

Culture collection of parasitic protists at the Zoological Institute RAS (CCPP ZIN RAS)

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Summary

Establishment of the bank of living cultures of trypanosomatids at the Laboratory of Protozoology, Zoological Institute of the Russian Academy of Sciences, St. Petersburg, started in 1979. The first edition of the collection catalogue (Malysheva et al., 2001) included 33 strains of trypanosomatids. The present, second edition contains descriptions of 52 strains of trypanosomatids and 28 strains of aphelids and parasitic chytridiomycetes. The strains of aphelids and parasitic chytridiomycetes were isolated and initially cultivated at the Center for Culturing Collection of Microorganisms of the Research park of St. Petersburg State University. This collection is named the Culture Collection of Parasitic Protists of the Zoological Institute RAS (CCPP ZIN RAS).

Key words: Aphelididae, bibliography, culture collection, GenBank, Gromochytriacae, living cultures, Mesochytriacae, parasitic protists, Trypanosomatidae

Introduction

Study of biodiversity of parasitic protists is one of the “hot spots” in modern biology. Many of these organisms cause dangerous infections of humans, animals and plants, and their genetic peculiarities are the unique examples of evolutionary changes in eukaryotes. The establishment, support and accession of such culture collections are very important tasks for study of biodiversity, cell biology, and parasite–host interactions. A

depository of parasitic protozoans was established at the Laboratory of Protozoology of the Zoological Institute RAS in 1979. The first edition of the collection catalogue was published in 2001 and included 33 strains of trypanosomatids (Malysheva et al., 2001). The present, second edition contains descriptions of 52 strains of trypanosomatids augmented with 28 strains of aphelids and parasitic chytridiomycetes. The structure of the catalogue is generally the same as in the first edition (Malysheva et al., 2001); however, it was modified in two aspects:

1) the deposition GenBank Numbers were included, and 2) a new section “List of the lost strains” was added.

Cultivating methods

Axenic trypanosomatid cultures have been maintained in the liquid nutrient medium BHI (Difco) with addition of hemin (25 mg/ml) and inoculated once a month. The cultures were placed in the fridge (5° C) after inoculation and subsequent incubation during three days at 25° C.

For cultivation of the *Blastocrithidia* flagellates, a two-phase medium has been used: the blood agar as a dense phase, and a BHI medium with the addition of serum (5-10%) as a liquid phase. For cultivation of the *Trypanosoma* flagellates, a slightly modified two-phase medium has been used: the blood agar as a dense phase, and a physiological solution with the addition of serum (5-10%) as a liquid phase.

Accumulating cultures of the aphelids and chytrids were maintained in culture on *Tribonema gayanum* Pasch. (strain 20 CALU) as the host cultivated in the mineral medium: K_2HPO_4 (66.7 mg/l); $MgSO_4 \times 7H_2O$ (33 mg/l); KNO_3 (100 mg/l); microelements (1 mg/l) of stock solution: $ZnSO_4 \times 7H_2O$ (0.22 g/l), $MgSO_4$ (1.81 g/l), $CuSO_4 \times 5H_2O$ (0.079 g/l), $NaBO_3 \times 4H_2O$ (2.63 mg/l), $(NH_4)_6Mo_7O_{24} \times 4H_2O$ (1 mg/l), $FeSO_4 \times 7H_2O$ (9.3 mg/l), $CaCl_2$ (1.2 mg/l), $Co(NO_3)_2 \times H_2O$ (0.02 mg/l), EDTA (10 mg/l), pH 7.0-7.2 (Gromov and Titova, 1991) in the 12 ml glass tubes containing 3-5 ml of the medium at room temperature in the presence of light (24 h). The inoculation was performed twice a month.

Catalogue of living cultures

Class Kinetoplastea Honigberg 1963 emend. Vickerman 1976

Subclass Metakinetoplastina Vickerman 2004

Order Trypanosomatida Kent 1880 stat. nov. Hollande 1952

Family Trypanosomatidae Doflein 1951

Genus *Angomonas* Souza and Corte-Real, 1991
A. deanei (Carvalho, 1973)

Synonyms: *Crithidia deanei* Carvalho, 1973; *Crithidia roitmani*, Fiorini et al., 1989; *Herpetomonas roitmani* (Fiorini et al., 1989)

1 Strain TCC080E (=ATCC 50305)

Depositor: S.A. Podlipaev

History: 1990, received from E.P. Camargo, São Paulo University, Brazil. Isolated in Brazil.

Host: *Ornidia obesa* (Fabricius, 1775) (Diptera).

GenBank: AF038023, AF038026, EU079130, EU095978, HM593012

Bibliography: Fiorini et al., 1989; Faria e Silva et al., 1991; Hollar et al., 1998; Yurchenko et al., 2009, Teixeira et al., 2011.

Genus *Crithidia* Léger, 1902

C. brevicula Frolov et Malysheva, 1989

Synonyms: *Crithidia allae* Frolov et Malysheva, 1989 (NBrA); *Wallaceina brevicula* Frolov et Malysheva, 1989 (NBr, NBrB); *Wallaceina inconstans* Podlipaev, Frolov et Kolesnikov, 1990 (GK); *Wallaceina vicina* Malysheva et Frolov, 2004 (WG); *Leptomonas peterhoffi* Podlipaev, 1985 (in part) (101); *Wallaceina podlipaevi* Malysheva et Frolov, 2009 (101); *Blastocrithidia gerricola* Podlipaev, 1985 (in part) (KV1); *Blastocrithidia miridarum* Podlipaev et Frolov, 1987 (in part) (BM33); *Leptomonas* sp. (F2); *Leptomonas* sp. (F5); *Leptomonas* sp. (F6); *Leptomonas* sp. (F7); *Leptomonas* sp. (F8); *Leptomonas* sp. (CL8).

