NIES-Collection

LIST OF STRAINS

Third Edition

1991

Microalgae

and

Protozoa

Edited by

Makoto M. Watanabe and Kiyoshi N. Satake

Supervized by

Committee for Evaluating Microbial Culture Strains

The National Institute for Environmental Studies

Environment Agency

JAPAN

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March 1, 1991

Contributors :

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and Sachiko Ono

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Cover : *Spirulina subsalsa*

第三版の序

国立環境研究所微生物系統存施設が，1988年に保存株リスト第二版を発行してから，３年を迎えることとなった。初版及び二版に関して，国内国外の各方面から多くの建設的意見や激励が寄せられたことには非常に勇気づけられたと共に，我々の事業が環境科学分野のみならず，基礎生物学，農学，水産学，食品学，医学等の分野でも注目され，重要視されていることを知り，責任の重さを痛感したものである。

この第三版は，初版及び二版と同様に微生物系統保存株評価委員会の監修を受け，微細藻類510株，原生動物５株を掲載した。特に保存株の分類，保存株特性については注意深い検討がなされたが，不備な点があればご指摘願えれば幸いである。

本施設に保存されている微生物株の殆どは，我が国の藻類学者によって分離培養されたものであり，他の微生物保存機関には保存されていないものである。今後，貴重な微生物株については，国内国外の微生物保存機関と密接な連携・協力関係を組み，共通のルールで共有していくことを考えている。また，本施設の事業は，微生物株の収集・保存・分譲にとどまらず，分類学的研究，保存技術の開発，株情報の収集およびその電算機管理システムの開発等多岐に亘っているが，これらの事業が益々充実し成果をあげるために，施設の充実，要員の拡充をはかっていく所存である。今後とも一層のご批判とご支援を賜わることができれば幸いである。

平成３年３月

国立環境研究所微生物系統保存株評価委員会委員長
国立環境研究所生物園環境部長

菅　原　　淳

保存株リスト第一版発刊に寄せて

国立環境研究所に我が国最初の環境微生物の系統保存施設が設置されたのは，昭和58年１月であったが，その後約２年間にわたって，同研究所の関係者の並々ならぬ努力によって，微生物保存事業に関する周到なる準備作業が繰り展げられ，ようやくここにその成果を保存株リストとして集大成されたことは，環境科学にたずさわる多くの研究者にとって，これ程慶ばしいことはない。ここに関係者各位に対して満腔の敬意を表明したい。

今回刊行された保存株リストは，当面環境生物学上重要な生産者である微細藻類に的を絞ったものであるが，これは我が国の現行微生物系統保存事業のうちで，最も弱点とされていた分野であり，学界･産業界からもその実現が強く要望されていたところである。微細藻類の系統保存は，長年にわたり活発に研究されてきた細菌類や菌類の系統保存とは異なり，その分離，培養，保存等の条件が極めて複雑で，技術的に多くの困難な作業を伴うものである。本研究所においてはその性格上多角的研究に取り組んでいるが，その特徴を生かして所内の衆知を結集してこの点を克服し，世界的に通用する信頼度の高い系統保存事業を軌道に載せることに成功した。本施設の保存する微生物株は，その特性が科学的に実証されているために，これを実験的に使用する研究者，あるいはそれら微生物データの利用者にとって，高い信頼感をもって利用することができる。しかも本施設では，保存微生物株に関する独自の電算機管理システムを開発したので，その保存株データを環境生物に関するデータベースの一環として利用することが可能となった。このことによって，とかく遅れがちであった我が国環境生物学の近代化が著しく促進されるものと信ずる。

本施設の当初の目標は環境問題に関係のある多種多様の微生物株を総合的に収集保存することにあったが，現状ではようやく微細藻類についての系統保存体制が確立されたに止まっている。今後益々施設設備の充実，要員の拡充等をはかって，微細藻類のみならず，環境生物学の調査研究上欠かすことのできないその他の微生物の系統保存をも実施し，名実ともにそなわった世界的な環境微生物株保存センターの一つとして発展されることを期待したい。

昭和60年２月

元富山大学長
東京大学名誉教授
柳　田　友　道

目　　次

Ⅰ．はじめに

国立環境研究所微生物系統保存施設は，昭和58年に環境微生物の系統保存を行なうことを目的として設立された。この施設は，当研究所で遂行されている微生物学的研究で使用されている微生物の培養株を，所内研究者の要望に応じて保存し，分譲することを目的としていたが，環境科学に携わる微生物学者からの強い要望を考慮して，所内に止らず，広く他機関からも微生物株とそれらの株データの収集および分譲を積極的に行なうこととし，将来的には国際的な環境微生物のカルチャーコレクションセンターとして国内外の環境関連研究機関および研究者と密接なネットワーク体制を構築し，環境微生物研究の推進を支える役割を担っていくことを計画している。

本施設で保存される微生物の培養株は，表１に記されているように微細藻類，原生動物および特殊な浄化能を有する細菌類が対象となっているが，現状ではこれらすべてを同時に保存できる体制の整備が不十分であることおよび環境科学の分野では水域の汚染と浄化に微細藻類が密接に関連していることから，微細藻類株が積極的に収集・保存されている。収集されたすべての株について，その種名，培養条件，保存法，形態学的特徴，生理生態学的特徴，環境科学との関連性に関する株特性の検査や情報収集が行なわれ，更にそれらの株データ管理のパーソナルコンピューターによるシステム化が行なわれている。

表１　本施設に保存される対象となる微生物株

環境問題との関連性での類型	対象となる微生物株
環境汚染の原因となる微生物	赤潮形成藻類，水の華形成藻類，有毒藻類，水道水の異味異臭をもたらす藻類または放線菌類，硫酸還元細菌等
環境汚染の指標となる微生物	AGP 供試藻類，重金属耐性微生物，水質の富栄養化の指標となる細菌類，微細藻類，原生動物等
自浄作用，廃水及び廃棄物処理に関係する微生物	光合成細菌，脱窒菌，硝化細菌，汚染原因微生物を捕食または溶解する微生物，活性汚泥及び生物膜処理の原生動物及び細菌類，嫌気性処理にかかわる嫌気性細菌，生物学的処理の障害となる微生物等
有機合成化合物の分解に関係する微生物	PCB，フェノール，各種除草剤及び農薬等の分解に関与する細菌類
金属の酸化・還元作用に関連する微生物	昇汞($HgCl_2$)やシアン化水銀の還元に関与する細菌類，亜砒酸の酸化に関与する細菌類，重金属のバクテリアリーチングに関与する細菌類等

本施設に保存された環境微生物培養株の最初のリストには，施設，組織，基本業務の概要説明とともに，微細藻類262株が掲載された（渡辺・笠井，1985)。それ以降，施設，組織，基本業務の大きな変化はないが，寄託された株，安定した増殖が得られた株および株データの変更を行なった株があり，それらは追補株リスト及び第2版として毎年掲載された。現在，微細藻類510株，原生動物5株が保存されるに至っている。第3版は，これらの保存株すべてを再整理し，新たなデータを加えて，掲載したものである。

II. 培養株の寄託

1．寄託条件

微生物の培養株の本施設への保存寄託は，以下の条件を満たしている培養株で，微生物系統保存株評価委員会の審査を経たものとする。

(1) 寄託の対象となる微生物は原則として以下のいずれかにあてはまることとする。
(i)環境汚染の原因となる微生物，(ii)環境汚染の指標となる微生物，(iii)自浄作用，廃水及び廃棄物処理に関係する微生物，(iv)有機合成化合物の分解に関係する微生物，(v)金属の酸化・還元作用に関係する微生物。

(2) 種名及び履歴が明らかである培養株であることを原則とするが，既に多くの調査研究において属名をもって使用されている微生物株については例外として受け入れる。

(3) 寄託対象微生物は，保存条件が確立している培養株，すなわち保存中の状態が安定しているクローン株であることを基本とし，次のいずれかにあてはまる培養株であることとする。
(i)微細藻類では無菌培養株か単藻培養株であること，(ii)原生動物では無菌培養株か餌料としての他の微生物のみが混入している単一種培養株であること，(iii)細菌類はすべて純粋培養株であること。

(4) 寄託された培養株は原則としてすべて分譲対象として扱う。

(5) その他，特に微生物系統保存株評価委員会が必要と認めたもの。

2．寄託の手続き

(1) 寄託者は様式－1の書類に所定事項を記入の上，下記の寄託先へ申し込むこととする。
〒305　茨城県つくば市小野川16―2　国立環境研究所微生物系統保存施設
電話0298(51)6111　内線625，627　FAX0298(51)4732

(2) 受託可否は寄託依頼があった日から1ヶ月以内に行う。

(3) 寄託者は受託の解答があった日から1ヶ月以内に，微生物株を本施設に寄託するものとする。

(4) 寄託書類の記載事項と寄託された微生物株の状態が一致せず，前述した寄託条件より逸脱した場合には，寄託のあった日より1ヶ月以内に受託の取り消しを寄託者へ知らせることとする。

様式－1(1)

微生物株寄託依頼書

国立環境研究所

微生物系統保存施設 殿

国環研記入
受付日＿＿＿＿
受付担当者＿＿＿＿
受付番号＿＿＿＿
受託 □可 □否

平成　　年　　月　　日

(フリガナ)
依頼者氏名

(フリガナ)
所属機関

部・室・課名

住所 〒

電話　　(　　)　　(内線　　)

下記微生物株の寄託を依頼します。

寄託理由

[1] 学名

[2] 株名

[3] 履歴

1. (フリガナ) 採集場所：
2. 生息場所：
3. 採集年月日：
4. (フリガナ) 採集者：
5. 分離年月日：
6. (フリガナ) 分離者：
7. 分離試料源：□ 土，□ 水，□ 動物（　　），□ 植物（　　），□ 雪または氷，□ その他（　　）
8. 分離する時の生物の状態：□ 運動性栄養細胞，□ 非運動性栄養細胞，□ 休眠細胞，□ 胞子，□ その他（　　）
9. 分離方法：□ ピペット洗浄法，□ 希釈法，□ 寒天平板法，□ 走性，□ その他（　　）
10. 分離した時の処理：□ 無処理，□ 抗生物質，□ 紫外線照射，□ 化学物質，□ 熱処理，□ 超音波処理，□ その他（　　）
11. (フリガナ) 同定者
12. (フリガナ) 無菌化者
13. (フリガナ) クローン化者

様式－1(2)

4 株の状態

1．微細藻類 □ 無菌，□ 単藻，□ クローン

2．細 菌 類 □ 純粋，□ クローン

3．原生動物 □ 無菌，□ 単一種混菌，□ 二種混菌，□ 混合

4．そ の 他 （ ）

5 培 地

1．培 地 名：＿＿＿＿＿＿

2．培地組成[注1]及び作成上の注意

＿＿＿＿＿＿

6 培養条件

1．温　　度：＿＿＿＿＿＿

2．照　　度：＿＿＿＿＿＿

3．光　　源：＿＿＿＿＿＿

4．明暗周期：＿＿＿＿＿＿

7 保存条件

□ 継代培養保存

1．温　　度：＿＿＿＿＿＿

2．照　　度：＿＿＿＿＿＿

3．光　　源：＿＿＿＿＿＿

4．明暗周期：＿＿＿＿＿＿

5．保存期間：＿＿＿＿＿＿

□ 凍結保存

1．凍害防御物質：＿＿＿＿＿＿

2．凍結速度：＿＿＿＿＿＿

3．融解速度：＿＿＿＿＿＿

4．保存温度：□ 液体窒素，□ ディープフリーザー(-80℃)，□ その他（ ）

□ 凍結乾燥保存

□ 可　　□ 否

□ 乾燥保存

□ 可　　□ 否

8 株 特 性

1．環境上問題となる特性

＿＿＿＿＿＿

2．生理生態的特性

＿＿＿＿＿＿

3．その他の特性

＿＿＿＿＿＿

9 その他の情報

＿＿＿＿＿＿

10 文　献

注）通常よく使用されている培地の場合，原典を記すだけでよい。

III. 保存株の分譲

1．所内研究者への分譲

(1) 分譲条件

i）分譲された株を使った研究成果を論文として発表する場合は，本施設から分譲を受けたことを明記し，別刷を本施設へ送ることとする。

ii）分譲された株を第三者に分譲することを禁止する。

iii）株データの分譲については，保存株の分譲に準じて行われる。

(2) 分譲依頼の手続き

i）分譲希望者は様式－2の書類に所定事項を記入の上，本施設へ申し込むこととする。

ii）分譲を受けた者は受領後直ちに培養株の状態について，様式－3の書類に所定事項を記入の上，本施設へ提出するものとする。

2．所外への分譲

本施設に保存されている微生物株の所外への分譲は，地球・人間環境フォーラムで行われている。分譲依頼等はフォーラム発行のカタログを参照されたい。

様式－2

微生物株分譲依頼書

国立環境研究所

微生物系統保存施設 殿

国環研記入
受付日
受付担当者
受付番号

平成　　年　　月　　日

（フリガナ）
依頼者氏名

（フリガナ）
所属機関

部・室・課名

住所 〒

電話　　（　　）　　（内線　　）

研究目的（具体的に）

株データ

□ 要　　（株番号　　）

□ 不要

下記微生物株について分譲を依頼します。

微生物種名及び株番号

国環研担当者記入

様式－3

微生物株の受領と分譲時の状態についての報告

国立環境研究所
微生物系統保存施設 殿

国環研記入
受付番号＿＿＿＿
受付者＿＿＿＿
受付日

平成　　年　　月　　日
（フリガナ）
依頼者氏名
（フリガナ）
所属機関
部・室・課名
住所 〒

電話　　（　　）　　（内線　　）

年　　月　　日に分譲されました微生物株の受領と分譲時の株の状態について下記のように報告いたします。

株の分譲時の状態
□ 良好株
□ 不良株
□ その他

当施設についての意見と要望

分譲株（種名及び株番号）

国環研担当者記入

IV. 分譲株の培養保存法

微生物株は，ねじ口試験管に培養された状態で郵送される。株の分譲をうけた場合，株を絶やさないために下記の点に留意する必要がある。

i） 培地は株を受け取る前に作成しておく。

ii） 株を受領後速やかに荷をとき，新鮮な培地に植え継ぎ，当方で指示した温度と照度下(第Ⅷ章参照)で培養する。その場合明暗サイクルは12時間明期12時間暗期とし，ねじ口試験管のねじ蓋をゆるくする。

iii） 良好な増殖が確認された後に，更に株を保存する場合には，当方で指示した期間毎に新鮮な培地に移植する必要がある(第Ⅷ章参照)。

V. 藻類培地作成の基本手法

藻類株の保存には，数多くの培地を必要とする。それぞれの培地は次章に掲載した処方せんに従って作成されるが，正確かつ簡便に培地を作成するために，本施設で採用している基本手法について述べておきたい。

1．保存試薬液

培地は一般に多量栄養素，微量金属，およびビタミン類(表2)で構成されている。これらの諸成分の保存試薬液を作成しておくことが，培地作成の簡便さをもたらす。このうち，微量金属やビタミン類の保存液の濃度は非常に低いので，保存試薬液作成時には，より濃度の高い原液を作成する必要がある。以下，各々について保存試薬液の濃度と作成方法についてのべる。

A 多量栄養素：各栄養素につき，10 mg/mlの濃度の保存試薬液を作成し，冷蔵庫(5℃)で保管する。

B 微量金属：これらの成分は，各々の保存試薬液で作成され保管される場合と，混液で保管される場合がある。

(1) 各種保存試薬液

i） 10-100 mg/mlの濃度で各種金属の原液を作成する。

ii） 各原液を1 mg/mlの濃度に希釈し，冷蔵庫(5℃)に保管する。

IV. 分譲株の培養保存法

微生物株は，ねじ口試験管に培養された状態で郵送される。株の分譲をうけた場合，株を絶やさないために下記の点に留意する必要がある。

i） 培地は株を受け取る前に作成しておく。

ii） 株を受領後速やかに荷をとき，新鮮な培地に植え継ぎ，当方で指示した温度と照度下(第Ⅷ章参照)で培養する。その場合明暗サイクルは12時間明期12時間暗期とし，ねじ口試験管のねじ蓋をゆるくする。

iii） 良好な増殖が確認された後に，更に株を保存する場合には，当方で指示した期間毎に新鮮な培地に移植する必要がある(第Ⅷ章参照)。

V. 藻類培地作成の基本手法

藻類株の保存には，数多くの培地を必要とする。それぞれの培地は次章に掲載した処方せんに従って作成されるが，正確かつ簡便に培地を作成するために，本施設で採用している基本手法について述べておきたい。

1．保存試薬液

培地は一般に多量栄養素，微量金属，およびビタミン類(表2)で構成されている。これらの諸成分の保存試薬液を作成しておくことが，培地作成の簡便さをもたらす。このうち，微量金属やビタミン類の保存液の濃度は非常に低いので，保存試薬液作成時には，より濃度の高い原液を作成する必要がある。以下，各々について保存試薬液の濃度と作成方法についてのべる。

