.

Amoeba proteus strain Olgino

Date 2013

From M.V. Tavrovskaya (Institute of Cytology, St. Petersburg, Russia).

Origin The strain was established by M.V. Tavrovskaya in 2013 by cloning of amoeba isolated from the pond Olginskyi (Svetlanovskyi ave., St. Petersburg, Russia).

Amoeba proteus culture BY13

Date 1989

From D.V. Ossipov (Biological Research Institute, St. Petersburg (Leningrad) State University, Russia).

Origin Isolated by D.V. Ossipov in 1989 from a pond in Borok settlement (Yaroslavl' province, Russia).

Notes In the record-card of this culture there is no information about cloning procedures, so it is probable not a strain.

Amoeba sp. strain AS-102

Date 1971

From D.V. Ossipov (Biological Research Institute, St. Petersburg (Leningrad) State University, Russia).

Origin Isolated by D.V. Ossipov in 1971 from a small freshwater stream in the Ghizil-Agaj State Reserve (Azerbaijan).

Notes Amoebae of this strain differ from known species of the genus *Amoeba* (see references below).

Bibliography Goodkov et al., 2010; Ivanova et al., 2004; Podlipaeva and Goodkov, 2009; Sopina, 1993, 2000.

Amoeba sp. strain Belomor

Date 1985

From D.B. Gromov (Institute of Cytology, St. Petersburg, Russia).

Origin Established by Dmitry B. Gromov in 1985 by cloning of amoeba isolated from the freshwater lake at the Srednyi Island, Chupa Inlet (Kandalaksha Gulf, Western White Sea, North-Western Russia).

Notes Amoebae of this strain differ from *Amoeba proteus* and belongs to the so-called "*leningradensis*-type" (Page and Kalinina, 1984).

Bibliography Goodkov et al., 2010; Podlipaeva and Goodkov, 2009.

Amoeba sp. strain DG

Date 1993

From D.B. Gromov (Institute of Cytology, St. Petersburg, Russia).

Origin Established by Dmitry B. Gromov in 1985 by cloning amoeba isolated from the freshwater lake at the Srednyi Island, Chupa Inlet (Kandalaksha Gulf, Western White Sea, North-Western Russia).

Notes Amoebae of this strain differ from *Amoeba proteus* and belongs to the so-called "*leningradensis*-type" (Page and Kalinina, 1984), as well as amoebae of the strain Belomor (presumably, they belong to one and the same species).

Bibliography Podlipaeva et al., 2006.

Amoeba amazonas strain Amaz

Date 1969

From D.M. Prescott (Department of Molecular, Cell and Developmental Biology, University of Colorado, Boulder, Colorado, USA).

Origin Isolated from the Amazon River (Brazil) and named by D.M. Prescott.

Notes The species name, applied to the laboratory strain, was invalid for a long time, because it was given without taxonomically valid description (Flickinger, 1974; Page, 1988), though this amoeba represents a real species (Friz, 1992).

Bibliography Goodkov et al., 1993, 2010; Karpov, 1993; Karpov et al., 1991; Podlipaeva and Goodkov, 2009; Sopina, 1989b, 1993, 1994, 2000; Sopina and Fokin, 1993; Tchistyakova et al., 1997; Yudin, 1982.

Amoeba borokensis strain Bor

Date 1974

From L.V. Kalinina (Institute of Cytology, St. Petersburg (Leningrad), Russia).

Origin Isolated from the pond in Borok settlement (Yaroslavl' province, Russia) by L.V. Kalinina in 1974.

Notes These amoebae till 1986 were considered as one of the strains of *A. proteus* (strain Bor) when they were described as a separate species (Kalinina et al., 1986).

Bibliography Afon'kin, 1989; Afon'kin and Kalinina, 1987; Afon'kin and Goodkov, 1989; Goodkov et al., 2010; Kalinina et al., 1986, 1987, 1988; Karpov et al., 1991; Page, 1986; Podlipaeva and Goodkov, 2009; Podlipaeva et al., 2006; Sopina, 1989b, 1993, 1994, 2000; Sopina and Fokin, 1993; Yudin, 1982.

Amoeba indica strain Ind

Date 1985

From F.C. Page (Institute of Terrestrial Ecology, Cambridge University, UK).

Origin Isolated from a small pond in Bombay (former name of the city of Mumbai, India) by M.V.N. Rao in 1971.

Notes The species name, applied to the laboratory strain (Chatterjee and Rao, 1974; Rao and Chatterjee, 1974), was invalid for a long time, because it was given without taxonomically valid description (Page, 1988), though the differences of these amoebae from *Amoeba proteus* indicated repeatedly (Friz, 1987, 1992; Sopina, 1989, 2000; etc.).

Bibliography Goodkov et al., 2010; Karpov et al., 1991; Podlipaeva and Goodkov, 2009; Sopina, 1989b, 1993, 1994, 2000; Sopina and Fokin, 1993; Yudin, 1982.

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