2 Strain NBr

Depositor: A.O. Frolov

History: 1986, isolated by A.O. Frolov in the vicinity of the Lyady village, Pskov Province, Russia.

Host: *Nabis (Nabis) brevis* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: AF153045, AF316620, AJ401357, AJ401378, EU088277- EU088279, KJ443335- KJ443337, KJ443350, KJ474892- KJ474894, KJ474931, KJ474932, Z32854,

Bibliography: Frolov and Malysheva, 1989a, 1989b; 1990; Podlipaev et al., 1991; Malysheva and Frolov, 1995; Podlipaev et al., 1998; Podlipaev and Frolov, 2000; Yurchenko et al., 2000; Merzlyak et al., 2001a, 2001b; Yurchenko et al., 2006; Yurchenko et al., 2009; Kostygov et al., 2014

3 Strain NBrB

Depositor: A.O. Frolov

History: Clonal culture. 1986, isolated from the culture of *C. brevicula* (NBr) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.

Host: *Nabis (Nabis) brevis* Scholtz, 1847 (Heteroptera: Nabidae).

Bibliography: Frolov and Malysheva, 1989a, 1989b; Kolesnikov et al., 1990; Skarlato et al., 1990; Podlipaev et al., 1991; Malysheva and Frolov, 1995.

4 Strain WG

Depositor: M.N. Malysheva

History: 2000, isolated by M.N. Malysheva in Komarovo, Leningrad Province, Russia.

Host: *Limnporus rufoscutellatus* (Latreille,

1807) (Heteroptera: Gerridae).

GenBank: KJ443338-KJ443340, KJ443354, KJ474895-KJ474897, KJ474907-KJ474909

Bibliography: Kostygov et al., 2004; Malysheva and Frolov, 2004; Kostygov et al., 2014.

5 Strain 101

Depositor: S.A. Podlipaev

History: 1980, isolated by S.A. Podlipaev in Peterhof, St. Petersburg, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: JN944133, AF153039, AF322390, EU088283-EU088285, KJ443308-KJ443311, KJ474867, KJ474935-KJ474937, KJ443306, KJ443307, KJ474866, KJ474933, KJ474934

Bibliography: Podlipaev, 1985; Kolesnikov et al., 1990; Marakhova et al., 1991; Podlipaev et al., 1991; Podlipaev et al., 1998; Podlipaev and Frolov, 2000; Merzlyak et al., 2001a; Kostygov et al., 2004; Yurchenko et al., 2006; Malysheva and Frolov, 2009; Yurchenko et al., 2009; Gerasimov et al., 2012a; Kostygov et al., 2014.

6 Strain KV1

Synonyms: *Blastocrithidia gerricola* Podlipaev, 1985 (in part).

Depositor: S.A. Podlipaev

History: 1981, isolated by S.A. Podlipaev at the Curonian Spit, Kaliningrad Province, Russia.

Host: *Gerris lacustris* (Linnaeus, 1758) (Heteroptera).

GenBank: AF153036, AF322391, AJ401379, AY547459; KJ443332-KJ443334, KJ443351, KJ474889-KJ474891, KJ474928-KJ474930.

Bibliography: Podlipaev, 1985; Kolesnikov et al., 1990; Podlipaev et al., 1991; Podlipaev et al., 1998; Podlipaev and Frolov, 2000; Merzlyak et al., 2001a, 2001b; Podlipaev et al., 2004; Yurchenko et al., 2006; Kostygov et al., 2014.

7 Strain BM33

Depositor: A.O. Frolov

History: 1985, isolated by A.O. Frolov in the Berezitsy village, Pskov Province, Russia.

Host: *Leptopterna dolobrata* (Linnaeus, 1758) (Heteroptera: Miridae).

GenBank: AY547462, AY547483, KJ443312, KJ443313, KJ443355, KJ474868-KJ474870, KJ474916-KJ474918

Bibliography: Podlipaev and Frolov, 1987; Podlipaev et al., 2004; Kostygov et al., 2014.

8 Strain F2

Depositor: S.A. Podlipaev

History: 1986, isolated by S.A. Podlipaev at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: AF375664, DQ140170, KJ443317-KJ443319, KJ443344, KJ474874-KJ474876, KJ474913-KJ474915,

Bibliography: Podlipaev and Rokitskaya, 1999; Kostygov et al., 2004; Yurchenko et al., 2006; Kostygov et al., 2014.

9 Strain F5

Depositor: S.A. Podlipaev

History: 1986, isolated by S.A. Podlipaev at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: AY547460, KJ443320-KJ443322, KJ443345, KJ474877-KJ474879, KJ474923, KJ474924

Bibliography: Podlipaev et al., 1991; Podlipaev and Rokitskaya, 1999; Kostygov et al., 2004; Podlipaev et al., 2004; Kostygov et al., 2014.