A 多量栄養素：各栄養素につき，10 mg/mlの濃度の保存試薬液を作成し，冷蔵庫(5℃)で保管する。

B 微量金属：これらの成分は，各々の保存試薬液で作成され保管される場合と，混液で保管される場合がある。

(1) 各種保存試薬液

i） 10-100 mg/mlの濃度で各種金属の原液を作成する。

ii） 各原液を1 mg/mlの濃度に希釈し，冷蔵庫(5℃)に保管する。

表2．培地に使われる栄養塩類

多量栄養塩	微量金属
NaCl	H_3BO_3
KCl	$MnCl_2 \cdot 4H_2O$
$CaCl_2 \cdot 2H_2O$	$MnSO_4 \cdot 7H_2O$
$MgCl_2 \cdot 6H_2O$	$FeCl_3 \cdot 6H_2O$
Na_2SO_4	$FeSO_4 \cdot 7H_2O$
K_2SO_4	$CoCl_2 \cdot 6H_2O$
$MgSO_4 \cdot 7H_2O$	$ZnSO_4 \cdot 7H_2O$
$NaNO_3$	$CuSO_4 \cdot 5H_2O$
KNO_3	$Na_2MoO_4 \cdot 2H_2O$
$Ca(NO_3)_2 \cdot 4H_2O$	ビタミン類
NH_4NO_3	Vitamin B_{12}
$NaH_2PO_4 \cdot 2H_2O$	Biotin
β-Na_2glycerophosphate	Thiamine HCl
KH_2PO_4	Nicotinic acid
K_2HPO_4	Calcium panthothenate
Na_2CO_3	*p*-Aminobenzoic acid
$NaHCO_3$	Inositol
$Na_2SiO_3 \cdot 9H_2O$	Folic acid
	Thymine

(2) 混液

i） (1)- i ）と同様の操作を行う。

ii） 必要量の80%量の蒸留水をビーカーに加える。

iii） 十分に撹拌しながら必要量のNa_2EDTAを溶解する。

iv） 十分に撹拌しながら各種微量金属原液を必要量添加する。

v） 蒸留水を加え，最終量に調整し，冷蔵庫（5℃）に保管する。

C ビタミン類：ビタミンB_{12}，ビオチン，チアミンの3種のビタミンだけで多くの藻類が増殖するので，殆どの培地はこれら3種のビタミン類だけが添加されている。しかし，いくつかの培地では，他のビタミン類が添加されている。

(1) ビタミンB_{12}，ビオチン，チアミン

i） ビタミンB_{12}とビオチンについては，各々0.1 mg/mlの原液を作成し，チアミンについては，10 mg/mlの原液を作成する。

ii） これらの原液を多数の試験管に1 mlずつ分注し，オートクレーブ滅菌後，−20℃のフリーザーに保管する。

iii) 各ビタミンについて，保存原液の1mlを溶解し，蒸留水で1/100に希釈してビタミンB_{12}とビオチンについては1μg/mlの保存試薬液，チアミンについては100μg/mlの保存試薬液を作成し，冷蔵庫に保管し，使用する。

(2) 他のビタミン類：ある培地では，多種のビタミン類が混液の形で添加される（第VI章—46参照）。大量に作成しておくことをすすめる。

i) 各種ビタミンについて，0.1-1mg/mlの原液を作成する。

ii) 必要量の80%の蒸留水をビーカーに加える。

iii) 十分に撹拌しながら各種ビタミン原液を必要量加える。

iv) 蒸留水で最終量に調整する。

v) ミリポアフィルター(0.22μm)でろ過滅菌したのち，滅菌された試薬瓶に100mlずつ分注し，−20°Cのフリーザーで保管する。一部を溶解し，冷蔵庫（5°C）に保管しながら使用する。

2．培地作成

培地は，合成培地と強化培地に大別される。すべての淡水藻や一部の海産藻は合成培地で，殆どの海産藻は強化培地で保存されている。

(1) 合成培地（淡水）

i) 必要量の約80-90%の蒸留水をビーカーに加える。

ii) 十分に撹拌しながら，トリス，グリシルグリシン，HEPES，TAPS，Bicine，MES等のバッファー剤(必要とされる場合)を必要量天秤で測定し，添加する。

iii) 各種栄養塩を各々の保存液から，必要量添加する。

iv) 蒸留水で最終量に調整する。

v) バッファー剤が使用されている場合，1N HClあるいは1N NaOHで，使用されていない場合は各々1/10の濃度で，pHを調整する。

vi) 培地10mlずつ試験管に分注し，オートクレーブで滅菌する（121°C，20min)。

(2) 合成培地（海水）

i) 必要量の約80%の蒸留水をビーカーに加える。

ii) 十分撹拌しながら，バッファー剤（トリス，NTA等）および多量栄養塩類（NaCl，$MgSO_4$，KCl，$CaCl_2$）を天秤で必要量測定し，添加する。

iii) 他の各種栄養塩類を，各々の保存液から必要量添加する。

iv) 蒸留水で最終量に調整する。

v) 1N HClでpHを調整する(通常8.0)。

vi) 培地10mlずつ試験管に分注し，オートクレーブで滅菌する（121°C，20min)。

(3) 強化海水培地

i) 汚染のない外洋海水を採取し，ワットマンGF/Cフィルターでろ過し，粒子を除く。

ii) 塩分を調べる。通常の外洋海水の塩分は約35‰である。

iii) 必要量の80-90%の海水をビーカーに加える。

iv) 必要量のトリスを天秤で測定し，溶解する（必要とされる場合)。

v) 他の栄養塩類を，各々の保存液から必要量添加する。

vi) 海水で最終量に調整する。

vii) pHを測定する。指示されている場合は1N HClで調整する（通常8.0)。

viii) 培地10mlずつ試験管に分注し，オートクレーブで滅菌する（121°C，20min)。

3．寒天斜面培地

通常寒天は1.5%の濃度で滅菌する前に液体培地に加えられる。

i) 寒天を必要量天秤で測定し，液体培地に添加し，オートクレーブで121°Cに熱し，溶解する。

ii) 溶解後，速やかに10mlずつ試験管に分注し，オートクレーブで滅菌する(121°C，20 min)。

iii) 滅菌後，試験管上部に直径1cmの枕木をして寝かせ，放冷して培地を斜面状に固まらす。

PREFACE TO THE THIRD EDITION

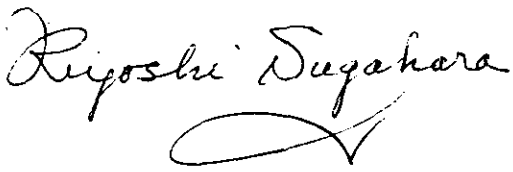
Three years have past since we published the second edition of the list. During this period a considerable number of new cultures have been added to the NIES-Collection. We appreciate the many comments and words of encouragement about the publications from people in diverse places. These have led us to recognize more than ever the value of the NIES-Collection for research and development. Its use extends not only to environmental science, but also to basic biology and microbiology-related fields such as agriculture, fisheries, food manufacture and medical science.

The third edition lists 510 strains of microalgae and 5 strains of protozoa. These have been evaluated by the Committee for Evaluating Microbial Culture Strains, which is composed of microbiologists from this institute and authorities from other organizations. Although special care has been exercised to ascertain that the taxonomy and characteristics of all strains are clear and precise, we are always grateful for further advice and criticism.

Most of the strains in the NIES-Collection were isolated originally by phycologists in our country and do not exist in other collections. We plan to share responsibility for preservation of the important strains by keeping close contacts with other culture collections.

The NIES-Collection carries out such wide-ranging activities as collection, preservation, distribution, taxonomy, preservation technology, and development of a microbial strain data processing system. We hope to make steady progress in these various activities by expansion of facilities and staff. We would much appreciate your advice, criticism and cooperation concerning the performance of the NIES-Collection.

March 1, 1991.



Kiyoshi Sugahara D. Sci.
Chairman of Committee for Evaluating
Microbial Culture Strains.
Director of Environmental Biology Division

PREFACE TO THE FIRST EDITION

In January 1983, the first culture collection of environmental microorganisms in Japan was established at the National Institute for Environmental Studies. In the two years since that time, many dedicated people have collaborated in the collection of microorganisms for the institute. The fruits of their efforts have culminated in a "List of Strains," which I feel will be highly praised by environmental scientists. I would like to extend to all who were involved, my most sincere thanks and gratitude.

The list published herein focuses on microalgae which are important primary producers in the environment. Notwithstanding the fact that there has been a high demand for microalgal collections by both the academic and industrial worlds, until the establishment of the NIES-Collection, no microalgal culture collection for environmental studies *per se* existed in Japan. Unlike the culture collection of bacteria and fungi, organisms which have been actively studied for a long time, the isolation, cultivation, and preservation of microalgae are technically much more complex. Since this institution has characteristically performed interdisciplenary studies, it was possible to conquer these difficulties, and set the culture collection of microalgae on the right path by utilizing the knowledge of its many experts.

Users of the microbial strains of the NIES-Collection will find both their quality and the data maintained about them, highly reliable because the characteristics of the microalgae have been carefully examined and re-examined. Due to the development of the strain computer data processing system, strain data have added to the general data base of environmental biology. Collectively, these developments will contribute to the rapid growth of environmental microbiology, and allow it to catch up with microbiological research in other fields.

Although the ultimate objective of the NIES-Collection is to collect and preserve a great variety of microorganisms related to environmental problems, at present only the collection of microalgal cultures has been established. I hope that in the future the NIES-Collection will preserve not only microalgae, but also other microorganisms which are indispensable to environmental biology. By planning expansion of the facilities and the staff, the NIES-Collection should develop as an international culture collection center, truly worthy of the name.

September 1, 1985

T. Yanagita

Tomomichi Yanagita, D. Sci.
Professor Emeritus of University of Tokyo.

CONTENTS

I. INTRODUCTION

The Microbial Culture Collection at the National Institute for Environmental Studies (NIES-Collection) was founded at 1983 as the first collection center of environmental organisms.

Although microalgae, bacteria and protozoa related to environmental problems will be preserved in this collection in the future (Table 1), microalgae associated with water pollution and cleaning have been collected and preserved the most actively as the first step. The specific name, source, conditions of cultivation and preservation, purity, morphological and physiological characteristics, and environmental characteristics, of all the strains collected have been reexamined, and the revized data processed using a personal computer.

The first list of environmental microorganisms preserved in the NIES-Collection (Watanabe & Kasai 1985) offered 262 strains of microalgae, together with the examples of NIES-Collection facilities, organization and fundamental pattern of research. Since then, as the result of our studies on many strains isolated by us and given by colleagues, a considerable number of new algal strains have been added and the supplementary and the Second lists published (Watanabe & Kasai 1986, 1987, 1988). The total numbers of strains of algae and protozoa in the NIES-

Table 1. Microbial culture strains preserved in the NIES-Collection

Environmental Microorganisms	Examples
Causative microorganisms of environmental pollution.	Causative algae of red tide or water bloom, toxic algae, microorganisms causing the offensive odor or taste of tap water and sulfate-reducing bacteria.
Microbial indicators of environmental pollution.	Algae used in bioassay studies of water pollution, metal resistant microorganisms and microbial indicators of eutrophication.
Microorganisms associated with environmental self-cleaning and waste water treatment.	Photosynthetic bacteria, denitrifying bacteria, microorganisms which prey upon or lyse causative organisms of environmental pollution, bacteria and protozoa associated with activated sludge, microbial film processing, or anaerobic processing.
Microorganisms associated with biodegradation of synthetic organic compounds.	Bacteria associated with biodegradation of PCB, phenol and agricultural chemicals.
Microorganisms associated with oxidation and reduction of metals.	Bacteria associated with reduction of mercury chloride (II) or mercury cyanide (II), oxidation of arsenious acid, or bacterial leaching of heavy metals.

Collection are now 510 and 5, respectively.

The third edition lists all the strains of algae and protozoa preserved in the collection together with new or revized data.

II. DEPOSITION OF STRAINS

1. Condition for deposit

The decision to accept the deposit of a strain is made by Committee for Evaluating Microbial Culture Strains. A strain for deposit in the NIES-Collection should fit the following criteria.

(1) It must be at least one of the following microorganism types:
   i) Causative microorganism of environmental pollution.
   ii) Microbial indicator of environmental pollution.
   iii) Microorganism related to waste water treatment or self-cleaning by the environment.
   iv) Microorganism related to the biodegradation of synthetic organic compounds.
   v) Microorganism capable of oxidation or reduction of metals.

(2) The source of the strain and the specific name should be established, though strains which have been used in number of studies may be accepted even if only the generic name is known.

(3) It should be a stable clonal strain in one of the following states:
   i) Microalgae; axenic or unialgal strain.
   ii) Protozoa; axenic or xenic strain with supplementary microorganisms added as food.
   iii) Bacteria; pure strain.

(4) As a rule, deposited strains are available to the general public.

(5) At the discretion of Committee for Evaluating Microbial Culture Strains, some microorganisms may be accepted for deposit, even if they did not meet the above criteria.

2. Procedure for deposit

(1) The depositor should complete a Strain Deposit Request Form (p.21) and send it to the following address:
   Microbial Culture Collection,

The National Institute for Environmental Studies,
Onogawa 16-2, Tsukuba, Ibaraki 305, Japan

(2) A reply is given within one month from the date of receipt of the Strain Deposit Request Form.

(3) The depositor should send an actively growing or lyophilized sample of the strain with relevant reprint if available within one month of the date the acceptance was sent.

(4) If the state of the sent strain does not coincide with the description on the Strain Deposit Request Form, or did not meet any of the rules shown, the acceptance for deposit is cancelled. (The NIES reserves the right to refuse any deposit at its discretion.)

Strain Deposit Request Form

NIES use only	
Date	
Name	
Number	
Accept	☐ YES ☐ NO

Director,
Microbial Culture Collection,
The National Institute for Environmental Studies

Date

Depositor's name

Depositor's address

I wish to contribute the following microbial culture strain to the NIES-Collection.

Reason for deposit:

1. **Scientific name with citation of authority**

2. **Strain number, symbols and other collection number**

3. **History**
   a. Locality :
   b. Habitat :
   c. Collection date :
   d. Collector :
   e. Isolation date :
   f. Isolator :

g. Source of isolation : ☐ soil, ☐ water, ☐ animal ( ),
☐ plant ( ), ☐ snow or ice, ☐ others ( )

h. Isolation objective : ☐ motile vegetative cell, ☐ nommotile vegetative cell,
☐ domant cell, ☐ spore, ☐ others ( )

i. Physical separation : ☐ pipette washing, ☐ dilution, ☐ agar plating,
☐ taxis, ☐ others ( )

j. Isolation treatment: ☐ none, ☐ antibiotics, ☐ ultra-violet irradiation,
☐ chemicals ( ), ☐ ultra-sonic, ☐ heat, ☐ others ( )

k. Identified by :

l. Axenified by:

m. Clonized by:

4. Status

a. Microalgae : ☐ axenic, ☐ unialgal, ☐ clonal

b. Bacteria : ☐ pure, ☐ clonal

c. Protozoa : ☐ axenic, ☐ monoxenic, ☐ dixenic, ☐ mixed

5. Medium

a. Name :

b. Composition and notes for preparation of medium :

6. Experimental culture conditions

a. Temperature :

b. Light intensity :

c. Light quality

d. L/D cycle:

7. Stock-culture conditions

a. Maintenance by sub-culturing

i. Temperature:

ii. Light intensity:

iii. Light quality:

iv. L/D cycle:

v. Duration:

b. Preservation in freezing

i. Cryoprotectant :

ii. Freezing rate :

iii. Thawing rate :

iv. Temperature : ☐ liquid nitrogen, ☐ −80°C, ☐ others ( )

c. Preservation in freeze-drying

☐ yes ☐ no

d. Preservation in drying

☐ yes ☐ no

8. Strain characteristics

a. Environmental :

b. Physiological and ecological :

c. Miscellaneous :

9. Other information

10. References

III. ORDERING AND DISTRIBUTION OF STRAINS

1. Distribution to researchers of this institute

(1) Rules on distribution

i) Anyone who uses a NIES-Collection strain in a paper which is subsequently published, is requested to give the full number of the strain, e.g. NIES-125, and to send a reprint to the NIES-Collection.

ii) In order to prevent trouble, confusion, or difficulty in the collection, accumulation and processing of strain information and data, the distribution of any NIES-Collection strain to a third party is strictly prohibited.

(2) Procedure for ordering strains

i) All orders for strains must be requested to the NIES-Collection by completing a Strain Ordering Form.

ii) Upon receipt of a strain, the Strain Receipt Form should be completed and returned to the NIES-Collection as soon as possible.

2. Distribution to people of other organizations, both academic and commercial

The distribution of the strains is made through the Global Environmental Foram (GEF), and the ordering procedure is shown in the GEF Catalogues (April, 1991).

Strain Ordering Form

NIES use only
Date
Name
Number

Director,
Microbial Culture Collection,
The National Institute for Environmental Studies

Date

Orderer name

Orderer address

The following microbial culture strains are requested.

Scientific name and strain number :

Object of use (in detail) :

Need of strain data :

☐ YES (strain number)

☐ NO

Strain Receipt Form

NIES use only
Date
Name
Number

Director,
Microbial Culture Collection,
The National Institute for Environmental Studies

Date

Receipient's name

Receipient's address

Date received :

I received the following culture strains.

Scientific names and strain numbers :

States of received strains :

☐ Good (strain number)

☐ Poor (strain number)

☐ Others (strain number)

Comments :

IV. ESTABLISHMENT OF FRESH CULTURES

When investigators are to receive culture strains, the following steps should be observed to establish fresh cultures.

i) Appropriate culture media should be prepared before receipt according to the recipes given in Chap. VI and with reference to the basic methods for preparation given in Chap. V.

ii) Immediately after receipt, cultures should be unpacked, transferred to new media and grown at the temperature and light intensity directed by the Collection (cf. Chap. VIII); the light-dark cycle should be 12 hours light to 12 hours dark, and the screw-cap on the tube should be loosened.

iii) After detecting good growth, further maintenance of cultures requires transfer into new media at intervals suggested by the Collection (cf. Chap. VIII).

V. BASIC METHOD FOR PREPARATION OF ALGAL CULTURE MEDIA

A number of media are used for maintenance of algal cultures and prepared according to the recipes given in the next chapter. The present chapter introduces the basic methods for preparation adopted in the NIES-Collection.

1. Stock solutions

Media are generally composed of three components, macronutrients, trace metals and vitamins (cf. Table 2) and prepared from stock solutions of these components. The concentration of stock solutions of trace metals and vitamins is very low and primary stock solutions are prepared for dilution to obtain the stock solutions.

A. Macronutrients: Separate stock solutions with a concentration of 10 mg/ml of each macronutrient are prepared and stored in a refrigerator (5°C).

B. Trace metals: These elements are prepared either as separate stock solutions or mixed stock solutions.

(1) Separate stock solution

i) Prepare a separate primary solution with a concentration of 10 - 100 mg/ml.

ii) Dilute each primary solution to prepare the stock solution with a concentration of 1 mg/ml and store in a refrigerator (5°C).

Table 2. Chemicals employed in media

Macronutrients	Trace metals
NaCl	H_3BO_3
KCl	$MnCl_2 \cdot 4H_2O$
$CaCl_2 \cdot 2H_2O$	$MnSO_4 \cdot 7H_2O$
$MgCl_2 \cdot 6H_2O$	$FeCl_3 \cdot 6H_2O$
Na_2SO_4	$FeSO_4 \cdot 7H_2O$
K_2SO_4	$CoCl_2 \cdot 6H_2O$
$MgSO_4 \cdot 7H_2O$	$ZnSO_4 \cdot 7H_2O$
$NaNO_3$	$CuSO_4 \cdot 5H_2O$
KNO_3	$Na_2MoO_4 \cdot 2H_2O$
$Ca(NO_3)_2 \cdot 4H_2O$	**Vitamins**
NH_4NO_3	Vitamin B_{12}
$NaH_2PO_4 \cdot 2H_2O$	Biotin
β-Na_2 glycerophosphate	Thiamine HCl
KH_2PO_4	Nicotinic acid
K_2HPO_4	Calcium panthothenate
Na_2CO_3	ρ-Aminobenzoic acid
$NaHCO_3$	Inositol
$Na_2SiO_3 \cdot 9H_2O$	Folic acid
	Thymine

(2) Mixed stock solution

i) Same as (1) - i)

ii) Add approximately 80% of the required volume of distilled water to a beaker.

iii) Dissolve the required amount of Na_2EDTA ,while stirring continuously.

iv) Dispense the required volume of each trace metal from primary solution, while stirring continuously.

v) Dilute to final volume with distilled water and store in a refrigerator (5°C).

C. Vitamins: Only three vitamins, vitamin B_{12}, biotin, and thiamine HCl have been found necessary for growth of many microalgae and are added to most media. Some media, in addition, contain other vitamins.

(1) Vitamin B_{12}, biotin and thiamine HCl

i) Prepare separate primary stock solution with a concentration of 0.1 mg/ml of vitamin B_{12} and biotin and 10 mg/ml of thiamine HCl.

ii) After dispersing 1 ml of these primary stock solution into each of a number of test tubes and autoclaving (121°C, 20 min), store in a freezer at -20°C.

iii) Thaw and dilute 1 ml of primary stock solution of each vitamins to prepare the working stock solution with a concentration of 1 μg/ml of

vitamin B_{12} and biotin and of 100 μg/ml of thiamine HCl and store in a refrigerator (5°C).

(2) Other vitamins: Additional vitamins are added to some media in the forms of mixes (cf. Chap. VI-46). It is recommended to prepare a large volume of mixed stock solution.

i) Prepare a separate primary solution with a concentration of 0.1-1 mg/ml.
ii) Add approximately 80% of the required volume of distilled water to a beaker.
iii) Dispense the required volume of each vitamin from the primary solution, while stirring continuously.
iv) After sterilization by passing through a Millipore filter (0.22 μm), aseptically dispense 100 ml of the mixed stock solution into each of a number of vessels and store in a freezer at -20°C.

2. Media

Media are divided broadly into two categories, synthetic and enriched. The former are used for maintenance of all freshwater algal cultures and some marine ones and the latter for most marine ones.

(1) Synthetic medium (freshwater)

i) Add approximately 80–90% of the required volume of distilled water to a beaker.
ii) Dissolve appropriate quantities of weighed buffer such as Tris (hydroxymethyl) aminomethane (known as Tris), glycylglycine, HEPES, TAPS, Bicine, MES or 1,2,3,4-cyclopentan tetracarboxylic acid (if required), while stirring continuously. These buffers are easily soluble with stirring.
iii) Dispense the appropriate nutrients from previously prepared stock solutions, while stirring continuously.
iv) Dilute to final volume with distilled water.
v) Check the pH and make any adjustments with either 1N HCl or 1N NaOH (if buffers required) or with either 0.1N HCl or 0.1 N NaOH (if no buffers required).
vi) Dispense 10 ml of medium into each of the test tube (18 x 150 mm) and sterilize by autoclaving (121°C, 20 min).

(2) Synthetic medium (marine)

i) Add approximately 80% of the required volume of distilled water to a beaker.
ii) Dissolve appropriate quantities of weighed Tris, Nitrilotriacetic acid (known as NTA) and major salts such as NaCl, $MgSO_4$, KCl and $CaCl_2$, while stirring continuously.
iii) Dispense the other nutrients from previously prepared stock solutions.
iv) Dilute to the final volume with the distilled water.

v) Check the pH, which is usually adjusted to 8.0 with 1N HCl.
vi) Dispense 10 ml of medium into each of the test tubes and sterillize by autoclaving (121°C, 20 min).

(3) Enriched seawater medium

i) Collect offshore water free from gross pollution and remove particulate matter with Whatman GF/C filters.
ii) Check the salinity. A salinity of 35 ‰ is considered normal seawater.
iii) Add approximately 80–90% of the required volume of seawater to a beaker.
iv) Dissolve appropriate quantities of weighed Tris (if required).
v) Dispense the appropriate nutrients from previously prepared stock solutions.
vi) Dilute to the final volume with seawater.
vii) Check the pH and adjust to 8.0 with 1N HCl if necessary.
viii) Dispense 10 ml of medium into each test-tube and sterilize by autoclaving (121° C, 20 min).

3. Agar slant

Agar is added usually at concentrations of 1.5% after liquid medium has been prepared, prior to autoclaving.

i) Add the appropriate quantities of weighed agar to liquid medium and heat to 121°C by autoclaving to melt all the agar.
ii) After melting, quickly dispense 10 ml of agar medium into each test-tube and sterilize by autoclaving (121°C, 20 min).
iii) After sterilization, lay the upper part of the test-tube on a rod (1 $cm\phi$) and cool to form an agar slant.

VI. MEDIA

1. Stock media for algae

1. AF-6 (65)[1]

$NaNO_3$	14	mg
NH_4NO_3	2.2	mg
$MgSO_4 \cdot 7H_2O$	3	mg
KH_2PO_4	1	mg
K_2HPO_4	0.5	mg
$CaCl_2 \cdot 2H_2O$	1	mg
$CaCO_3$[2]	1	mg
Fe-citrate	0.2	mg
Citric acid	0.2	mg
Biotin	0.2	μg
Thiamine HCl	1	μg
Vitamin B_6	0.1	μg
Vitamin B_{12}	0.1	μg
Trace metals[2]	0.5	ml
Distilled water	99.5	ml
pH 6.6[3]		

1) Reference number in parentheses.
2) In the NIES-Collection, $CaCO_3$ is removed and PIV metals are used instead of trace metals.
3) pH is adjusted to 6.6 by buffering with 40 mg MES.

2. C (43)

$Ca(NO_3)_2 \cdot 4H_2O$	15	mg
KNO_3	10	mg
β-Na_2 glycerophosphate	5	mg
$MgSO_4 \cdot 7H_2O$	4	mg
Vitamin B_{12}	0.01	μg
Biotin	0.01	μg
Thiamine HCl	1	μg
PIV metals[1]	0.3	ml
Tris (hydroxymethyl) aminomethane	50	mg
Distilled water	99.7	ml
pH 7.5		

1) See 50

3. CA (53)

$Ca(NO_3)_2 \cdot 4H_2O$	2	mg
KNO_3	10	mg
NH_4NO_3	5	mg
β-Na_2 glycerophosphate	3	mg
$MgSO_4 \cdot 7H_2O$	2	mg
Vitamin B_{12}	0.01	μg
Biotin	0.01	μg
Thiamine HCl	1	μg
PIV metals[1]	0.1	ml
Fe (as EDTA; 1:1 molar)[2]	0.1	mg
HEPES	40	mg
Distilled water	99.9	ml
pH 7.2		

1) See 50
2) See 46

4. CAM

CA medium with pH adjusted to 6.5 by buffering with MES instead of HEPES.

5. Carefoot (4)

$NaNO_3$	247	mg
$CaCl_2 \cdot 2H_2O$	11	mg
$MgSO_4 \cdot 7H_2O$	47	mg
K_2HPO_4	9	mg
KH_2PO_4	23	mg
NaCl	15	mg
PIV metals[1]	5	ml
Distilled water	995	ml
pH	7.5	

* In the NIES-Collection, 0.02 μg Vitamin B_{12}, 0.02 μg Biotin and 2 μg Thiamine HCl are added to this medium.
1) See 50

6. CB

C medium with pH adjusted to 9.0 by buffering with Bicine instead of Tris (hydroxymethyl) aminomethane.

7. CC (48)

C medium with pH adjusted to 3.0 by buffering with 1, 2, 3, 4—cyclopentan tetracarboxylic acid instead of Tris (hydroxymethyl) aminomethane.

8. CSi

C medium with pH adjusted to 7.0 by buffering with 50 mg HEPES instead of Tris (hydroxymethyl) aminomethane. Thereafter, 10 mg $Na_2SiO_3 \cdot 9H_2O$ is added.

9. CSi+Cu

0.250 mg $CuSO_4 \cdot 5H_2O$ is added to CSi medium.

10. CT (169)

C medium with pH adjusted to 8.2 by buffering with 40 mg TAPS instead of Tris (hydroxymethyl) aminomethane.

11. CYT

10 mg Yeast extract and 20 mg Tryptone are added to C medium.

12. HUT (42)

KH_2PO_4	2	mg
$MgSO_4 \cdot 7H_2O$	2.5	mg
Sodium acetate	40	mg
Potassium citrate	4	mg
Polypeptone	60	mg
Yeast extract	40	mg
Vitamin B_{12}	0.05	μg
Thiamine HCl	0.04	mg
Distilled water	100	ml

pH 6.4

* Add 150 mg agar to 100 ml of the medium for semi - solid medium.

13. MA (45)

$Ca(NO_3)_2 \cdot 4H_2O$	5	mg
KNO_3	10	mg
$NaNO_3$	5	mg
Na_2SO_4	4	mg
$MgCl_2 \cdot 6H_2O$	5	mg
β-Na_2 glycerophosphate	10	mg
Na_2 EDTA	0.5	mg
$FeCl_3 \cdot 6H_2O$	0.05	mg
$MnCl_2 \cdot 4H_2O$	0.5	mg
$ZnCl_2$	0.05	mg
$CoCl_2 \cdot 6H_2O$	0.5	mg
$Na_2MoO_4 \cdot 2H_2O$	0.08	mg
H_3BO_3	2	mg
Bicine	50	mg
Distilled water	100	ml

pH 8.6

14. MAF - 6

10 mg Glucose and 10 mg Sodium acetate are added to AF-6 medium.

15. M Chu No. 10 (6)

$Ca(NO_3)_2 \cdot 4H_2O$	20	mg
KH_2PO_4	6.2	mg
$MgSO_4 \cdot 7H_2O$	25	mg
Na_2CO_3	20	mg
$Na_2SiO_3 \cdot 9H_2O$	25	mg
HCl (1N)[1]	0.25	ml
Na_2 EDTA $\cdot 2H_2O$	2	mg
$FeCl_3 \cdot 6H_2O$	1	mg
H_3BO_3	2.48	mg
$MnCl_2 \cdot 4H_2O$	1.39	mg
$(NH_4)_6Mo_7O_{24} \cdot 4H_2O$	1	mg
Vitamin B_{12}	10	μg
Thiamine HCl	1	μg
Biotin	1	μg
Distilled water	1	l

1) In the NIES - Collection, the pH of the medium is adjusted to 7.6 with 1 N HCl instead of 0.25 ml HCl (1N).

16 . MDM (147)

KNO_3	0.1	g
$MgSO_4 \cdot 7H_2O$	25	mg
K_2HPO_4	25	mg
NaCl	10	mg
$CaCl_2 \cdot 2H_2O$	1	mg
Fe solution [1]	0.1	ml
A_5 solution [2]	0.1	ml
Agar	1.5	g
Distilled water	99.8	ml
pH 8.0		

1) See 47
2) See 44

17 . MG (44)

$Ca(NO_3)_2 \cdot 4H_2O$	2	mg
KNO_3	10	mg
β-Na_2 glycerophosphate	3	mg
$MgSO_4 \cdot 7H_2O$	2	mg
Vitamin B_{12}	0.01	μg
Biotin	0.01	μg
Thiamine HCl	1	μg
PIV metals [1]	0.1	ml
Fe (as EDTA; 1:1 molar) [2]	0.1	mg
HEPES	40	mg
Distilled water	99.9	ml
pH 7.2		

1) See 50
2) See 46

18 . MGM

MG medium with pH adjusted to 6.5 by buffering with MES instead of HEPES.

19 . P 35 (45)

NH_4NO_3	10	mg
$MgSO_4 \cdot 7H_2O$	4	mg
KCl	5	mg
$CaCl_2 \cdot 2H_2O$	7.4	mg
β-Na_2 glycerophosphate	5	mg
Sodium acetate	100	mg
Vitamin B_{12}	0.01	μg
Biotin	0.01	μg
Thiamine HCl	1	μg
PIV metals [1]	0.3	ml
Tris (hydroxymethyl) aminomethane	50	mg
Distilled water	99.7	ml
pH 8.0		

1) See 50

20 . MW (125)

Urea	8.5	mg
$NaNO_3$	1.7	mg
NH_4Cl	0.425	mg
$Ca(NO_3)_2 \cdot 4H_2O$	100	mg
$CaCO_3$	10	mg
$CaCl_2 \cdot 2H_2O$	14	mg
KNO_3	10	mg
$KHCO_3$	9	mg
β-Na_2 Glycerophosphate	20	mg
$MgSO_4 \cdot 7H_2O$	15	mg
PIV metals [1]	0.5	ml
Vitamin B_{12}	0.2	μg
Thiamine HCl	20	μg
Biotin	0.2	μg
Glycylglycine	100	mg
Distilled water	999.5	ml
pH 7.2		

1) See 50

21. MW / 5

MW medium is diluted with distilled water to 1/5.

22. URO (85)

NH_4NO_3	2.5	mg
β-Na_2 glycerophosphate	2	mg
$MgSO_4 \cdot 7H_2O$	5	mg
$CaCl_2 \cdot 2H_2O$	5	mg
KCl	0.5	mg
Thiamine HCl	5	μg
Vitamin B_{12}	0.05	μg
Biotin	0.05	μg
Fe-EDTA	0.25	mg
PIV metals [1]	0.5	ml
Distilled water	499.5	ml
pH 7.5		

1) See 50
2) The pH of the medium is adjusted to 7.5 with 0.1 N HCl.

23. VT (124)

$Ca(NO_3)_2 \cdot 4H_2O$	11.78	mg
β-Na_2 glycerophosphate	5	mg
$MgSO_4 \cdot 7H_2O$	4	mg
KCl	5	mg
Vitamin B_{12}	0.01	μg
Biotin	0.01	μg
Thiamine HCl	1	μg
PIV metals [1]	0.3	ml
Glycylglycine	50	mg
Distilled water	99.7	ml
pH 7.5		

1) See 50

24. VTAC (107)

20 mg Sodium acetate is added to VT medium.

25. VTYT (49)

10 mg Yeast extract and 20 mg tryptone are added to VT medium.

26. W (168)

$Ca(NO_3)_2 \cdot 4H_2O$	10	mg
KNO_3	1	mg
$MgSO_4 \cdot 7H_2O$	1.5	mg
β-Na_2 glycerophosphate	2	mg
Urea	1.7	mg
Thiamine HCl	0.2	μg
Vitamin B_{12}	0.002	μg
Biotin	0.002	μg
PIV metals [1]	0.05	ml
Glycylglycine	10	mg
Distilled water	99.95	ml
pH 7.5		

1) See 50

27. SW (120)

A small amount of dried soil is put into a test tube, and 20 ml distilled water is added.

28. SOT (104)

$NaHCO_3$	1.68	g
K_2HPO_4	50	mg
$NaNO_3$	0.25	g
K_2SO_4	0.1	g
NaCl	0.1	g
$MgSO_4 \cdot 7H_2O$	20	mg
$CaCl_2 \cdot 2H_2O$	4	mg
$FeSO_4 \cdot 7H_2O$	1	mg
Na_2EDTA	8	mg
A_5 solution [1]	0.1	ml
Distilled water	99.9	ml

1) See 44

29 . ESM (109)

$NaNO_3$	120	mg
K_2HPO_4	5	mg
Vitamin B_{12}	1	μg
Biotin	1	μg
Thiamine HCl	100	μg
Fe-EDTA	259	μg
Mn-EDTA	332	μg
Tris (hydroxymethyl) aminomethane	1	g
Soil extract[1]	50	ml
Seawater	950	ml
pH 8.0		

1) See 53

30 . f / 2 (28)

$NaNO_3$	75	mg
$NaH_2PO_4 \cdot 2H_2O$	6	mg
Vitamin B_{12}	0.5	μg
Biotin	0.5	μg
Thiamine HCl	100	μg
$Na_2SiO_3 \cdot 9H_2O$	10	mg
f/2 metals[1]	1	ml
Seawater	999	ml

1) See 48

31 . M-ASP7 (179)

NaCl	25	g
$MgSO_4 \cdot 7H_2O$	9	g
KCl	0.7	g
$CaCl_2 \cdot 2H_2O$	0.3	g
$NaNO_3$	50	mg
$NaH_2PO_4 \cdot 2H_2O$	20	mg
Vitamin B_{12}	1	μg
Vitmin mix S_3[1]	10	ml
$Na_2SiO_3 \cdot 9H_2O$	10	mg
P_N metals[2]	30	ml
Tris (hydroxymethyl) aminomethane	1	g
NTA	70	mg
Distilled water	960	ml
pH8.0		

1) See 52
2) See 51

32 . MF

f/2 medium with $Na_2SiO_3 \cdot 9H_2O$ replaced by 10 ml soil extract and adjusted to pH 8.0 by buffering with 1g Tris (hydroxymethyl) aminomethane.