10 Strain F7

Depositor: S.A. Podlipaev

History: 1986, isolated by S.A. Podlipaev at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: KJ443326-KJ443328, KJ443347, KJ474883-KJ474885, KJ474910-KJ474912

Bibliography: Kostygov et al., 2004; Kostygov et al., 2014.

11 Strain CL8

Depositor: A.O. Frolov

History: 1984, isolated by A.O. Frolov in Peterhof, St. Petersburg, Russia.

Host: *Nabis (Dolichonabis) limbatus* Dahlbom, 1851 (Heteroptera: Nabidae).

GenBank: KJ443314-KJ443316, KJ443349, KJ474871-KJ474873, KJ474925-KJ474927

Bibliography: Podlipaev and Rokitskaya, 1999; Kostygov et al., 2004; Kostygov et al., 2014.

12 Strain GER4

Depositor: M.N. Malysheva

History: 2013, isolated by M.N. Malysheva in Komarovo, Leningrad Province, Russia.

Host: *Limnopus rufoscutellatus* (Latreille, 1807) (Heteroptera: Gerridae)

C. fasciculata Léger, 1902

13 Strain Cf-C1

Depositor: S.A. Podlipaev

History: 1992, received from D. Maslov, University of California-Riverside, USA.

Host: unknown.

GenBank: AF124228, AODS00000000, CFU 05816, CFU12625, CFU30216- CFU30223, D13007-D13036, EU714010, JX271578- JX271580, K03444- K03446, K03448- K03452, L18916, M19066, M19266, M20252, M22852, U05816, U30216- U30223, X03047, X04483, X04760,

Bibliography: Birkenmeyer et al., 1985; Ray et al., 1986; Feagin et al., 1988; Maslov et al., 1988; Sugisaki and Ray, 1988; Hughes et al., 1989; van der Spek et al., 1991; Campbell, Ray, 1993; Malysheva and Frolov, 1993; Sugisaki and Takanami, 1993; Maslov et al., 1994; Yasuhira and Simpson, 1995; Podlipaev et al., 1998; Engel and Ray, 1999; Podlipaev and Rokitskaya, 1999; Podlipaev and Frolov, 2000; Lye et al., 2010; Malysheva et al., 2010; Arendt, 2013.

C. guilhermei Soares et al., 1986

14 Strain Cg

Depositor: S.A. Podlipaev

History: 1990, received from E.P. Camargo, São Paulo University, Brazil, isolated in Rio de Janeiro, Brazil.

Host: *Lucilia cuprina* (Wiedemann, 1830) (Diptera: Calliphoridae).

GenBank: HQ834477

Bibliography: Soares et al., 1986; Faria e Silva, et al., 1991; Branquinha et al., 1996; Podlipaev and Rokitskaya, 1999.

Crithidia spp.

15 Strain C4

Depositor: S.A. Podlipaev

History: 1987, isolated by S.A. Podlipaev in the Nizhnesvirsky Nature Reserve, Leningrad Province, Russia.

Host: *Limnporus rufoscutellatus* (Latreille, 1807) (Heteroptera: Gerridae).

GenBank: AY547463, AY547482

Bibliography: Podlipaev et al., 1998; Skarlato et al., 1998; Podlipaev and Frolov, 2000; Podlipaev et al., 2004.

16 Strain Cfm9

Depositor: A.O. Frolov

History: 1983, isolated by A.O. Frolov in Peterhof, St. Petersburg, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: AF153041, AF320820, AY547465, AY547491

Bibliography: Merzlyak et al., 2001a; Podlipaev et al., 2004, Yurchenko et al., 2006.

17 Strain CL6

Depositor: A.O. Frolov

History: 1983, isolated by A.O. Frolov in the Berezitsy village, Pskov Province, Russia.

Host: *Nabis (Nabicula) limbatus* Dahlbom, 1851.

Bibliography: Podlipaev and Rokitskaya, 1999.

Genus *Leptomonas* Kent, 1880

Leptomonas pyrrhocolis (Zotta, 1912)

18 Strain LP

Depositor: M.N. Malysheva

History: Isolated by M.N. Malysheva, Krasnodar Region, Russia.

Host: *Pyrrhocoris apterus* Linnaeus, 1758 (Heteroptera: Pyrrhocoridae).

GenBank: AY029072, DQ140169

Bibliography: Yurchenko et al., 2006; Votýpka et al., 2012.

19 Strain K1

Depositor: S.A. Podlipaev

History: 2004, isolated by S.A. Podlipaev in Burkina Faso, West Africa.

Host: *Dysdercus* sp. (Heteroptera: Pyrrhocoridae).

20 Strain D1

Depositor: S.A. Podlipaev

History: 2004, isolated by S.A. Podlipaev in Burkina Faso, West Africa.

Host: *Dysdercus* sp. (Heteroptera: Pyrrhocoridae).

21 Strain PP1

Depositors: A.O. Frolov, M.N. Malysheva

History: 2014, isolated in Pskov Province, Russia.

Host: *Pyrrhocoris apterus* Linnaeus, 1758 (Heteroptera: Pyrrhocoridae).

Bibliography: Frolov et al., 2014.

22 Strain PP2

Depositors: A.O. Frolov, M.N. Malysheva

History: 2014, isolated in Pskov Province, Russia.