33 . MKM (147)

KNO_3	75	mg
KH_2PO_4	2.5	mg
$MgSO_4 \cdot 7H_2O$	2	mg
Fe-citrate	250	μg
Agar	1.5	g
Seawater	50	ml
Distilled water	50	ml

34 . WESM

ESM medium with 950 ml seawater replaced by 850 ml seawater and 100 ml distilled water.

2. Bacteria-free check media

For freshwater algae

35 . YT (48)

Stock medium	1	l
Yeast extract	0.1	g
Tryptone	0.2	g

36 . B - I (54)

Stock medium	1	l
Proteose peptone	1	g

37 . B - II (54)

Stock medium	1	l
Yeast extract	5	g

38 . B - III (54)

Stock medium	1	l
Peptone	5	g
Beef extract	3	g

39 . B - IV (54)

Stock medium	1	l
Glucose	1	g
Peptone	1	g

40 . B - V (54)

Stock medium	1	l
Sodium acetate	0.5	g
Glucose	0.5	g
Tryptone	0.5	g
Yeast extract	0.3	g

For marine algae

41 . STP (123)

$NaNO_3$	20	mg
K_2HPO_4	1	mg
Sodium glutamate	50	mg
Glucose	20	mg
Glycine	10	mg
D, L-Alamine	10	mg
Vitamin mix 8 [1]	0.1	ml
Trypticase	20	mg
Yeast autolysate [2]	20	mg
Sucrose	100	mg
Soil extract [3]	5	ml
Seawater	80	ml
Distilled water	15	ml

pH 7.5

1) In NIES - Collection, Vitamin mix 8 is replaced by *Vitamin mix* S_3.
2) In NIES - Collection, Yeast autolysate is replaced by Yeast extract.
3) See 53

42 . MM 23 (M. Tatewaki, pers. comm.)

NaCl	1.8	g
$MgSO_4 \cdot 7H_2O$	0.5	g
KCl	60	mg
$NaNO_3$	100	mg
$CaCl_2 \cdot 2H_2O$	36.7	mg
K_2HPO_4	6	mg
Sucrose	0.4	g
PII metals [1]	2	ml
$FeCl_3 \cdot 6H_2O$	48	μg
Thiamine HCl	10	μg
Biotin	0.1	μg
Vitamin B_{12}	0.2	μg
C-Source Mix II [2]	1	ml
Tris (hydroxymethyl) aminomethane	100	mg
Distilled water	97	ml

pH 8.0

1) See 49
2) See 45

43 . Bf / 2 (196)

f/2 medium [1]	1	l
Trypticase	0.5	g
Yeast extract	0.05	g

1) In NIES-Collection, ASP7 is replaced by f / 2 medium.

3. Trace metals, vitamin mixes and soil extract

44 . A_5 solution (40)

H_3BO_3	286	mg
$MnSO_4 \cdot 7H_2O$	250	mg
$ZnSO_4 \cdot 7H_2O$	22.2	mg
$CuSO_4 \cdot 5H_2O$	7.9	mg
$Na_2MoO_4 \cdot 2H_2O$	2.1	mg
Distilled water	100	ml

45 . C - Source Mix II (M. Tatewaki, pers. comm.)

Glycine	100	mg
D,L - Alanine	100	mg
L - Aspargine	100	mg
Sodium acetate $\cdot 3H_2O$	200	mg
Glucose	200	mg
L - Glutamic acid	200	mg
Distilled water	100	ml

46 . Fe (as EDTA;1:1 molar) (122)

$Fe(NH_4)_2(SO_4)_2 \cdot 6H_2O$	351	mg
Na_2 EDTA $\cdot 2H_2O$	330	mg
Distilled water	500	ml

* 1 ml of this solution contains 0.1 mg Fe.

47 . Fe solution (48)

$FeSO_4 \cdot 7H_2O$	1	mg
Distilled water	500	ml
Conc $\cdot H_2SO_4$	2	drops

48 . f / 2 metals (28)

$Na_2EDTA \cdot 2H_2O$	4.4	g
$FeCl_3 \cdot 6H_2O$	3.16	g
$CoSO_4 \cdot 7H_2O$	12	mg
$ZnSO_4 \cdot 7H_2O$	21	mg
$MnCl_2 \cdot 4H_2O$	180	mg
$CuSO_4 \cdot 5H_2O$	7	mg
$Na_2MoO_4 \cdot 2H_2O$	7	mg
Distilled water	1	l

49 . PII metals (121)

H_3BO_3	114	mg
$FeCl_3 \cdot 6H_2O$	4.9	mg
$MnSO_4 \cdot 4H_2O$	16.4	mg
$ZnSO_4 \cdot 7H_2O$	2.2	mg
$CoSO_4 \cdot 7H_2O$	480	μg
$Na_2EDTA \cdot 2H_2O$	100	mg
Distilled water	100	ml

50 . PIV metals (124)

$FeCl_3 \cdot 6H_2O$	19.6	mg
$MnCl_2 \cdot 4H_2O$	3.6	mg
$ZnSO_4 \cdot 7H_2O$ [1]	2.2	mg
$CoCl_2 \cdot 6H_2O$	0.4	mg
$Na_2MoO_4 \cdot 2H_2O$	0.25	mg
$Na_2EDTA \cdot 2H_2O$	100	mg
Distilled water	100	ml

1) In NIES-Collection, $ZnCl_2$ is replaced by $ZnSO_4 \cdot 7H_2O$.

51 . P_N metals (179)

$Na_2EDTA \cdot 2H_2O$	1	g
H_3BO_3	1.13	g
$FeCl_3 \cdot 6H_2O$	63	mg
$CoSO_4 \cdot 7H_2O$	0.93	mg
$ZnSO_4 \cdot 7H_2O$	46.6	mg
$MnCl_2 \cdot 4H_2O$	32	mg
Distilled water	*1*	*l*

52 . Vitamin mix S_3 (121)

Thiamine HCl	50	mg
Nicotinic acid	10	mg
Calcium pantothenate	10	mg
p - Aminobenzoic acid	*1*	mg
Biotin	0.1	mg
Inositol	500	mg
Folic acid	0.2	mg
Thymine	300	mg
Distilled water	1	l

53 . Soil extract (123)

1 kg soil combined with 1 liter distilled water is heated for 2h and then cooled. The supernatant is passed through a GF/C filter and then *distilled water added until there is a total of 1* liter.

4 . Stock medium for protozoa

54 . LE

L Solution: White part of lettuce is dried at 90°C for 1 h without scorching. 3 g of the dried lettuce is added to 1 liter boiling water (9 : 1 distilled *water / tap water) and boiled for 30 minutes,* while stirring. The supernatant is passed through cottonwool.

E solution: 3 g *of crushed yolk of hardboiled* egg is added to 1 liter water (9 : 1 distilled water / tap water) and boiled for 30 minutes, *while stirring. The supernatant is passed through* cottonwool.

Equal quantities of L and E solutions are mixed. *The pH is adjusted to 6.8 with 1 N NaOH. 100* ml of the solution is dispensed into each 200 ml - Erlenmayer flasks and sterilized by autoclaving *(120°C, 15 min).*

VII. 保存株リストの利用法

系統保存株の学名はアルファベット順に並べてあり，学名が同じ場合は株番号順に並べてある。同定者が記載されていない限り，学名は原則として分離者によってつけられたものである。また，株番号は，数字の前にNIES-をつけて使用することとし(例：NIES-1)，株の学名が命名法などの変更で変わった場合や，やむをえない理由で消失した場合にも変更したり付け変えたりしないものとする。

個々の項目についての説明は下記の例を参照されたい。

Achnanthes minutissima Kützing[1)]

71[2)] Kosaka River/Akita[3)] (1983-04)[4)]
B-29[5)], Axenic, Clonal,[6)] A. Yuri[7)] (1983-09)[8)]
Identified by: M. Mizuno[9)]
Culture conditions: CSi, 20°C, 3000 lx, 1 M (25°C, 3000 lx)[10)]
Characteristics: Indicator, Freshwater[11)]
A15-6 (Yuri)[12)]
References: 140, 141[13)]

1) 学名と原著者名：原著者名は学名の後に記した。
2) 株番号：数字の前にNIES-を付けて使用すること。
3) 採集地
4) 採集年月
5) 他の保存機関に保存されている場合の株名，( )内は保存機関名，IAMは東京大学応用微生物研究所，TACは国立科学博物館筑波実験植物園である。
6) 株の状態
7) 分離者
8) 分離年月
9) 同定者（分離者と異なる場合のみ記した）
10) 保存条件：培地名，保存温度，保存照度，保存期間。明暗周期は12時間明12時間暗に設定されている。培地は，特に記さない限り液体である。軟寒天培地：SS，寒天斜面培地：S，二相培地：Biの場合は，略号を( )内に記した。また，( )内の温度，照度は前培養が必要な場合，その条件である。
11) 株の性質

unstable；保存状態が不安定で，永続的な維持が困難である株

untransportable；長期間の（航空便での）郵送では，生存状態で受けとるのが困難である株

12）分離者等の使用している株名

13）参考文献の番号

VII. EXPLANATORY NOTES ABOUT THE LIST

The strains are listed by genus and species in alphabetical order. Strains under the same species are given in the order of their strain numbers. The scientific name of each strain was designated by the isolator, unless the identifier was noted. The number assigned to a strain remains the same, regardless of any change in nomenclature. The strain number should be used with the initials "NIES-". A detailed example of a strain description is presented below.

Achnanthes minutissima	Kützing[1]
71[2]	Kosaka River/Akita[3] (1983-04)[4]
	B-29 (IAM),[5] Axenic, Clonal,[6] A. Yuri[7] (1983-09)[8]
	Identified by: M. Mizuno[9]
	Culture conditions: CSi, 20°C, 3000 lx, 1M, (25°C, 3000 lx)[10]
	Characteristics: Indicator, Freshwater[11]
	A15-6 (Yuri)[12]
	References: 140, 141[13]

1) Scientific name with author(s)
2) Strain number. The number should be used with the collection initials "NIES-", e.g. NIES-71.
3) Collection site
4) Collection date
5) The strain designations in the other culture collections with the abbreviation of the collections or institutions in parentheses.
   IAM : Institute of Applied Microbiology, University of Tokyo
   TAC : Tsukuba Botanical Garden, National Science Museum
6) State of the strain
7) Isolator
8) Isolation date
9) Identifier, who is described in only the case of different person from isolator.
10) Culture condition for maintenance: medium*, temperature, light intensity and duration of subculturing**. The light-dark cycle is defined as12 hours light and 12 hours dark.
    * Unless otherwise noted the phase of the medium is liquid.
      The abbreviation in parentheses are SS for semi-solid, S for solid and Bi for biphasic.
    ** Preculture temperature and light intensity are given in parenthese when preculture is required.

11) Characteristics of the strain
"Unstable" indicates that the strain probably cannot be maintained indefinitely, for various reasons including unsuccessful induction of auxospore formation and germination in diatom.
"Untransportable" indicates that the strain is not robust enough to be sent by air mail, involving much time.

12) Strain designation given by the isolator.

13) Reference number. Reference corresponding to the number is listed in pp. 150 ~ 162.

VIII. LIST OF STRAINS

ALGAE

Achnanthes lanceolata Brébisson

406 Miyata River / Ibaraki (1987-04)
Unialgal, F.Kasai (1987-04)
Identified by: N.Takamura
Culture conditions: M Chu No.10, 15°C, 1500 lx, 2M
Characteristics: Freshwater
3st-0-28
References: 133, 134

Achnanthes longipes Agardh

330 Kawazu / Shizuoka (1985-05)
Unialgal, Clonal, T.Sawaguchi (1985-05)
Culture conditions: f/2, 10°C, 2000 lx, 1M
Characteristics: Marine

Achnanthes minutissima Kützing

71 Kosaka River / Akita (1983-04)
Axenic, Clonal, A.Yuri (1983-09)
Identified by: M.Mizuno
Culture conditions: CSi, M Chu No.10, 20°C, 3000 lx, 1M
Characteristics: Indicator, Freshwater
References: 115, 133, 134, 181, 182

407 Miyata River / Ibaraki (1987-05)
Unialgal, F.Kasai (1987-06)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
4st-0-8
Reference: 134

408 Ashio / Gunma (1987-08)
Clonal, F.Kasai (1987-09)
Identified by: M.Idei
Culture conditions: CSi, 15°C, 1500 lx, 2M

Characteristics: Freshwater
AT5-23
Reference: 134

409 Ashio / Gunma (1987-08)
Clonal, F.Kasai (1987-08)
Identified by: M.Idei
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
Ast-3-3
Reference: 134

410 Watarase River / Gunma (1987-08)
Unialgal, F.Kasai (1987-09)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
AT4-18
Reference: 134

411 Miyata River / Ibaraki (1987-02)
Unialgal, F.Kasai (1987-03)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
1st-3-17
References: 133, 134

412 Miyata River / Ibaraki (1987-02)
Unialgal, F.Kasai (1987-03)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
1St-1-1
References: 133, 134

413 Miyata River / Ibaraki (1987-02)
Unialgal, F.Kasai (1987-03)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
1st-2-8

References: 133, 134

414 Ooe River(Ozegahara) / Fukushima (1987-10)
Unialgal, F.Kasai (1987-11)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
0-25
Reference: 134

Achnanthes minutissima var. ***saprophila*** Kobayashi et Mayama
372 Lake Kasumigaura / Ibaraki (1985-12)
Axenic, Clonal, T.Sawaguchi (1985-12)
Identified by: M.Idei
Culture conditions: CSi, M Chu No.10, 20°C, 3000 lx, 1M
Characteristics: Indicator, Freshwater

Actinastrum hantzschii Lagerheim
415 Lake Kasumigaura / Ibaraki (1983-07)
Unialgal, Clonal, F.Kasai (1983-07)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

Amphidinium britannicum (Herdman) Lebour
405 Hasaki / Ibaraki (1987-05)
Unialgal, Clonal, T.Sawaguchi (1987-05)
Culture conditions: ESM, 20°C, 3000 lx, 1M
Characteristics: Benthic, Marine, Untransportable

Amphidinium carterae Hulburt
331 Iriomote Isl. / Okinawa (1986-01)
Axenic, Clonal, T.Sawaguchi (1986-02)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Marine, Unstable, Untransportable

Anabaena affinis Lemmermann

40 Lake Kasumigaura / Ibaraki (1974-08)
M-168(IAM), Unialgal, Clonal, M.M.Watanabe (1974-08)
Culture conditions: CT, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Freshwater, Unstable
References: 48, 173, 193

Anabaena circinalis Rabenhorst

41 Lake Kasumigaura / Ibaraki (1974-08)
M-169(IAM), Unialgal, Clonal, M.M.Watanabe (1974-08)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Freshwater, Unstable
References: 48, 173

Anabaena cylindrica Lemmermann

19 M-1(IAM), Axenic
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater, Nitrogen fixation
References: 1, 2, 14, 18, 20, 21, 22, 23, 24, 25, 26, 27, 36, 48, 84, 105, 106, 107, 108, 117, 118, 119, 132, 138, 147, 154, 173, 188, 189, 190, 191, 192, 193

Anabaena flos-aquae f. *flos-aquae* Brébisson ex Bornet et Flahault

73 Lake Kasumigaura / Ibaraki (1978-08)
32(TAC), Unialgal, Clonal, M.Watanabe (1978-08)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater, Unstable
Reference: 173

74 Lake Kasumigaura / Ibaraki (1978-08)
33(TAC), Unialgal, Clonal, M.Watanabe (1978-08)
Culture conditions: CT, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater, Unstable
Reference: 173

75 Lake Kasumigaura / Ibaraki (1978-12)
43(TAC), Unialgal, Clonal, M.Watanabe (1978-12)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater, Unstable
Reference: 173

Anabaena solitaria f. ***solitaria*** Klebahn

80 Lake Kasumigaura / Ibaraki (1978-12)
42(TAC), Unialgal, Clonal, M.Watanabe (1978-12)
Culture conditions: CB, 25°C, 1500 lx, 20D
Characteristics: Water bloom, Freshwater, Unstable
Reference: 173

Anabaena spiroides Klebahn

76 Lake Kasumigaura / Ibaraki (1983-06)
Axenic, Clonal, S.Suda (1983-06)
Culture conditions: CT, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater, Unstable
K-A-12
Reference: 173

Anabaena spiroides f. ***crassa*** (Lemmermann) Elenkin

78 Lake Kasumigaura / Ibaraki (1978-07)
30(TAC), Unialgal, Clonal, M.Watanabe (1978-07)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater, Unstable

Anabaena spiroides f. ***spiroides*** Klebahn

77 Lake Kasumigaura / Ibaraki (1978-08)
31(TAC), Unialgal, Clonal, M.Watanabe (1978-08)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater, Unstable
Reference: 173

79 Lake Kasumigaura / Ibaraki (1978-07)
28(TAC), Unialgal, Clonal, M.Watanabe (1978-07)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater, Unstable

263 Lake Kasumigaura / Ibaraki (1978-07)
27(TAC), Unialgal, Clonal, M.Watanabe (1978-07)
Culture conditions: CT, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Freshwater, Unstable

Anabaena variabilis Kützing
23 M-2(IAM), Unialgal
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater, Non-heterocystous variant
References: 2, 9, 10, 11, 24, 25, 26, 48, 132, 139, 147