Host: *Pyrrhocoris apterus* Linnaeus, 1758 (Heteroptera: Pyrrhocoridae).

Bibliography: Frolov et al., 2014.

23 Strain PP3

Depositors: A.O. Frolov, M.N. Malysheva

History: 2014, isolated in Pskov Province, Russia.

Host: *Pyrrhocoris apterus* Linnaeus, 1758 (Heteroptera: Pyrrhocoridae).

Bibliography: Frolov et al., 2014.

- 24 Strain PP1 cl 10**
Depositor: M.N. Malysheva
History: Clonal culture. 2014, isolated from the culture of *L. pyrrhocoris* (Strain PP1) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.
- 25 Strain PP1 cl 11**
Depositor: M.N. Malysheva
History: Clonal culture. 2014, isolated from the culture of *L. pyrrhocoris* (Strain PP1) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.
- 26 Strain PP2 cl 2**
Depositor: M.N. Malysheva
History: Clonal culture. 2014, isolated from the culture of *L. pyrrhocoris* (Strain PP2) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.
- 27 Strain PP2 cl. 3**
Depositor: M.N. Malysheva
History: Clonal culture. 2014, isolated from the culture of *L. pyrrhocoris* (Strain PP2) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.
- 28 Strain PP3 cl. 4**
Depositor: M.N. Malysheva
History: Clonal culture. 2014, isolated from the culture of *L. pyrrhocoris* (Strain PP3) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.
- 29 Strain PP3 cl. 5**
Depositor: M.N. Malysheva
History: Clonal culture. 2014, isolated from the culture of *L. pyrrhocoris* (Strain PP3) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.
- 30 Strain PP3 cl. 6**
Depositor: M.N. Malysheva
History: Clonal culture. 2014, isolated from the culture of *L. pyrrhocoris* (Strain PP3) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.
- 31 Strain 25EC**
Depositor: S.A. Podlipaev
History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, El Ceibo, Costa Rica.
Host: nymph *Dysdercus* sp. (Heteroptera: Pyrrhocoridae).
GenBank: JF937081
Bibliography: Votýpka et al., 2012.
- 32 Strain 27EC**
Depositor: S.A. Podlipaev
History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, El Ceibo, Costa Rica.
Host: nymph *Dysdercus* sp. (Heteroptera: Pyrrhocoridae).
- 33 Strain 28EC**
Depositor: S.A. Podlipaev
History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, El Ceibo, Costa Rica.
Host: nymph *Dysdercus* sp. (Heteroptera: Pyrrhocoridae).
GenBank: JF937082-JF937084
Bibliography: Votýpka et al., 2012.
- 34 Strain 29EC**
Depositor: S.A. Podlipaev
History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, El Ceibo, Costa Rica.
Host: undetermined nymph Pyrrhocoridae (Heteroptera).
- 35 Strain 30EC**
Depositor: S.A. Podlipaev
History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, El Ceibo, Costa Rica.
Host: nymph *Dysdercus* sp. (Heteroptera: Pyrrhocoridae).
- 36 Strain 31EC**
Depositor: S.A. Podlipaev
History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, El Ceibo, Costa Rica.
Host: nymph *Dysdercus* sp. (Heteroptera: Pyrrhocoridae).
- 37 Strain 32EC**
Depositor: S.A. Podlipaev
History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, El Ceibo, Costa Rica.
Host: nymph *Dysdercus* sp. (Heteroptera: Pyrrhocoridae).
- 38 Strain 12VL**
Depositor: S.A. Podlipaev
History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, Carrara, Costa Rica.
Host: *Dysdercus obliquus* (Heteroptera: Pyrrhocoridae).
GenBank: JF937077

Bibliography: Votýpka et al., 2012.

Leptomonas podlipaevi Yurchenko, Lukeš, Xu, Maslov, 2006

39 Strain UCR5

Depositor: S.A. Podlipaev

History: 2003, received from D. Maslov, University of California-Riverside, USA. 2002, isolated by D. Maslov, California, USA.

Host: *Boisea rubrolineata* (Barber, 1956) (Heteroptera: Rhopalidae).

GenBank: DQ019000; DQ140174, DQ140175, DQ383649

Bibliography: Yurchenko et al., 2006.

L. seymouri Wallace, 1977

40 Strain ATCC 30220

Depositor: S.A. Podlipaev

History: 1992, received from D. Maslov, University of California-Riverside, USA. 1959, isolated by F.G. Wallace, Florida, USA.

Host: *Dysdercus suturellus* (Herrich-Schaeffer, 1842) (Heteroptera: Pyrrhocoridae).

GenBank: AF047495, AF053738, AF153040, AF338253, AH015821, AJ243569, AJ245951, AJ313532, AJ318494-AJ318497, AJ401380, AJ511865, AY160127, AY160128, AY547477, DQ239758, DQ239760, DQ239761, EF421167-EF421174, EU623433, GQ153669-GQ153671, JN944129, S78663, U23406, X07487, X07488, X07716, X14005, X78552, X82217

Bibliography: Wallace, 1977; Camargo et al., 1978 a, 1978b; Galinari and Camargo, 1978; Goncalves de Lima et al., 1979; Fish et al., 1981; Freymuller and Camargo, 1981; Alfieri and Camargo, 1982; Camargo et al., 1982; Dollahon et al., 1983; Kim and Ray, 1985; Bellofatto et al., 1988; Bellofatto and Cross, 1988; Conchon et al., 1989; Teixeira and Camargo, 1989; Gazzinelli et al., 1991; Palfi et al., 1994; Xu et al., 1994; Hartree and Bellofatto, 1995; He and Bellofatto, 1995; Teixeira et al., 1995; Branquinho et al., 1996; Hannaert et al., 1998; Bell and Bindereif, 1999; Podlipaev and Rokitskaya, 1999; Bell et al., 2000; Gilinger and Bellofatto, 2001; Merzlyak et al., 2001a,b; Podlipaev et al., 2004; Bessolitsina et al., 2005; Das and Bellofatto, 2005; Flegontov et al., 2006a,b; Nasereddin et al., 2008; Jackson, 2010; Gerasimov et al., 2012a.