Anabaenopsis circularis (G.S.West) Woloszynska et Miller
21 M-4(IAM), Unialgal, A.Watanabe
Identified by: Hirano
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 2, 48, 84, 147, 153, 173

Aphanizomenon flos-aquae f. ***gracile*** (Lemmermann) Elenkin
81 Lake Kasumigaura / Ibaraki (1978-01)
1(TAC), Axenic, Clonal, M.Watanabe (1978-02)
Culture conditions: CB, 25°C, 1500 lx, 20D
Characteristics: Water bloom, Indicator, Freshwater, Unstable
Reference: 173

Aphanocapsa montana Cramer
416 Nikko / Tochigi (1987-04)
Unialgal, F.Kasai (1987-04)
Identified by: M.M.Watanabe
Culture conditions: CB, CSi+Cu, 20°C, 500 lx,

4M, (20°C, 1500 lx)
Characteristics: Freshwater
NK-24
Reference: 134

Asterionella glacialis Castracane

265 Matoya Bay / Mie (1984-09)
Unialgal, Clonal, T.Sawaguchi (1984-09)
Culture conditions: f/2, 10°C, 2000 lx, 1M
Characteristics: Marine

417 Maizuru Bay / Kyoto (1985-10)
Unialgal, Clonal, C.E.Riquelme (1985-10)
Culture conditions: f/2, 15°C, 2000 lx, 1M
Characteristics: Marine

Astrephomene gubernaculifera Pocock

418 Kaisei / Kanagawa (1981)
Axenic, Clonal, H.Nozaki (1981-05)
Culture conditions: VTAC, 20°C, 1000 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type -

419 Kaisei / Kanagawa (1981)
Axenic, Clonal, H.Nozaki (1981-05)
Culture conditions: VTAC, 20°C, 1000 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type +

Aulosira laxa Kirchner

50 Pusa / India
M-128(IAM), Unialgal, G.S.Venkataraman
Identified by: M.M.Watanabe
Culture conditions: MDM(S), 20°C, 500 lx, 4M,
(25°C, 3000 lx)
Characteristics: Freshwater, Nitrogen fixation
References: 48, 173

Brachiomonas submarina Bohlin

375 Hachinohe Harbor / Aomori (1986-08)
Axenic, Clonal, T.Sawaguchi (1986-08)

Culture conditions: ESM, 15°C, 2000 lx, 1M
Characteristics: Marine, Brackish

Cachonina niei Loeblich III

420 Iriomote Isl. / Okinawa (1986-01)
Axenic, Clonal, T.Sawaguchi (1986-02)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Marine, Untransportable

Calothrix brevissima G.S.West

22 Parao Isl. (1941-09)
M-7(IAM), Unialgal, A.Watanabe
Identified by: K.Negoro
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater, Nitrogen fixation, Chromatic adaptation
References: 48, 116, 147

Calothrix crustacea Thuret

266 Oshoro Bay / Hokkaido (1972-09)
M-171(IAM), Unialgal, Clonal, M.M.Watanabe (1972-09)
Culture conditions: f/2, MKM(S), 20°C, 500 lx, 6M, (20°C, 1500 lx)
Characteristics: Marine
References: 48, 167

Calothrix parasitica (Chauvin) Thuret

267 Oshoro Bay / Hokkaido (1972-07)
M-172(IAM), Unialgal, Clonal, M.M.Watanabe (1972-07)
Culture conditions: MKM(S), 20°C, 500 lx, 6M, (20°C, 1500 lx)
Characteristics: Marine, Endophytic
Reference: 48

334 Oshoro Bay / Hokkaido (1973-02)
M-173(IAM), Unialgal, Clonal, M.M.Watanabe (1973-02)
Culture conditions: MKM(S), 20°C, 500 lx, 6M, (20°C, 1500 lx)

Characteristics: Marine, Endophytic
Reference: 48

Calothrix scopulorum (Weber et Mohr) Agardh

268 Oshoro Bay / Hokkaido (1972-09)
M-174(IAM), Unialgal, Clonal, M.M.Watanabe (1972-09)
Culture conditions: f/2, MKM(S), 20°C, 500 lx, 6M, (20°C, 1500 lx)
Characteristics: Marine
References: 48, 167

Carteria obtusa Dill

428 Kashiwa / Chiba (1986-09)
Unialgal, Clonal, M.M.Watanabe (1986-09)
Identified by: S.Suda
Culture conditions: C, 20°C, 2000 lx, 2M
Characteristics: Freshwater

429 Tsuchiura / Ibaraki (1986-02)
Axenic, Clonal, S.Suda (1986-03)
Culture conditions: AF-6, 20°C, 2000 lx, 2M
Characteristics: Freshwater

430 Kashiwa / Chiba (1986-09)
Unialgal, Clonal, M.M.Watanabe (1986-09)
Identified by: S.Suda
Culture conditions: C, 20°C, 2000 lx, 2M
Characteristics: Freshwater

431 Tsuchiura / Ibaraki (1986-02)
Axenic, Clonal, S.Suda (1986-05)
Culture conditions: AF-6, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Carteria crucifera Korschikov in Pascher

421 Tsuchiura / Ibaraki (1986-02)
Axenic, Clonal, S.Suda (1986-05)
Culture conditions: CYT, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Carteria inversa (Korschikov) Bourrelly

422 Tsukuba / Ibaraki (1982-11)
Axenic, Clonal, F.Kasai (1982-11)
Identified by: S.Suda
Culture conditions: C, 20°C, 2000 lx, 3M
Characteristics: Freshwater

423 Higashihiroshima / Hiroshima (1983-08)
Unialgal, Clonal, M.Erata (1983-08)
Identified by: S.Suda
Culture conditions: C, 20°C, 2000 lx, 3M
Characteristics: Freshwater

424 Lake Kasumigaura / Ibaraki (1983-08)
Axenic, Clonal, S.Suda (1983-08)
Culture conditions: AF-6, 20°C, 2000 lx, 2M
Characteristics: Freshwater

425 Tsukuba / Ibaraki (1985-11)
Axenic, Clonal, S.Suda (1985-11)
Culture conditions: AF-6, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Carteria klebsii (Dangeard) France

426 Tsuchiura / Ibaraki (1986-02)
Unialgal, Clonal, S.Suda (1986-05)
Culture conditions: AF-6, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Carteria multifilis (Fresenius) Dill

427 Kashiwa / Chiba (1986)
Unialgal, Clonal, M.M.Watanabe (1986)
Identified by: S.Suda
Culture conditions: VT, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Carteria radiosa Korschikov

432 Tsukuba / Ibaraki (1985-11)
Axenic, Clonal, S.Suda (1985-11)
Culture conditions: AF-6, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Ceratium hirundinella (O.F.Müller) Schrank

376 Lake Hinuma / Ibaraki (1986-06)
Unialgal, Clonal, M.M.Watanabe (1986-06)
Culture conditions: URO, 20°C, 4000 lx, 1M
Characteristics: Brackish, Freshwater, Untransportable

Chaetoceros debile Cleve

270 Hachinohe Harbor / Aomori (1985-01)
Unialgal, Clonal, T.Sawaguchi (1985-01)
Culture conditions: f/2, 5°C, 2000 lx, 1M
Characteristics: Marine
Reference: 115

Chaetoceros sociale Lauder

377 Shitaru Harbor / Shizuoka (1985-05)
Unialgal, Clonal, T.Sawaguchi (1985-05)
Culture conditions: f/2, 5°C, 2000 lx, 20D
Characteristics: Marine

Chamaesiphon polymorphus Geitler

433 Lake Mashu / Hokkaido (1987-09)
Unialgal, F.Kasai (1987-09)
Identified by: M.M.Watanabe
Culture conditions: CSi, CSi+Cu, 10°C, 500 lx, 2M, (10°C, 1500 lx)
Characteristics: Freshwater
M-29
Reference: 134

Chamaesiphon subglobosus Lemmermann

434 Miyata River / Ibaraki (1987-03)
Unialgal, F.Kasai (1987-05)
Identified by: N.Takamura
Culture conditions: CSi, CSi+Cu, 20°C, 500 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater
2st-2-1
References: 133, 134

Characium maximum S.Watanabe

154 Sasebo / Nagasaki (1975-08)
Unialgal, S.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Soil
6-EBO-2(S.Watanabe)
Reference: 185

Characium polymorphum Printz

436 Between Ghorepani and Billethadi / Nepal (1965-12)
C-340(IAM), Unialgal, Clonal, T.Ichimura (1969-07)
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

Chattonella antiqua (Hada) Ono

1 Harima-Nada / Seto Inland Sea (1978-09)
Axenic, Clonal, M.M.Watanabe (1978-09)
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
Ho-1(M.M.Watanabe)
References: 37, 74, 76, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 101, 177

2 Osaka Bay / Osaka (1982-09)
Axenic, Clonal, S.Yamochi
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
Reference: 37

83 Off Hiketa / Seto Inland Sea (1977-08)
Axenic, Clonal, C.Ono
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
References: 37, 141

84 Off Hiketa / Seto Inland Sea (1972)
Axenic, Clonal, T.Okaichi
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
Reference: 37

85 Shodo Isl. / Kagawa (1978-07)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
References: 37, 38

86 Uranouchi Bay / Kochi (1980-11)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
References: 37, 38, 141

113 Naoshima Isl. / Kagawa (1982-07)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
Reference: 37

114 Harima-Nada / Seto Inland Sea (1983-08)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
References: 37, 187

161 Axenic, Clonal
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
HI-70(Takayama)
Reference: 29

Chattonella marina (Subrahmanyan) Hara et Chihara

3 Osaka Bay / Osaka (1982-08)
Axenic, Clonal, S.Yamochi (1982-08)
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
Reference: 141

14 Harima-Nada / Seto Inland Sea (1983-02)
Axenic, Clonal, M.M.Watanabe
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
References: 37, 187

115 Kinko Bay / Kagoshima (1978-06)
Axenic, Clonal, Aramaki/Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
Reference: 37

116 Harima-Nada / Seto Inland Sea (1981-07)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
Reference: 37

117 Naoshima Isl. / Kagawa (1983-07)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
Reference: 37

118 Harima-Nada / Seto Inland Sea (1983-07)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, 20°C, 4000 lx, 1M

Characteristics: Red tide, Marine,
Untransportable
References: 37, 38, 141

121 Kagoshima Bay / Kagoshima (1982)
Axenic, Clonal, T.Aramaki (1982)
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
References: 37, 38, 141

Chlamydomonas augustae var. ***ellipsoidea*** S.Watanabe

158 Sumatra / Indonesia (1979-08)
Axenic, Clonal, S.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M,
(25°C, 3000 lx)
Characteristics: Soil
ASE-242(S.Watanabe)
Reference: 185

Chlamydomonas fasciata Ettl

437 Tsukuba / Ibaraki (1984-05)
Unialgal, Clonal, S.Suda (1984-05)
Culture conditions: C, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Chlamydomonas monadina var. ***monadina*** Stein

438 Lake Kasumigaura / Ibaraki (1983-07)
Axenic, Clonal, S.Suda (1983-07)
Culture conditions: C, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Chlamydomonas monticola S.Watanabe

157 Mt. Shiroumadake / Nagano (1980-08)
Axenic, Clonal, S.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M,
(25°C, 3000 lx)
Characteristics: Soil
KUC80-4(S.Watanabe)
References: 115, 185

Chlamydomonas neglecta Korschikov in Pascher

439 Tsukuba / Ibaraki (1984-05)
Axenic, Clonal, S.Suda (1984-05)
Culture conditions: C, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Chlamydomonas parkeae Ettl

440 Izumi Bay / Nagasaki (1986-03)
Unialgal, Clonal, S.Suda (1986-03)
Culture conditions: f/2, 20°C, 2000 lx, 2M
Characteristics: Marine

441 Hachinohe Habor / Aomori (1985-01)
Unialgal, Clonal, S.Suda (1985-02)
Culture conditions: f/2, 20°C, 2000 lx, 2M
Characteristics: Marine

Chlamydomonas pulsatilla Wollenweber

122 Muroran / Hokkaido (1966-05)
C-385(IAM), Axenic, Clonal, T.Ichimura (1966-05)
Culture conditions: P35, 20°C, 500 lx, 2M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 48, 173

Chlorella pyrenoidosa Chick

226 C-28(IAM), Axenic, Clonal
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 48, 80, 135, 147

Chlorella vulgaris Beijerinck

227 C-30(IAM), Axenic, A.Watanabe
Identified by: H.Fukushima
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 48, 147

Chlorogonium metamorphum Skuja

123 Niseko / Hokkaido (1964-07)
C-349(IAM), Axenic, Clonal, T.Ichimura (1964-07)
Culture conditions: AF-6, 20°C, 500 lx, 2M, (25°C, 3000 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

446 Tsuchiura / Ibaraki (1985-04)
Axenic, Clonal, S.Suda (1985-04)
Culture conditions: C, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Chloromonas insignis (Anachin) Gerloff et Ettl

447 Lake Kasumigaura / Ibaraki (1983-08)
Axenic, Clonal, S.Suda (1983-08)
Culture conditions: C, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Chlorosarcinopsis caeca S.Watanabe

160 Tottori (1972-05)
Unialgal, S.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Soil
TOT-24(S.Watanabe)
Reference: 185

Chlorosarcinopsis delicata S.Watanabe

153 Kyoto / Kyoto (1975-04)
Axenic, Clonal, S.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Soil
KUC3-6(S.Watanabe)
Reference: 185

Closterium acerosum (Schrank) Ehrenberg ex Ralfs

124 Daramshara / Nepal (1965-10)
Axenic, Clonal, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 3M,

(20°C, 1500 lx)
Characteristics: Freshwater

125 Rukumkot / Nepal (1965-10)
Axenic, Clonal, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater

126 Muna / Nepal (1965-11)
Unialgal, Clonal, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater

127 Sapporo / Hokkaido
C-435(IAM), Axenic, Clonal, Y.Nishihama
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

Closterium acerosum (Schrank) Ehrenberg

448 C-314(UTEX 1075), Axenic, Clonal
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater
Reference: 48

Closterium aciculare var. ***subpronum*** W. et G.S.West

258 Lake Biwa / Shiga (1983-12)
Axenic, Clonal, M.M.Watanabe (1983-12)
Culture conditions: CA, 20°C, 6000 lx, 2M
Characteristics: Water bloom, Freshwater, Heterothallic, Mating type +

259 Lake Biwa / Shiga (1983-12)
Axenic, Clonal, M.M.Watanabe (1983-12)
Culture conditions: CA, 20°C, 6000 lx, 2M
Characteristics: Water bloom, Freshwater, Heterothallic, Mating type -

260 Lake Kasumigaura / Ibaraki (1983-11)
Unialgal, Clonal, F.Kasai (1983-11)
Identified by: M.M.Watanabe
Culture conditions: CA, 20°C, 6000 lx, 2M
Characteristics: Freshwater, Heterothallic, Mating type -

Closterium calosporum var. *calosporum* Wittrock

271 Vermont / U.S.A.
C-318(IAM), Unialgal, Clonal, P.W.Cook
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater
References: 48, 53, 156, 157

Closterium calosporum var. *galiciense* Gutwinski

128 Ibaraki
Axenic, Clonal, M.M.Watanabe
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -

162 Ibaraki
Unialgal, Clonal, M.M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 3M, (25°C, 1500 lx)
Characteristics: Freshwater, Heterothallic, Mating type +

163 Ginama / Okinawa (1973-06)
C-455(IAM), Axenic, Clonal, T.Ichimura (1973-10)
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -
R-5-3(Ichimura)
References: 53, 156, 157

164 Ginama / Okinawa (1973-06)
C-454(IAM), Unialgal, Clonal, T.Ichimura (1973-10)
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 3M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +
R-5-2(Ichimura)
References: 53, 156, 157

165 Iriomote Isl. / Okinawa (1973-03)
C-457(IAM), Axenic, Clonal, T.Ichimura (1973-10)
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (25°C, 1500 lx)
Characteristics: Freshwater, Heterothallic, Mating type +
R-11-6(Ichimura)
References: 53, 156, 157

166 Kagawacho / Kagawa (1974-09)
Unialgal, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -
J5-56-11(Ichimura)

167 Kagawacho / Kagawa (1974-09)
Unialgal, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +
J5-56-12(Ichimura)

168 Iriomote Isl. / Okinawa (1973-03)
Unialgal, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -
R-11-5(Ichimura)
References: 53, 156, 157

Closterium calosporum var. ***himalayense*** M.Watanabe

169 Shewaden / Nepal (1972-06)
Unialgal, Clonal, M.M.Watanabe
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
N-134-5(M.M.Watanabe)
References: 156, 157

170 Suke / Nepal (1972-06)
Unialgal, Clonal, M.M.Watanabe
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
N-143-19(M.M.Watanabe)

171 Suke / Nepal (1972-06)
Unialgal, Clonal, M.M.Watanabe
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
N-147-3(M.M.Watanabe)
References: 61, 156

336 Suke / Nepal (1972-06)
Axenic, Clonal, M.M.Watanabe
Identified by: M.Watanabe
Culture conditions: CA, 25°C, 1500 lx, 2M
Characteristics: Freshwater, Homothallic
N-147-12(M.M.Watanabe)

Reference: 156

Closterium ehrenbergii Meneghini ex Ralfs

228 Ebina / Kanagawa (1975-12)
Axenic, Clonal, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 3M, (25°C, 1500 lx)
Characteristics: Freshwater, Heterothallic, Mating type +, Mating group B
KK-33-1(Ichimura)
References: 46, 47, 49, 50, 52, 61

229 Ebina / Kanagawa (1975-12)
Axenic, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater, Heterothallic, Mating type -, Mating group B
KK-33-6(Ichimura)
References: 46, 47, 49, 50, 52, 61