Leptomonas spp.

41 Strain LS

Depositor: S.A. Podlipaev

History: 1992, received from D. Maslov,

University of California-Riverside, USA, isolated in USA.

Host: unknown.

GenBank: J03814, L19409, X53914

Bibliography: Lake et al., 1988; Fernandes et al., 1993; Podlipaev and Rokitskaya, 1999.

42 Strain 24EC

Depositor: S.A. Podlipaev

History: 2003, received from D. Maslov, University of California-Riverside, USA. 2003, isolated by D. Maslov, El Ceibo, Costa Rica.

Host: undetermined nymph of Pyrrhocoridae (Heteroptera).

Genus *Blastocrithidia* Laird, 1959

Blastocrithidia sp.

43 Strain BLP

Depositor: M.N. Malysheva

History: 2015, isolated in Pskov Province, Russia.

Host: *Pyrrhocoris apterus* Linnaeus, 1758 (Heteroptera: Pyrrhocoridae).

Remark: non-axenic.

Genus *Herpetomonas* Kent, 1880

H. muscarum (Leidy, 1856)

Synonym: *H. megaseliae* Dagget et al. 1972

44 Strain: ATCC 30260

Depositor: S.A. Podlipaev

History: 1992, received from D. Maslov, University of California-Riverside, USA. 1968, isolated by F.G. Wallace in Minneapolis, Minnesota, USA.

Host: *Musca domestica* Linnaeus, 1758 (Diptera: Muscidae).

GenBank: AY547484, AUXJ00000000, AY547484, DQ092548, EU095983, EU095984, FJ807255, JF756655, JN944119, JQ359731, JQ359748, JQ406959- JQ406961, KC503350-KC503410, KF160206-KF160242, KP689382, KP689382, KP689391, KP689399, L10849, L10850, L18872, U01007, U01011, U01015, U05812

Bibliography: Rogers and Wallace, 1971; Galinari and Camargo, 1978; Yoshida, 1978; Fish et al., 1981; Freymuller and Camargo, 1981; Coombs et al., 1982; Alfieri and Camargo, 1982; Van der Ploeg et al., 1984; Teixeira and Camargo, 1989; Faria e Silva et al., 1991; Landweber and Gilbert, 1993; Maslov et al., 1994; Lopes et al., 1997; Redman and Coombs, 1997; Podlipaev et al., 1998; Podlipaev and Rokitskaya, 1999; Podlipaev and Frolov, 2000; Podlipaev et al., 2004; Yurchenko et al., 2006; Gile et al., 2009; Yurchenko et al., 2009; Rocha et al.,

2010; Alves et al., 2011; Gerasimov et al., 2012a; Alves et al., 2013; Borghesan et al., 2013; Klein et al., 2013.

H. samuelpeessoai (Galvao et al., 1970).

Synonyms: *Leptomonas pessoai* Galvao et al., 1970, *H. pessoai* sensu Levine, 1978.

45 Strain: ATCC 30252

Depositor: S.A. Podlipaev

History: 1992, received from D. Maslov, University of California-Riverside, USA, isolated in Brazil.

Host: *Zelus leucogrammus* (Perty, 1833) (Heteroptera: Reduviidae).

GenBank: AF047494, AF064359-AF064399, AJ401381, AJ493125, FJ807256, JN944120, JQ359716, JQ359743, JQ406989-JQ406991, L10851, L10852, L38605, U01008, U01012, U01016, X62331

Bibliography: Galvão et al., 1970; Roitman et al., 1972; Roitman and Roitman, 1972; Camargo et al., 1978; Galinari and Camargo, 1978; Yoshida, 1978; Goncalves de Lima et al., 1979; Fish et al., 1981; Freymuller and Camargo, 1981; Alfieri and Camargo, 1982; Fish et al., 1982; Pinto et al., 1982; Kim and Ray, 1985; Palatnik et al., 1987; Jansen et al., 1988; Conchon et al., 1989; Teixeira and Camargo, 1989; Faria e Silva et al., 1991; Aksoy, 1992; Gazzinelli et al., 1992; Hupperich et al., 1992; Landweber and Gilbert, 1993; Landweber and Gilbert, 1994; Hannaert et al., 1998; Podlipaev et al., 1998; Fu et al., 1999; Podlipaev and Rokitskaya, 1999; Podlipaev and Frolov, 2000; Merzlyak et al., 2001; Gile et al., 2009; Gerasimov et al., 2012a; Borghesan et al., 2013.