Closterium gracile Brébisson ex Ralfs

179 Kathmandu / Nepal (1968-05)
C-444(IAM), Unialgal, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater, Heterothallic, Mating type +
Reference: 48

180 Kathmandu / Nepal (1968-05)
C-445(IAM), Unialgal, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater, Heterothallic, Mating type -
Reference: 48

Closterium incurvum Brébisson

181 Dhorpatan / Nepal (1965-11)
C-438(IAM), Unialgal, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 4M,

(20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

337 Nawakot / Nepal (1965-10)
Unialgal, T. Ichimura
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic

Closterium moniliferum var. ***moniliferum*** (Bory) Ehrenberg ex Ralfs

172 Unialgal
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic

173 Kitaadachigun / Saitama (1969-01)
C-432(IAM), Axenic, Clonal, T.Ichimura (1969-03)
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater, Homothallic
Reference: 143

174 Ghorepani / Nepal (1965-12)
Unialgal, Clonal, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater, Homothallic

Closterium moniliferum var. ***submoniliferum*** (Woronichin) Krieger

182 Kitaadachigun / Saitama (1969-01)
C-433(IAM), Axenic, Clonal, T.Ichimura (1969-03)
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater, Heterothallic, Mating type +
Reference: 48

183 Kitaadachigun / Saitama (1969-01)
C-434(IAM), Unialgal, Clonal, T.Ichimura (1969-03)
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater, Heterothallic, Mating type -
Reference: 48

Closterium navicula (Brébisson) Lütkemüller

175 Chingkhola / Nepal (1965-11)
C-443(IAM), Unialgal, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 3M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

176 Ghorepani / Nepal (1965-12)
Unialgal, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 3M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic

177 Billethadi / Nepal (1965-12)
Unialgal, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 3M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic

178 Shewaden / Nepal (1972-06)
Unialgal, Clonal, M.M.Watanabe (1974)
Culture conditions: CA, 20°C, 1000 lx, 3M, (20°C, 3000 lx)
Characteristics: Freshwater

Closterium peracerosum-strigosum-littorale complex

51 Katsuta / Ibaraki (1974-08)
Unialgal, Clonal, M.M.Watanabe (1974-08)
Culture conditions: CA, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +, Group II A

IB-4-2(M.M.Watanabe)
References: 167, 170, 171, 172

52 Katsuta / Ibaraki (1974-08)
Axenic, Clonal, M.M.Watanabe (1974-08)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -, Group II A
IB-4-9(M.M.Watanabe)
References: 167, 170, 171, 172

53 Katsuta / Ibaraki (1974-08)
Axenic, Clonal, M.M.Watanabe (1974-08)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +, Group II A
IB-6-8(M.M.Watanabe)
References: 167, 170, 171, 172

54 Katsuta / Ibaraki (1974-08)
Axenic, Clonal, M.M.Watanabe (1974-08)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -, Group II A
IB-6-9(M.M.Watanabe)
References: 167, 170, 171

55 Katsuta / Ibaraki (1975-05)
Axenic, Clonal, M.M.Watanabe (1975-05)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -, Group II C
IB-8-15(M.M.Watanabe)
References: 167, 170, 171

56 Katsuta / Ibaraki (1975-05)
Axenic, Clonal, M.M.Watanabe (1975-05)
Culture conditions: C, 15°C, 1000 lx, 4M,

(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -, Group II A
IB-8-24(M.M.Watanabe)
References: 115, 167, 170, 171

57 Katsuta / Ibaraki (1975-05)
Axenic, Clonal, M.M.Watanabe (1975-05)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +, Group II A
IB-8-25(M.M.Watanabe)
References: 115, 167, 170, 171

58 Mito / Ibaraki (1975-06)
Unialgal, Clonal, M.M.Watanabe (1975-06)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -, Group II A
IB-10-1(M.M.Watanabe)
References: 167, 170, 171

59 Mito / Ibaraki (1975-06)
Axenic, Clonal, M.M.Watanabe (1975-06)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +, Group II A
IB-10-2(M.M.Watanabe)
References: 167, 170, 171

60 Mito / Ibaraki (1975-06)
Axenic, Clonal, M.M.Watanabe (1975-06)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +, Group II B
IB-12-1(M.M.Watanabe)
References: 167, 170, 171

61 Mito / Ibaraki (1975-06)
Axenic, Clonal, M.M.Watanabe (1975-06)
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type -, Group II B
IB-12-2(M.M.Watanabe)
References: 167, 170, 171

62 Katsuta / Ibaraki (1975-06)
Axenic, Clonal, M.M.Watanabe (1975-06)
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type +, Goup II A
IB-13-1(M.M.Watanabe)
References: 167, 170, 171

63 Katsuta / Ibaraki (1975-06)
Unialgal, Clonal, M.M.Watanabe (1975-06)
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type -, Group II A
IB-13-2(M.M.Watanabe)
References: 167, 170, 171

64 Lake Kasumigaura / Ibaraki (1974-11)
Axenic, Clonal, M.M.Watanabe (1974-11)
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type -, Group II B
KAS-4-29(M.M.Watanabe)
References: 62, 63, 64, 99, 167, 170, 171, 172

65 Lake Kasumigaura / Ibaraki (1974-11)
Axenic, Clonal, M.M.Watanabe (1974-11)
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type +, Group II B
KAS-4-30(M.M.Watanabe)

References: 62, 63, 64, 99, 167, 170, 171, 172

66 Piuthan / Nepal (1965-10)
Unialgal, Clonal, T.Ichimura
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type +, Group I A
N-13-1(Ichimura)
References: 43, 44, 167

67 Damchan / Nepal (1965-11)
Unialgal, Clonal, T.Ichimura
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type +, Group I B
N-31-19(Ichimura)
References: 44, 167

68 Damchan / Nepal (1965-11)
Axenic, Clonal, T.Ichimura
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type -, Group I B
N-31-24(Ichimura)
References: 44, 167

69 Lake Teganuma / Chiba (1974-06)
Unialgal, Clonal, M.M.Watanabe (1974-06)
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic,
Mating type +, Group II B
TG-2-21(M.M.Watanabe)
References: 167, 170, 171

70 Lake Teganuma / Chiba (1974-06)
Axenic, Clonal, M.M.Watanabe (1974-06)
Culture conditions: C, 15°C, 1000 lx, 4M,
(20°C, 3000 lx)

Characteristics: Freshwater, Heterothallic, Mating type -, Group II B
TG-2-22(M.M.Watanabe)
References: 167, 170, 171

261 Katsuta / Ibaraki (1974-08)
Unialgal, Clonal, M.M.Watanabe (1974-08)
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +, Group II C
IB-8-14(M.M.Watanabe)
References: 167, 170, 171

262 Piuthan / Nepal (1965-10)
Unialgal, Clonal, T.Ichimura
Culture conditions: C, 15°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -, Group I A
N-13-4(Ichimura)
References: 44, 167

Closterium pleurodermatum West et West

449 Iriomote Isl. / Okinawa (1973-03)
C-518(IAM), Unialgal, T.Ichimura (1973-12)
Culture conditions: CA, 20°C, 1000 lx, 4M, (25°C, 1500 lx)
Characteristics: Freshwater

Closterium praelongum var. ***brevius*** Nordstedt

450 Nawakot / Nepal (1965-10)
C-447(IAM), Axenic, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

451 Billethadi / Nepal (1965-12)
Mixed, T.Ichimura
Culture conditions: MG, 20°C, 1000 lx, 4M, (20°C, 3000 lx)

Characteristics: Freshwater, Homothallic

Closterium pusillum var. ***maius*** Raciborski

185 Billethadi / Nepal (1965-12)
C-449(IAM), Unialgal, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic
Reference: 48

Closterium rostratum var. ***subrostratum*** Krieger

338 Kathmandu / Nepal (1968-05)
C-446(IAM), Axenic, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

Closterium selenastrum M.Watanabe

339 Mt. Yonaha / Okinawa (1972-10)
Unialgal, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (25°C, 1500 lx)
Characteristics: Freshwater, Homothallic
R-9-40(Ichimura)
References: 53, 156, 157

340 Mt. Yonaha / Okinawa (1972-10)
Unialgal, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (25°C, 1500 lx)
Characteristics: Freshwater, Homothallic
R-9-42(Ichimura)
References: 53, 157

Closterium spinosporum var. ***crassum*** M.Watanabe

186 Lake Akan / Hokkaido (1973-09)
Axenic, Clonal, M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)

Characteristics: Freshwater, Homothallic
AK-46(M.Watanabe)
References: 53, 156, 157

187 Mt. Yonaha / Okinawa (1973-06)
C-461(IAM), Unialgal, Clonal, T.Ichimura (1973-10)
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
R-9-13(Ichimura)
References: 53, 156, 157

341 Mt. Yonaha / Okinawa (1972-10)
Axenic, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
R-9-12(Ichimura)
References: 53, 156, 157

Closterium spinosporum var. ***malaysiense*** M.Watanabe

188 Penang / Malaysia (1974-01)
Unialgal, Clonal, M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +
M-10-1(M.Watanabe)
References: 156, 157

189 Penang / Malaysia (1974-01)
Unialgal, Clonal, M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -
M-10-4(M.Watanabe)
References: 156, 157

Closterium spinosporum var. *ryukyuense* M.Watanabe

191 Iriomote Isl. / Okinawa (1973-06)
Unialgal, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
R-12-3(Ichimura)
References: 156, 157

192 Iriomote Isl. / Okinawa (1973-06)
Unialgal, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (25°C, 1500 lx)
Characteristics: Freshwater, Homothallic
R-12-6(Ichimura)
References: 156, 157

193 Iriomote Isl. / Okinawa (1973-06)
Unialgal, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
R-12-2G3(Ichimura)
Reference: 156

Closterium spinosporum var. *spinosporum* Hodgetts

194 Tsukudemura / Aichi (1972-10)
Axenic, Clonal, T.Ichimura
Identified by: M.Watanabe
Culture conditions: CAM, 20°C, 1000 lx, 4M, (25°C, 1500 lx)
Characteristics: Freshwater, Homothallic
A-2-22(Ichimura)
References: 53, 156, 157

195 Tsukudemura / Aichi (1972-10)
Unialgal, Clonal, M.M.Watanabe
Identified by: M.Watanabe
Culture conditions: CAM, 20°C, 1000 lx, 4M, (20°C, 3000 lx)

Characteristics: Freshwater, Homothallic
A-7-3(M.M.Watanabe)
Reference: 157

196 Tsukudemura / Aichi (1972-10)
Unialgal, Clonal, M.M.Watanabe
Identified by: M.Watanabe
Culture conditions: CAM, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
A-7-6(M.M.Watanabe)
Reference: 156

197 Tsukudemura / Aichi (1972-10)
Unialgal, Clonal, M.M.Watanabe
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
A-13-4(M.M.Watanabe)
References: 156, 157

Closterium tumidum Johnson

198 Billethadi / Nepal (1965-12)
C-450(IAM), Unialgal, Clonal, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

Closterium venus Kützing ex Ralfs

199 Kathmandu / Nepal (1968)
Unialgal, Clonal, T.Ichimura
Culture conditions: CA, 20°C, 1000 lx, 4M, (20°C, 3000 lx)
Characteristics: Freshwater

Closterium wallichii Turner

200 Kitaadachigun / Saitama (1969-01)
C-451(IAM), Unialgal, Clonal, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)

Characteristics: Freshwater, Homothallic
Reference: 48

201 Lake Kasumigaura / Ibaraki (1983-09)
Axenic, Clonal, F.Kasai (1983-09)
Culture conditions: C, 20°C, 1000 lx, 4M,
(20°C, 1500 lx)
Characteristics: Freshwater, Homothallic

202 Ghasa / Nepal (1965-11)
Axenic, Clonal, T.Ichimura
Culture conditions: C, 20°C, 1000 lx, 4M,
(20°C, 1500 lx)
Characteristics: Freshwater, Homothallic

Coelastrum astroideum De Notaris

129 Lake Shoji / Yamanashi (1981-10)
56(TAC), Axenic, Clonal, M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 2M,
(25°C, 3000 lx)
Characteristics: Freshwater

130 Lake Shoji / Yamanashi (1981-08)
51-9A(TAC), Axenic, Clonal, M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 2M,
(25°C, 3000 lx)
Characteristics: Freshwater

244 Lake Kasumigaura / Ibaraki (1983-08)
Unialgal, Clonal, F.Kasai (1983-08)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M,
(25°C, 3000 lx)
Characteristics: Freshwater

342 Lake Kawaguchi / Yamanashi (1981-10)
54(TAC), Unialgal, Clonal, M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Freshwater

Coelastrum morus W. et G.S.West
231 Hachijo Isl. / Tokyo (1984-04)
Axenic, Clonal, F.Kasai (1984-05)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Coelastrum proboscideum Bohlin
131 Near Tukcha / Nepal (1965-11)
C-344(IAM), Unialgal, Clonal, T.Ichimura (1969-07)
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 48, 173

Coelastrum reticulatum (Dangeard) Senn
132 Lake Yamanaka / Yamanashi (1981-10)
53-5A(TAC), Unialgal, Clonal, M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 2M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

Coelastrum reticulatum var. *reticulatum* (Dangeard) Senn
245 Lake Kasumigaura / Ibaraki (1983-10)
Unialgal, Clonal, F.Kasai (1983-10)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

Coolia monotis Meunier
343 Hachijo Isl. / Tokyo (1984-04)
Axenic, Clonal, S.Suda (1984-04)
Culture conditions: ESM, 20°C, 1500 lx, 3M
Characteristics: Marine, Tide pool, Unstable, Untransportable

Coscinodiscus granii Gough
273 Hachinohe Harbor / Aomori (1985-01)
Unialgal, Clonal, T.Sawaguchi (1985-01)

Culture conditions: f/2, 10°C, 2000 lx, 1M
Characteristics: Marine

Cosmarium contractum Kirchner

133 Lake Yamanaka / Yamanashi (1981-10)
53(TAC), Unialgal, Clonal, M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 2M,
(20°C, 1500 lx)
Characteristics: Indicator, Freshwater

Cosmarium hians Borge

452 Lake Yamanaka / Yamanashi (1981-06)
Unialgal, Clonal, M.H.Watanabe (1981-06)
Culture conditions: C, 20°C, 3000 lx, 2M
Characteristics: Freshwater

Cosmocladium constrictum (Archer) Archer

248 Lake Biwa / Shiga (1983-12)
Unialgal, Clonal, F.Kasai (1983-12)
Identified by: M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 3M,
(20°C, 1500 lx)
Characteristics: Freshwater

Cricosphaera roscoffensis (Dangeard) Gayral et Fresnel

8 Osaka Bay / Osaka (1978-09)
Axenic, Clonal, S.Yamochi
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine

Cryptomonas ovata Ehrenberg

274 Tsuchiura / Ibaraki (1982-10)
Axenic, Clonal, M.Ishimitsu (1982-10)
Culture conditions: VT, 10°C, 2000 lx, 2M
Characteristics: Freshwater
#00046(Ishimitsu)
Reference: 57

275 Tsuchiura / Ibaraki (1982-09)
Axenic, Clonal, M.Ishimitsu (1982-09)
Culture conditions: VT, 10°C, 2000 lx, 2M

Characteristics: Freshwater
#00042(Ishimitsu)
Reference: 57

Cryptomonas platyuris Skuja

276 Higashihiroshima / Hiroshima (1983-08)
Axenic, Clonal, M.Ishimitsu (1983-08)
Culture conditions: VT, 10°C, 2000 lx, 1M
Characteristics: Freshwater
#00096(Ishimitsu)
Reference: 57

344 Higashihiroshima / Hiroshima (1983-08)
Axenic, Clonal, M.Ishimitsu (1983-08)
Culture conditions: VT, 10°C, 2000 lx, 2M
Characteristics: Freshwater
#00103(Ishimitsu)
Reference: 57

Cryptomonas rostratiformis Skuja

277 Hongo / Hiroshima (1983-10)
Unialgal, Clonal, M.Ishimitsu (1983-10)
Culture conditions: VT, 15°C, 2000 lx, 1M
Characteristics: Freshwater
#00148(Ishimitsu)
Reference: 57

278 Hongo / Hiroshima (1983-10)
Unialgal, Clonal, M.Ishimitsu (1983-10)
Culture conditions: VT, 15°C, 2000 lx, 1M
Characteristics: Freshwater
#00154(Ishimitsu)
Reference: 57

345 Sugadaira / Nagano (1982-07)
Axenic, Clonal, M.Ishimitsu (1982-08)
Culture conditions: VT, 10°C, 2000 lx, 2M
Characteristics: Freshwater
#00006(Ishimitsu)
Reference: 57

Cryptomonas tetrapyrenoidosa Skuja

279 Higashihiroshima / Hiroshima (1983-08)
Axenic, Clonal, M.Ishimitsu (1983-08)
Culture conditions: VT, 10°C, 2000 lx, 2M
Characteristics: Freshwater
#00099(Ishimitsu)
Reference: 57

280 Sugadaira / Nagano (1982-07)
Axenic, Clonal, M.Ishimitsu (1982-08)
Culture conditions: VT, 10°C, 2000 lx, 2M
Characteristics: Freshwater
#00014(Ishimitsu)
Reference: 57

281 Minamiizu / Shizuoka (1983-05)
Axenic, Clonal, M.Ishimitsu (1983-05)
Culture conditions: VT, 5°C, 2000 lx, 2M
Characteristics: Freshwater
#00073(Ishimitsu)
Reference: 57

282 Tsuchiura / Ibaraki (1982-09)
Axenic, Clonal, M.Ishimitsu (1982-09)
Culture conditions: VT, 15°C, 2000 lx, 1M
Characteristics: Freshwater
#00056(Ishimitsu)
Reference: 57

346 Sugadaira / Nagano (1982-07)
Axenic, Clonal, M.Ishimitsu (1982-08)
Culture conditions: VT, 5°C, 2000 lx, 2M
Characteristics: Freshwater
#00009(Ishimitsu)
Reference: 57

347 Minamiizu / Shizuoka (1983-05)
Axenic, Clonal, M.Ishimitsu (1983-05)
Culture conditions: VT, 5°C, 2000 lx, 2M
Characteristics: Freshwater
#00072(Ishimitsu)
Reference: 57

348 Higashihiroshima / Hiroshima (1983-08)
Axenic, Clonal, M.Ishimitsu (1983-08)
Culture conditions: VT, 10°C, 2000 lx, 2M
Characteristics: Freshwater
#00109(Ishimitsu)
Reference: 57

Cyanidium caldarium (Tilden) Geitler
250 M-8(IAM), Unialgal
Culture conditions: CC, 20°C, 500 lx, 4M,
(25°C, 1500 lx)
Characteristics: Hot spring
Reference: 67

Cyanophora paradoxa Korschikoff
547 Axenic, E.Pringsheim
Culture conditions: VTYT, 20°C, 500 lx, 2M,
(25°C, 3000 lx)
LB555 UTEX

Cylindrocystis brebissonii var. ***brebissonii*** Meneghini
349 Lake Onuma / Hokkaido (1967-06)
C-354(IAM), Axenic, Clonal, M.Haga (1968-01)
Culture conditions: C(S), 20°C, 1000 lx, 4M,
(25°C, 3000 lx)
Characteristics: Freshwater, Homothallic

Dictyochloropsis irregularis Nakano et Isagi
378 Akkeshi / Hokkaido (1982-07)
Unialgal, Y.Isagi (1982-08)
Identified by: T.Nakano
Culture conditions: C(S), 20°C, 500 lx, 3M,
(25°C, 3000 lx)
Characteristics: Aerial
CCHU-2227(Nakano)
Reference: 98

Dictyosphaerium pulchellum Wood
453 Lake Kasumigaura / Ibaraki (1988-12)
Unialgal, Clonal, T.Yanai (1988-12)
Identified by: Y.Niiyama
Culture conditions: CB, 15°C, 1500 lx, 2M

Characteristics: Freshwater

Dimorphococcus lunatus A.Brown

134 Ozegahara / Gunma (1983-08)
Unialgal, Clonal, F.Kasai (1983-09)
Identified by: M.Watanabe
Culture conditions: CA, 20°C, 500 lx, 2M, (25°C, 3000 lx)
Characteristics: Freshwater

135 Tsuchiura / Ibaraki (1983-10)
Axenic, Clonal, F.Kasai (1983-10)
Identified by: M.Watanabe
Culture conditions: C, 20°C, 500 lx, 2M, (25°C, 3000 lx)
Characteristics: Freshwater
F-61-4
Reference: 173

Dinobryon divergens Imhof

284 Lake Biwa / Shiga (1983-12)
Unialgal, F.Kasai (1983-12)
Culture conditions: SW(Bi), 15°C, 2000 lx, 4M
Characteristics: Freshwater

Ditylum brightwellii (T.West) Grunow et Heurck

350 Shimoda / Shizuoka (1985-05)
Unialgal, Clonal, T.Sawaguchi (1985-05)
Culture conditions: f/2, 5°C, 2000 lx, 1M
Characteristics: Marine

Docidium undulatum var. ***undulatum*** Bailey

285 Oze / Fukushima (1983-08)
Unialgal, Clonal, F.Kasai (1983-09)
Culture conditions: SW(Bi), 20°C, 1000 lx, 3M
Characteristics: Freshwater

Draparnaldia plumosa (Vaucher) Agardh

454 Shirai River / Sapporo (1987-10)
Unialgal, F.Kasai (1987-10)
Culture conditions: C, 10°C, 500 lx, 3M, (10°C,

1500 lx)
Characteristics: Freshwater
2Tst-2-1
References: 134, 141

Echinosphaeridium nordstedtii Lemmermann

137 Lake Kasumigaura / Ibaraki (1983-08)
Axenic, Clonal, F.Kasai (1983-08)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater
F-5,6-3
Reference: 173

Eremosphaera gigas (Archer) Fott et Kalina

379 Shinobugaoka / Osaka (1968-11)
C-338(IAM), Unialgal, Clonal, T.Ichimura (1969-01)
Identified by: T.Nakano
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 48, 173

Eremosphaera viridis De Bary

380 Oze / Fukushima (1983-08)
Unialgal, Clonal, F.Kasai (1983-09)
Identified by: T.Nakano
Culture conditions: CAM, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Errerella bornhemiensis Conrad

455 Between Ghorepani and Billethadi / Nepal (1965-12)
C-341(IAM), Unialgal, Clonal, T.Ichimura (1972-05)
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater
Reference: 48

Eudorina elegans Ehrenberg

351 Lake Biwa / Shiga (1983-12)
Unialgal, Clonal, S.Suda (1983-12)
Culture conditions: CA, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Homothallic

Eudorina elegans var. ***elegans*** Ehrenberg

456 Chiyodaku / Tokyo (1977-09)
Axenic, Clonal, H.Nozaki (1977-09)
Culture conditions: VT, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type +

457 Chiyodaku / Tokyo (1977-09)
Axenic, Clonal, H.Nozaki (1977-09)
Culture conditions: VT, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type -

Eudorina elegans var. ***synoica*** (Ehrenberg) Goldstein

458 Midoriku / Yokohama / Kanagawa (1980-01)
Axenic, Clonal, H.Nozaki (1980-04)
Culture conditions: VT, 20°C, 1500 lx, 1M
Characteristics: Freshwater

Eudorina illinoisensis (Kofoid) Pascher

459 Nakaharaku / Kawasaki / Kanagawa (1984-01)
Axenic, Clonal, H.Nozaki (1985-06)
Culture conditions: VT, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic

460 Nakaharaku / Kawasaki / Kanagawa (1984-01)
Axenic, Clonal, H.Nozaki (1985-06)
Culture conditions: VT, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic

Euglena clara Skuja

253 Higashiyata River / Ibaraki (1983-07)
Axenic, Clonal, S.Suda (1983-07)
Culture conditions: AF-6, 20°C, 1500 lx, 1M,
(25°C, 3000 lx)

Characteristics: Indicator, Freshwater

Euglena gracilis Klebs

47 E-3(IAM), Axenic, Clonal
Culture conditions: HUT(SS), 20°C, 500 lx, 2M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater
References: 48, 147

48 E-6(IAM), Axenic, Clonal
Culture conditions: HUT(SS), 20°C, 500 lx, 2M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater
References: 8, 48, 55, 82, 84, 111, 112, 113, 114, 136, 137

Euglena gracilis var. ***bacillaris*** Pringsheim

49 E-2(IAM), Axenic, Clonal
Culture conditions: HUT, 20°C, 500 lx, 2M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater
References: 48, 147

Euglena mutabilis Schmitz

286 Takatori River / Ibaraki (1984-12)
Axenic, Clonal, S.Suda (1984-12)
Culture conditions: AF-6, 20°C, 2000 lx, 1M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

Eunotia pectinalis var. ***minor*** (Kützing) Rabenhorst

461 Mt.Tsukuba / Ibaraki (1987-04)
Unialgal, F.Kasai (1987-05)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 4M
Characteristics: Freshwater
(1)-16
Reference: 134

Eunotia serra var. ***serra*** Ehrenberg

352 Tsukiyono / Gunma (1985-07)
Unialgal, Clonal, T.Sawaguchi (1985-07)
Culture conditions: M Chu No.10, 15°C, 2000 lx, 2M
Characteristics: Freshwater

Eutreptiella gymnastica Throndsen

381 Yashima Bay / Kagawa (1982-10)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine

Fibrocapsa japonica Toriumi et Takano

136 Tsuda Bay / Kagawa (1978-07)
Axenic, Clonal, K.Yuki
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
Reference: 143

462 Hasaki / Ibaraki (1987-05)
Axenic, Clonal, T.Sawaguchi (1987-05)
Culture conditions: ESM, 20°C, 3000 lx, 1M
Characteristics: Red tide, Marine

Fragilaria capucina Desmazières

391 Lake Kasumigaura / Ibaraki (1985-04)
Unialgal, Clonal, T.Sawaguchi (1985-04)
Identified by: M.Idei
Culture conditions: M Chu No.10, 15°C, 2000 lx, 1M
Characteristics: Freshwater

Gephyrocapsa oceanica Kamptner

353 Tsushima / Nagasaki (1986-03)
Axenic, Clonal, T.Sawaguchi (1986-05)
Identified by: I.Inouye
Culture conditions: ESM, 20°C, 1500 lx, 20D
Characteristics: Marine

Glenodiniopsis uliginosa (Schilling) Woloszynska

463 Shizukuishi / Iwate (1984-09)
Unialgal, Clonal, T.Sawaguchi (1984-09)
Culture conditions: MW/5, 20°C, 3000 lx, 2M
Characteristics: Freshwater, Unstable, Untransportable

Gloeomonas lateperforata (Skuja) Ettl

464 Tsukuba / Ibaraki (1982-11)
Axenic, Clonal, F.Kasai (1982-11)
Identified by: S.Suda
Culture conditions: C, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Gomphonema gracile var. *gracile* Ehrenberg

465 Ashio / Gunma (1987-08)
Clonal, F.Kasai (1987-08)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
Ast-1-1
Reference: 134

Gomphonema parvulum var. *parvulum* Kützing

466 Shirai River / Sapporo (1987-07)
Unialgal, F.Kasai (1987-07)
Identified by: N.Takamura
Culture conditions: CSi, 10°C, 1500 lx, 2M
Characteristics: Freshwater
Tst-1-18
Reference: 134

467 Shirai River / Sapporo (1987-07)
F.Kasai (1987-07)
Identified by: N.Takamura
Culture conditions: M Chu No.10, 10°C, 1500 lx, 4M
Characteristics: Freshwater
Tst-4-3
Reference: 134

Gonatozygon brebissonii De Bary

138 Lake Kasumigaura / Ibaraki (1974-11)
Axenic, Clonal
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater

139 Lake Shoji / Yamanashi (1981-10)
56-1(TAC), Axenic, Clonal, M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater

Gonatozygon monotaenium De Bary

247 Tsukiyono / Gunma (1984-06)
Axenic, Clonal, F.Kasai (1984-06)
Culture conditions: C, 20°C, 1000 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater, Homothallic

287 Lake Yamanaka / Yamanashi (1981-10)
53-3(TAC), Unialgal, Clonal, M.Watanabe
Culture conditions: MG, 20°C, 1000 lx, 1M, (20°C, 1500 lx)
Characteristics: Freshwater

Gonium pectorale var. ***pectorale*** Müller

468 Kohokuku / Yokohama / Kanagawa (1979-04)
Axenic, Clonal, H.Nozaki (1979-04)
Culture conditions: VT, 20°C, 1000 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type -

469 Kohokuku / Yokohama / Kanagawa (1979-04)
Axenic, Clonal, H.Nozaki (1979-04)
Culture conditions: VT, 20°C, 1000 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type +

Gonium viridistellatum M.Watanabe

288 Okinawa / Okinawa (1973-06)
Axenic, Clonal, M.Watanabe
Culture conditions: CA, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type -
G4(M.Watanabe)
References: 102, 155

289 Okinawa / Okinawa (1973-06)
Axenic, Clonal, M.Watanabe
Culture conditions: CA, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type +
G3(M.Watanabe)
References: 102, 155

290 Okinawa / Okinawa (1973-06)
Axenic, Clonal, M.Watanabe
Culture conditions: CA, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type +
G1(M.Watanabe)
References: 102, 155

Gymnodinium breve Davis

140 Harima-Nada / Seto Inland Sea (1979-06)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

Gymnodinium fuscum Stein

470 Tsuchiura / Ibaraki (1986-02)
Unialgal, Clonal, T.Sawaguchi (1986-05)
Culture conditions: MW/5, 20°C, 3000 lx, 1M
Characteristics: Freshwater, Unstable, Untransportable

Gymnodinium nagasakiense Takayama et Adachi

249 Harima-Nada / Seto Inland Sea (1980-08)
Axenic, Clonal, K.Yuki
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable,

Untransportable

Gymnodinium sanguineum Hirasaka

11 Harima-Nada / Seto Inland Sea (1979-01)
Axenic, Clonal, M.M.Watanabe
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable
Reference: 143

141 Uchinomi Bay / Kagawa (1979-05)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

Gyrodinium falcatum Kofoid et Swezy

142 Harima-Nada / Seto Inland Sea (1981-10)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

Gyrodinium instriatum Freudenthal et Lee

143 Shodo Isl. / Kagawa (1978-06)
Axenic, Clonal, K.Yuki
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

354 Shimoda Harbor / Shizuoka (1985-05)
Axenic, Clonal, T.Sawaguchi (1985-05)
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

Haematococcus pluvialis Flotow

144 Sapporo / Hokkaido (1964-07)
C-392(IAM), Unialgal, Clonal, T.Ichimura (1964-07)
Culture conditions: C(S), 20°C, 500 lx, 3M,

(25°C, 3000 lx)
Characteristics: Freshwater, Homothallic
References: 48, 173

Hafniomonas montana (Geitler) Ettl et Moestrup

257 Tsukuba / Ibaraki (1983-10)
Axenic, Clonal, S.Suda (1983-10)
Identified by: I.Inouye
Culture conditions: C, 20°C, 1500 lx, 1M, (20°C, 3000 lx)
Characteristics: Freshwater
OUT-5
Reference: 173

Hemidinium nasutum Stein

471 Tsuchiura / Ibaraki (1987-08)
Unialgal, Clonal, T.Sawaguchi (1987-08)
Culture conditions: MW/5, 20°C, 3000 lx, 1M
Characteristics: Freshwater, Untransportable

Heterocapsa pygmaea Loeblich, Schmidt et Sherley

472 Kashiwazaki / Niigata (1986-08)
Unialgal, Clonal, T.Sawaguchi (1986-08)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Marine, Untransportable

473 Izuhara / Nagasaki (1986-03)
Unialgal, Clonal, T.Sawaguchi (1986-03)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Marine, Untransportable

Heterocapsa triquetra Stein

7 Osaka Bay / Osaka (1981-04)
Axenic, Clonal, S.Yamochi
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable

235 Harima-Nada / Seto Inland Sea (1982-03)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
Reference: 143

Heterosigma akashiwo (Hada) Hada

4 Fukuyama Bay / Hiroshima (1966-06)
Axenic, Clonal, H.Iwasaki et al.
Culture conditions: f/2, M-ASP7, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
FHE
Reference: 59

5 Gokasho Bay / Mie (1966)
Axenic, Clonal, H.Iwasaki et al.
Identified by: Y.Hara
Culture conditions: f/2, M-ASP7, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
GHE
Reference: 60

6 Osaka Bay / Osaka (1979-08)
Axenic, Clonal, M.M.Watanabe
Culture conditions: f/2, M-ASP7, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable
OHE-1(M.M.Watanabe)
References: 31, 32, 71, 72, 73, 75, 78, 81, 83, 130, 144, 145, 158, 159, 160, 161, 162, 163, 164, 165, 174, 175, 176, 177, 178, 179, 183, 194

9 Harima-Nada / Seto Inland Sea (1983-02)
Axenic, Clonal, M.M.Watanabe (1983-05)
Culture conditions: f/2, M-ASP7, 20°C, 4000 lx, 1M

Characteristics: Red tide, Marine,
Untransportable

10 Harima-Nada / Seto Inland Sea (1983-02)
Axenic, Clonal, M.M.Watanabe (1983-05)
Culture conditions: f/2, M-ASP7, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

145 Nomaike / Kagoshima (1978-05)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, M-ASP7, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
Reference: 143

146 Shido Bay / Kagawa (1978-06)
Axenic, Clonal, K.Yuki
Culture conditions: f/2, M-ASP7, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

293 Onagawa Bay / Miyagi (1984-08)
Axenic, Clonal, S.Suda (1984-09)
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

Hyalotheca dissiliens (Smith) Brébisson ex Ralfs

147 Nagatoro / Saitama (1969-11)
C-510(IAM), Unialgal, Clonal, T.Ichimura (1972-06)
Culture conditions: C, 20°C, 1000 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater, Heterothallic

148 Nagatoro / Saitama (1969-11)
C-511(IAM), Axenic, Clonal, T.Ichimura (1972-06)
Culture conditions: C, 20°C, 1000 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater, Heterothallic

149 Lake Kasumigaura / Ibaraki (1975-12)
C-512(IAM), Axenic, Clonal, T.Ichimura (1975-12)
Culture conditions: C, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic

150 Lake Kasumigaura / Ibaraki (1975-12)
C-513(IAM), Axenic, Clonal, T.Ichimura (1975-12)
Culture conditions: C, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic

Hyalotheca dissiliens var. ***dissiliens*** f. ***tridentula*** (Nordstedt) Boldt

294 Tsukuba / Ibaraki (1982)
Unialgal, Clonal, F.Kasai (1983-02)
Culture conditions: C, 20°C, 1000 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater, Homothallic

Hydrodictyon reticulatum (Lagerheim) Lagerheim

295 Kitakawachigun / Osaka (1968-11)
C-335(IAM), Unialgal, Clonal, T.Ichimura (1969-01)
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

Katodinium rotundatum (Lohmann) Loeblich

356 Hachinohe Harbor / Aomori (1985-01)
Axenic, Clonal, T.Sawaguchi (1985-01)
Culture conditions: f/2, ESM, 5°C, 500 lx, 1M
Characteristics: Marine, Unstable, Untransportable

Lagerheimia ciliata (Lagerheim) Chodat

382 Lake Kasumigaura / Ibaraki (1983-08)
Unialgal, Clonal, F.Kasai (1983-08)
Identified by: Y.Niiyama
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Leptocylindrus danicus Cleve