H. nabiculae (Podlipaev 1985)

Synonyms: *Leptomonas nabiculae* Podlipaev 1985, *L. peterhoffi* Podlipaev 1985, *L. occidentalis* Podlipaev 1985, *Leptomonas* sp. Nfm.

46 Strain Nfm2

Depositor: A.O. Frolov

History: 1991, isolated by A.O. Frolov in Bere-zitsy village, Pskov Province, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: JN624300

Bibliography: Podlipaev et al., 1998; Podlipaev and Frolov, 2000; Merzlyak et al., 2001a; Podlipaev et al., 2004; Kostygov et al., 2011.

Genus *Wallacemonas* Kostygov et Yurchenko, 2014

W. collosoma (Wallace, Clark, Dyer et Collins, 1960)

Synonym: *Leptomonas collosoma* Wallace, Clark, Dyer et Collins, 1960.

47 Strain: ATCC 30261

Depositor: S.A. Podlipaev

History: 1992, received from D. Maslov, University of California-Riverside, USA. 1960, isolated by F.G. Wallace in Minneapolis, Minnesota, USA.

Host: *Limnoporus dissortis* (Drake and Harris, 1930) (Heteroptera: Gerridae).

GenBank: AF006632, AF006750, AF050095, AF126283, AF153038, AF204671, AF331656, AF351198, AH015822, AY046598, AY145448, AY495451, AY495452, AY594669, DQ239762-DQ239765, EU084898, EU084899, HG323624, JF946515, JN582046, JN944123, K02633, L32919, S76723, X56453-X56455, X79014

Bibliography: Wallace et al., 1960; Camargo et al., 1978a,b; Galinari and Camargo, 1978; Fish et al., 1981; Freymuller and Camargo, 1981; Alfieri and Camargo, 1982; Camargo et al., 1982; Dollahon et al., 1983; Conchon et al., 1989; Teixeira et al., 1989; Gazzinelli et al., 1991; Ben-Shlomo et al., 1997; Xu et al., 1997; Levitan et al., 1998; Podlipaev et al., 1998; Goncharov et al., 1999; Podlipaev and Rokitskaya, 1999; Li et al., 2000; Podlipaev and Frolov, 2000; Liang et al., 2001; Merzlyak et al., 2001a; Liu et al., 2003; Liang et al., 2004; Yurchenko et al., 2009; Gerasimov et al., 2012a,b; Kostygov et al., 2014.

W. rigidus (Podlipaev, Malysheva et Kolesnikov, 1991)

Synonyms: *Leptomonas rigidus*, *Leptomonas* sp. PL11, *Leptomonas* sp. Sld

48 Strain PL11

Depositor: S.A. Podlipaev

History: 2001, isolated by P. Merkulov and E. Slisarenko at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Salda littoralis* (Linnaeus, 1758) (Heteroptera: Saldidae).

GenBank: JN582047, JN944127, JN944128

Bibliography: Kostygov et al., 2004; Podlipaev et al., 2004; Gerasimov et al., 2012b.

49 Strain Sld

Depositor: S.A. Podlipaev

History: 2000, isolated by S.A. Podlipaev at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Saldula pallipes* (Fabricius, 1794) (Heteroptera: Saldidae).

GenBank: JF946516, JN582048

Bibliography: Kostygov et al., 2004; Podlipaev et al., 2004, Gerasimov et al., 2012a, 2012b.

Wallacemonas sp.

50 Strain Wsd

Depositor: S.A. Podlipaev

History: 2001, isolated by P. Merkulov and E. Slisarenko at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Salda littoralis* (Linnaeus, 1758) (Heteroptera: Saldidae).

GenBank: AY547488, JF946514, JF946517, JN582045, JN944131, JN944132, JN944134, JN944135

Bibliography: Kostygov et al., 2004; Podlipaev et al., 2004, Gerasimov et al., 2012a, 2012b.

51 Strain TrypX

Depositor: S.A. Podlipaev

History: 1997, received from J. Lukeš, Institute of Parasitology, Czech Republic. 1983, isolated in Alexandria, Egypt.

Host: *Rattus norvegicus* (Berkenhout, 1769) (Rodentia: Muridae).

Bibliography: Morsy et al., 1988; Podlipaev et al., 1998; Podlipaev and Frolov, 2000; Podlipaev et al., 2004.

Genus *Trypanosoma* Gruby, 1843

Trypanosoma sp.

52 Strain TPE

Depositor: M.N. Malysheva

History: 2015, isolated by M.N. Malysheva in Pskov Province, Russia.

Host: *Pelophylax esculetus* (Linnaeus, 1758).

Remark: non-axenic.

Superphylum Opisthosporidia

Phylum Aphelida

Class Aphelidea

Order Aphelidida Gromov, 2000

Family Aphelididae Gromov, 2000

Genus *Aphelidium* Zopf, 1885

Aphelidium aff. *melosirae*

53 Strain X-101

Depositor: M.A. Mamkaeva

History: 2012, isolated by M.A. Mamkaeva in the vicinity of Sergievka park, Peterhof, St. Petersburg, Russia. Sample P-1.

Host: *Tribonema gayanum* Pash.

GenBank: KJ566931

Bibliography: Karpov et al. 2014.

54 Strain X-102

Depositor: M.A. Mamkaeva

History: 2012, isolated by M.A. Mamkaeva in the vicinity of the Kutuy village, Kingisepp District, Leningrad Province, Russia. Sample P-2.

Host: *Tribonema gayanum* Pash.

Aphelidida spp.

55 Strain X-103

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva in the vicinity of the Zaboroka village, Novgorod Province, Russia. Sample 19.

Host: *Tribonema gayanum* Pash.

56 Strain X-104

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva in the vicinity of the Kurakino village, Novgorod Province, Russia. Sample 21.

Host: *Tribonema gayanum* Pash.

57 Strain X-105

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva in the vicinity of the Kurakino village, Novgorod Province, Russia. Sample 23.

Host: *Tribonema gayanum* Pash.

58 Strain X-106

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva in the vicinity of Peterhof, St. Petersburg, Russia. Sample 24.

Host: *Tribonema gayanum* Pash.

59 Strain X-107

Depositor: M.A. Mamkaeva

History: 2015, isolated by M.A. Mamkaeva in the vicinity of the Okulovka town, Novgorod Province, Russia. Sample K-4.

Host: *Tribonema gayanum* Pash.

60 Strain X-108

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva from a roadside ditch in the vicinity of the Krestzy village, Novgorod Province, Russia. Sample A-1.

Host: *Tribonema gayanum* Pash.

61 Strain X-109

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva from a roadside ditch in the vicinity of the Krestzy village, Novgorod Province, Russia. Sample A-2.

Host: *Tribonema gayanum* Pash.

62 Strain X-110

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva from the pond of Krestzy village, Novgorod Province, Russia. Sample A-3.

Host: *Tribonema gayanum* Pash.

63 Strain X-111

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva from a roadside ditch in the vicinity of the Zaytzevo village, Novgorod Province, Russia. No specimen: A-6.

Host: *Tribonema gayanum* Pash.

64 Strain X-112

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva in the vicinity of Vyborg, Leningrad Province, Russia. Sample V-1.

Host: *Tribonema gayanum* Pash.

Class Chytridiomycetes

Genus “*Amoeboradix*”

“*Amoeboradix*” sp.

65 Strain X-113

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva from a roadside ditch in the vicinity of Sergievka park, Peterhof, St. Petersburg, Russia. Sample K-1.

Host: *Tribonema gayanum* Pash.

66 Strain X-114

Depositor: M.A. Mamkaeva

History: Isolated in the vicinity of the Opolie village, Kingisepp District, Leningrad Province, Russia. Sample K-2.

Host: *Tribonema gayanum* Pash.

Genus *Polyphagus* Nowak.

P. parasiticus Nowak.

67 Strain X-115

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva from a roadside ditch in the vicinity of the Zaborka village, Novgorod Province, Russia. Sample P.p.

Host: *Tribonema gayanum* Pash.

68 Strain X-116

Depositor: M.A. Mamkaeva

History: 2015, isolated by M.A. Mamkaeva in the vicinity of the Zaytzevo village, Novgorod Province, Russia. Sample P-6.

Host: *Tribonema gayanum* Pash.

Genus *Chytridium* Braun

Chytridium sp.

69 Strain X-117

Depositor: M.A. Mamkaeva

History: 2015, isolated by M.A. Mamkaeva in the vicinity of the Hartchevnia village, Novgorod Province, Russia. Sample H-1.

Host: *Tribonema gayanum* Pash.

70 Strain X-118

Depositor: M.A. Mamkaeva

History: isolated by M.A. Mamkaeva from a roadside ditch road, Leningrad Province, Russia. Sample CH-4.

Host: *Tribonema gayanum* Pash.

71 Strain X-119

Depositor: M.A. Mamkaeva

History: 2015, isolated by M.A. Mamkaeva in the vicinity of the Zaytzevo village, Novgorod Province, Russia. Sample CH-6.

Host: *Tribonema gayanum* Pash.

Genus *Rhizophydium* Schenk

Rhizophydium sp.

72 Strain X-120

Depositor: M.A. Mamkaeva

History: 2015, isolated by M.A. Mamkaeva in the vicinity of the Tregubovo village, Novgorod Province, Russia. Sample H-3

Host: *Tribonema gayanum* Pash.

73 Strain X-121

Depositor: M.A. Mamkaeva

History: 2015, isolated by M.A. Mamkaeva in the Kutuy village, Kingisepp District, Leningrad Province, Russia. Sample KU-1.

Host: *Tribonema gayanum* Pash.

74 Strain X-122

Depositor: M.A. Mamkaeva

History: 2015, isolated by M.A. Mamkaeva in the Kutuy village, Kingisepp District, Leningrad Province, Russia. Sample KU-2.

Host: *Tribonema gayanum* Pash.

Order Mesochytriales Karpov et Aleoshin, 2014
Family Mesochytriaceae Karpov et Aleoshin, 2014

Genus *Mesochytrium* Gromov et al. 2000

Mesochytrium sp.

75 Strain X-123

Depositor: M.A. Mamkaeva

History: 2012, isolated by M.A. Mamkaeva in the vicinity of Stary Peterhof, St. Petersburg, Russia. Sample 10.

Host: *Tribonema gayanum* Pash.

GenBank: FJ804149, FJ804153

Bibliography: Karpov et al. 2010.

Order Gromochytriales Karpov et Aleoshin, 2014

Family Gromochytriaceae Karpov et Aleoshin, 2014

Genus *Gromochytrium* Karpov et Aleoshin, 2014
Gromochytrium sp.

76 Strain X-124

Depositor: M.A. Mamkaeva

History: 2012, isolated by M.A. Mamkaeva in the Kutuy village, Kingisepp District, Leningrad Province, Russia. Sample X-22.

Host: *Tribonema gayanum* Pash.

77 Strain X-125

Depositor: M.A. Mamkaeva

History: 2013, isolated by M.A. Mamkaeva in the Zaborka village, Novgorod Province, Russia. Sample V-1.

Host: *Tribonema gayanum* Pash.

Class Monoblepharidomycetes

78 Strain X-126

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva in the vicinity of Kotka, Finland. Sample F-1.

Host: *Tribonema gayanum* Pash.

79 Strain X-127

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva from a roadside ditch in the vicinity of the Zaborka village, Novgorod Province, Russia. Sample PP1.

Host: *Tribonema gayanum* Pash.

80 Strain X-128

Depositor: M.A. Mamkaeva

History: 2014, isolated by M.A. Mamkaeva from a pond in the Zaytzevo village, Novgorod Province, Russia. Sample R.m.

Host: *Tribonema gayanum* Pash.

List of lost cultures

Genus *Crithidia* Léger, 1902

C. brevicula Frolov et Malysheva, 1989

1 Strain NBrA

Depositor: A.O. Frolov

History: Isolated from culture *C. brevicula* (NBr) in the Laboratory of Protozoology ZIN RAS, St. Petersburg, Russia.

Host: *Nabis (Nabis) brevis* (Scholtz, 1847) (Heteroptera).

Bibliography: Frolov and Malysheva, 1989a, 1990; Kolesnikov et al., 1990; Marakhova et al., 1991; Podlipaev et al., 1991.

2 Strain ZK

Depositor: A.O. Frolov

History: 1986, isolated by A.O. Frolov in the village Berezitsy, Pskov Province, Russia.

Host: *Grypocoris sexguttatus* (Fabricius, 1777) (Heteroptera: Miridae).

GenBank: AF121798, AF124056, AF153044, AJ401356, AJ401382, EU076608, EU088280-EU088282, KJ443341-KJ443343, KJ443353, KJ474898-KJ474900, KJ474904-KJ474906

Bibliography: Podlipaev and Frolov, 1987; Frolov and Skarlato, 1990; Kolesnikov et al., 1990; Podlipaev et al., 1990; Marakhova et al., 1991; Podlipaev et al., 1991; Marakhova et al., 1993; Podlipaev et al., 1998; Podlipaev and Rokitskaya, 1999; Podlipaev and Frolov, 2000; Yurchenko et al., 2000; Merzlyak et al., 2001a, 2001b; Yurchenko et al., 2009; Kostygov et al., 2014.

3 Strain F6

Depositor: S.A. Podlipaev

History: 1986, isolated by S.A. Podlipaev at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: AF153042, AY029073, AY547461, AY547478, KJ443323-KJ443325, KJ443346, KJ474880-KJ474882, KJ474901-KJ474903

Bibliography: Kolesnikov et al., 1990; Podlipaev et al., 1991; Merzlyak et al., 2001a; Kostygov et al., 2004; Podlipaev et al., 2004; Kostygov et al., 2014.

4 Strain F8

Depositor: S.A. Podlipaev

History: 1986, isolated by S.A. Podlipaev at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera: Nabidae).

GenBank: KJ443329-KJ443331, KJ443348, KJ474886-KJ474888, KJ474919-KJ474922

Bibliography: Podlipaev and Rokitskaya, 1999; Kostygov et al., 2004; Kostygov et al., 2014.

C. dedva Kostygov et al., 2011

5 Strain D2

Depositor: S.A. Podlipaev

History: 1982, isolated by S.A. Podlipaev in the village Beloostrov, Leningrad Province, Russia.

Host: *Nabis (Nabicula) flavomarginatus* Scholtz, 1847 (Heteroptera).

GenBank: JN624299

Bibliography: Podlipaev, 1985; Kolesnikov et al., 1990; Podlipaev et al., 1991; Podlipaev et al., 1998; Kostygov et al., 2004; Kostygov et al., 2011.

Crithidia sp.

6 Strain P

Depositor: S.A. Podlipaev

History: 1988, isolated by S.A. Podlipaev in the village Beloostrov, Leningrad Province, Russia.

Host: *Panorpa communis* Linnaeus, 1758 (Mecoptera).

Bibliography: Podlipaev et al., 1998; Bulat et al., 1999; Podlipaev and Rokitskaya, 1999; Podlipaev and Frolov, 2000; Kostygov et al., 2004; Podlipaev et al., 2004.

Genus *Wallacemonas* Kostygov et Yurchenko, 2014

W. rigidus (Podlipaev, Malysheva et Kolesnikov, 1991)

Synonyms: *Leptomonas rigidus* Podlipaev, Malysheva et Kolesnikov, 1991; *Wallaceina rigida*.

7 Strain 1b

Depositor: S.A. Podlipaev

History: 1987, isolated by S.A. Podlipaev at the Cape Kartesh (White Sea), Karelia, Russia.

Host: *Salda littoralis* (Linnaeus, 1758) (Heteroptera).

GenBank: JN582049

Bibliography: Podlipaev et al., 1991, Kolesnikov et al., 1990.

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