383 Mera Harbor / Shizuoka (1985-05)
Unialgal, Clonal, T.Sawaguchi (1985-05)
Culture conditions: f/2, 10°C, 2000 lx, 20D
Characteristics: Marine

Lobomonas monstruosa Korschikov

474 Iwaki / Fukushima (1984-08)
Unialgal, Clonal, S.Suda (1984-08)
Culture conditions: AF-6, 20°C, 2000 lx, 2M
Characteristics: Freshwater

Melosira ambigua (Grunow) O.Müller

20 Tsuchiura / Ibaraki (1983-10)
Axenic, Clonal, F.Kasai (1983-10)
Identified by: M.Mizuno
Culture conditions: CSi, M Chu No.10, 20°C, 3000 lx, 1M
Characteristics: Indicator, Freshwater, Unstable
Reference: 115

Melosira granulata var. *angustissima* O.Müller

332 Lake Kasumigaura / Ibaraki (1983-10)
Axenic, Clonal, F.Kasai (1983-10)
Identified by: M.Mizuno
Culture conditions: CSi, M Chu No.10, 20°C, 3000 lx, 1M
Characteristics: Indicator, Freshwater, Unstable

Melosira granulata var. ***angustissima*** f. ***spiralis*** Hustedt

333 Lake Kasumigaura / Ibaraki (1983-05)
Axenic, Clonal, T.Hiwatari (1983-05)
Identified by: M.Mizuno
Culture conditions: CSi, M Chu No.10, 20°C, 3000 lx, 1M
Characteristics: Indicator, Freshwater, Unstable

Merismopedia tenuissima Lemmermann

230 Tsukuba / Ibaraki (1984-05)
Unialgal, Clonal, F.Kasai (1984-05)
Identified by: M.M.Watanabe
Culture conditions: CT, 20°C, 1500 lx, 1M
Characteristics: Freshwater

Mesostigma viride Lauterborn

296 Mitsukaido / Ibaraki (1985-07)
Unialgal, Clonal, S.Suda (1985-07)
Identified by: I.Inouye
Culture conditions: C, 20°C, 3000 lx, 1M
Characteristics: Freshwater

475 Mitsukaido / Ibaraki (1986-01)
Unialgal, Clonal, S.Suda (1987-12)
Culture conditions: C, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type +

476 Mitsukaido / Ibaraki (1986-01)
Unialgal, Clonal, S.Suda (1986-12)
Culture conditions: C, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type -

477 Mitsukaido / Ibaraki (1986-01)
Unialgal, Clonal, S.Suda (1986-12)
Culture conditions: C, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type -

Micractinium pusillum Fresenius

151 Lake Kasumigaura / Ibaraki (1983-07)
Axenic, Clonal, F.Kasai (1983-07)
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater
F-19-4
Reference: 173

Micrasterias crux-melitensis (Ehrenberg) Hassall ex Ralfs

152 Kathmandu / Nepal (1968-05)
C-427(IAM), Unialgal, Clonal, T.Ichimura (1970-12)
Culture conditions: VT, 20°C, 1000 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater, Homothallic
Reference: 48

Micrasterias foliacea var. ***foliacea*** Bailey ex Ralfs

297 Higashihiroshima / Hiroshima (1983-10)
Unialgal, Clonal, F.Kasai (1983-10)
Culture conditions: MG, 20°C, 1000 lx, 3M, (25°C, 1500 lx)
Characteristics: Freshwater

Microcystis aeruginosa f. ***aeruginosa*** Kützing

44 Lake Kasumigaura / Ibaraki (1974-08)
M-176(IAM), Axenic, Clonal, M.M.Watanabe (1974-08)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
References: 3, 48, 54, 173, 193

87 Lake Kasumigaura / Ibaraki (1982-09)
Axenic, Clonal, M.H.Watanabe (1982-09)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
K-MA-11
Reference: 173

88 Lake Kawaguchi / Yamanashi (1981-06)
Unialgal, Clonal, M.H.Watanabe (1981-06)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
KW-MA1-3
Reference: 173

89 Lake Kawaguchi / Yamanashi (1981-06)
Axenic, Clonal, M.H.Watanabe (1981-06)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
KW-MA2-5
References: 173, 180

90 Lake Kawaguchi / Yamanashi (1981-06)
Unialgal, Clonal, M.H.Watanabe (1981-06)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
KW-MB-2
Reference: 173

91 Lake Kasumigaura / Ibaraki (1982-09)
Unialgal, Clonal, M.H.Watanabe (1982-09)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
K-MB-13
Reference: 173

99 Lake Suwa / Nagano (1982-08)
Unialgal, Clonal, M.H.Watanabe (1982-08)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
S-MA-S5
References: 173, 193

100 Lake Suwa / Nagano (1982-08)
Unialgal, Clonal, M.H.Watanabe (1982-08)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
S-MB-S7
References: 173, 187

101 Lake Suwa / Nagano (1982-10)
48(TAC), Unialgal, Clonal, M.Watanabe (1982-10)
Culture conditions: CB, 25°C, 1500 lx, 20D
Characteristics: Water bloom, Indicator, Freshwater
Reference: 173

298 Lake Kasumigaura / Ibaraki (1982-09)
47(TAC), Axenic, Clonal, M.Watanabe (1982-09)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Toxic, Freshwater

299 Lake Kasumigaura / Ibaraki (1979-08)
Unialgal, Clonal, N.Takamura (1979-08)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Freshwater

Microcystis aeruginosa f. *flos-aquae* (Wittrock) Elenkin

98 Lake Kasumigaura / Ibaraki (1982-09)
Unialgal, Clonal, M.H.Watanabe (1982-09)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
K-MF-K-3
Reference: 173

478 Lake Kasumigaura / Ibaraki (1977-09)
Unialgal, O.Yagi (1978-04)
Culture conditions: MA, 20°C, 500 lx, 3M, (25°C, 1500 lx)
K-5

Microcystis elabens var. ***minor*** Nygaard

42 Lake Kasumigaura / Ibaraki (1974-08)
M-177(IAM), Unialgal, Clonal, M.M.Watanabe (1974-08)
Culture conditions: CT, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Freshwater
References: 48, 187, 193

Microcystis holsatica Lemmermann

43 Lake Kasumigaura / Ibaraki (1974-08)
M-179(IAM), Unialgal, Clonal, M.M.Watanabe (1974-08)
Culture conditions: CT, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Freshwater
References: 48, 187

Microcystis viridis (A.Brown) Lemmermann

102 Lake Kasumigaura / Ibaraki (1982-09)
Axenic, Clonal, M.H.Watanabe (1982-09)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Toxic, Freshwater
References: 56, 58, 66, 79, 110, 131, 180, 187, 193

103 Lake Kasumigaura / Ibaraki (1978-12)
44(TAC), Unialgal, Clonal, M.Watanabe (1978-12)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Toxic, Freshwater
Reference: 166

Microcystis wesenbergii Komárek

104 Chiyodaku / Tokyo (1982-11)
Unialgal, Clonal, M.H.Watanabe (1982-11)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
References: 100, 187

105 Lake Kasumigaura / Ibaraki (1982-09)
Unialgal, Clonal, M.H.Watanabe (1982-09)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater

106 Lake Kasumigaura / Ibaraki (1982-09)
Unialgal, Clonal, M.H.Watanabe (1982-09)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater

107 Lake Kawaguchi / Yamanashi (1981-06)
Axenic, Clonal, M.H.Watanabe (1981-06)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
Reference: 180

108 Lake Suwa / Nagano (1982-08)
Unialgal, Clonal, M.H.Watanabe (1982-08)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater

109 Lake Yogo / Shiga (1982-07)
Unialgal, Clonal, M.H.Watanabe (1982-07)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater

110 Lake Kasumigaura / Ibaraki (1978-08)
36(TAC), Unialgal, Clonal, M.Watanabe (1978-08)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater

111 Lake Kasumigaura / Ibaraki (1978-08)
37(TAC), Axenic, Clonal, M.Watanabe (1978-08)
Culture conditions: MA, 25°C, 3000 lx, 1M
Characteristics: Water bloom, Indicator,

Freshwater
Reference: 180

112 Lake Suwa / Nagano (1982-10)
52(TAC), Axenic, Clonal, M.Watanabe (1982-10)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
Reference: 193

Microthamnion kutzingianum Nägeli

479 Toyohira River / Sapporo (1987-07)
Unialgal, F.Kasai (1987-07)
Culture conditions: C, 10°C, 500 lx, 6M, (10°C, 1500 lx)
Characteristics: Freshwater
Tst11-6
Reference: 134

Monomastix minuta Skuja

255 Tsuchiura / Ibaraki (1983-07)
Axenic, Clonal, S.Suda (1983-07)
Culture conditions: C, 20°C, 3000 lx, 1M
Characteristics: Freshwater

256 Oze / Gunma (1983-08)
Axenic, Clonal, S.Suda (1983-11)
Culture conditions: CA, AF-6, 20°C, 3000 lx, 1M
Characteristics: Freshwater

Monoraphidium circinale (Nygaard) Nygaard

480 Tsuchiura / Ibaraki (1983-07)
Mixed, S.Suda (1983-07)
Identified by: F.Kasai
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Monoraphidium contortum (Thuret) Komárková-Legnerová

384 Lake Unagiike / Kagoshima (1985-02)
Unialgal, Clonal, T.Sawaguchi (1985-02)

Identified by: Y.Niiyama
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Monoraphidium griffithii (Berkeley) Komárková-Legnerová

385 Urizura / Ibaraki (1984-10)
Axenic, Clonal, T.Sawaguchi (1984-12)
Identified by: Y.Niiyama
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Myxosarsina burmensis Skuja

481 Mt.Tsukuba / Ibaraki (1987-04)
Unialgal, F.Kasai (1987-05)
Identified by: M.M.Watanabe
Culture conditions: MDM(S), 20°C, 500 lx, 5M, (20°C, 1500 lx)
Characteristics: Freshwater
(1)-45
Reference: 134

Nephroselmis aff. ***rotunda***

482 Ieshima Isls. / Hyogo (1984-08)
Unialgal, Clonal, S.Suda (1984-08)
Identified by: I.Inouye
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine

Nephroselmis astigmatica Inouye et Pienaar

252 Tateyama Harbor / Chiba (1983-08)
Axenic, Clonal, I.Inouye (1983-08)
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine
810-13(Inouye)

Nephroselmis olivacea Stein

483 Tsuchiura / Ibaraki (1986-02)
Unialgal, Clonal, S.Suda (1986-05)
Culture conditions: AF-6, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Heterothallic,

Mating type +
Reference: 127

484 Tsuchiura / Ibaraki (1986-02)
Axenic, Clonal, S.Suda (1986-05)
Culture conditions: AF-6, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type -

485 Tsuchiura / Ibaraki (1986-02)
Unialgal, Clonal, S.Suda (1986-05)
Culture conditions: AF-6, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type -
Reference: 127

Nephroselmis viridis Inouye

486 Harima-Nada / Seto Inland Sea (1983-02)
Unialgal, Clonal, S.Suda (1983-09)
Identified by: I.Inouye
Culture conditions: ESM, 20°C, 1500 lx, 1M
Characteristics: Red tide, Marine, Type strain

Nitzschia longissima var. ***reversa*** Grunow

358 Kawazu / Shizuoka (1985-05)
Unialgal, Clonal, T.Sawaguchi (1985-05)
Culture conditions: f/2, 10°C, 2000 lx, 1M
Characteristics: Marine

Nitzschia palea (Kützing) W.Smith

487 Miyata River / Ibaraki (1987-04)
Unialgal, F.Kasai (1987-05)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
3st-0-57
Reference: 134

488 Miyata River / Ibaraki (1987-02)
Unialgal, F.Kasai (1987-03)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 2M
Characteristics: Freshwater
1st-3-39
Reference: 134

489 Ashio / Gunma (1987-08)
Clonal, F.Kasai (1987-08)
Identified by: N.Takamura
Culture conditions: CSi, 15°C, 1500 lx, 1M
Characteristics: Freshwater
Ast-2-2
Reference: 134

Nostoc commune Vaucher

24 Kurobe Valley / Toyama
M-13(IAM), Unialgal, A.Watanabe
Identified by: H.Fukushima
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 48, 147, 173

38 Marble Point
M-115(IAM), Unialgal, O.Holm-Hansen
Identified by: M.M.Watanabe
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
Reference: 48

Nostoc linckia (Roth) Bornet et Flahault

25 Kagoshima / Kagoshima
M-16(IAM), Unialgal, M.Ishikawa
Identified by: M.M.Watanabe
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
Reference: 147

Nostoc linckia var. ***arvense*** C.B.Rao

28 Kagoshima / Kagoshima
M-30(IAM), Unialgal, M.Ishikawa
Identified by: Fukushima/Maruyama
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 48, 147

Nostoc minutum Desmazières

26 Ishigaki Isl. / Okinawa
M-17(IAM), Unialgal, M.Ishikawa
Identified by: M.M.Watanabe
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater, Chromatic adaptation
References: 147, 173

29 Ishigaki Isl. / Okinawa
M-31(IAM), Unialgal, M.Ishikawa
Identified by: M.M.Watanabe
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 147, 173

Oedogonium obesum (Wittrock) Hirn

203 C-348(IAM), Axenic, Clonal, E.Saito
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater
Reference: 48

Olisthodiscus luteus Carter

15 Tamano / Okayama / Seto Inland Sea
Axenic, Clonal, I.Inouye
Culture conditions: f/2, 20°C, 1500 lx, 1M
Characteristics: Red tide, Marine, Untransportable
References: 30, 143

Oltmannsiellopsis unicellularis Inouye et Chihara

359 Ieshima Isls. / Hyogo (1984-08)
Axenic, Clonal, S.Suda (1984-08)
Identified by: I.Inouye
Culture conditions: ESM, 20°C, 1500 lx, 2M
Characteristics: Red tide, Marine
Reference: 5

Oltmannsiellopsis viridis
(Hargraves et Steele) Chihara et Inouye

360 Onagawa Bay / Miyagi (1984-08)
Axenic, Clonal, S.Suda (1984-09)
Culture conditions: ESM, 20°C, 4000 lx, 2M
Characteristics: Marine

Oscillatoria agardhii Gomont

204 Lake Kasumigaura / Ibaraki (1983-08)
Axenic, Clonal, S.Suda (1983-08)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater
K-O-A
Reference: 173

205 Lake Kasumigaura / Ibaraki (1982-09)
53(TAC), Unialgal, Clonal, M.Watanabe (1982-09)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Indicator, Freshwater

Oscillatoria amphibia Agardh

361 Asaji Bay / Nagasaki (1985-07)
Unialgal, Clonal, M.M.Watanabe (1985-07)
Culture conditions: f/2, 20°C, 1500 lx, 1M
Characteristics: Marine

Oscillatoria animalis Agardh

206 M-75(IAM), Unialgal, F.Murano
Identified by: H.Fukushima
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater

Reference: 48

Oscillatoria laetevirens (Crouan) Gomont

31 Kawaji / Tochigi
M-42(IAM), Unialgal, M.Ishikawa
Identified by: H.Fukushima
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 48, 173

Oscillatoria limnetica Lemmermann

36 Nakano / Tokyo
M-92(IAM), Unialgal, F.Murano
Identified by: H.Fukushima
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 2, 48

Oscillatoria raciborskii Woloszynska

207 Lake Kasumigaura / Ibaraki (1983-06)
Axenic, Clonal, S.Suda (1983-06)
Culture conditions: CB, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Offensive taste and odor, Freshwater
K-O-R
Reference: 173

Oscillatoria rosea Utermohl

208 Asaji Bay / Nagasaki (1983-08)
Unialgal, Clonal, Y.Ichimura (1983-08)
Identified by: M.M.Watanabe
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Marine

Oscillatoria tenuis Agardh

33 Setagaya / Tokyo
M-50(IAM), Unialgal, M.Ishikawa
Identified by: K.Maruyama
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)

Characteristics: Indicator, Freshwater
Reference: 48

Oxyrrhis marina Dujardin

494 Hachinohe / Aomori (1988-08)
Mixed, T.Sawaguchi (1989-01)
Culture conditions: f/2, 20°C, 3000 lx, 1M
Characteristics: Predator, Marine, Untransportable

Pandorina morum (Müller) Bory

242 Lake Ozenuma / Fukushima (1983-08)
Axenic, Clonal, S.Suda (1983-09)
Culture conditions: CA, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type +

243 Lake Ozenuma / Fukushima (1983-08)
Axenic, Clonal, S.Suda (1983-09)
Culture conditions: CA, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type -

362 Lake Ozenuma / Fukushima (1983-08)
Axenic, Clonal, S.Suda (1983-09)
Culture conditions: CA, 20°C, 1500 lx, 1M
Characteristics: Freshwater, Heterothallic, Mating type -

Pediastrum angulosum var. *angulosum* (Ehrenberg) ex Meneghini

300 Higashihiroshima / Hiroshima (1983-10)
Unialgal, Clonal, F.Kasai (1983-10)
Identified by: M.Watanabe
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Pediastrum boryanum (Turpin) Meneghini

209 Lake Kasumigaura / Ibaraki (1982-12)
Axenic, Clonal, M.H.Watanabe (1982-12)
Culture conditions: C, 20°C, 1000 lx, 2M

Characteristics: Indicator, Freshwater

301 Lake Shoji / Yamanashi (1981-10)
56-3A(TAC), Unialgal, Clonal, M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Freshwater

Pediastrum duplex Meyen

212 Lake Kawaguchi / Yamanashi (1981-06)
Unialgal, Clonal, M.H.Watanabe (1981-06)
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Indicator, Freshwater

Pediastrum duplex var. ***duplex*** Meyen

210 Tsukuba / Ibaraki (1983-05)
Axenic, Clonal, A.Yuri (1983-05)
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

213 Tsukuba / Ibaraki (1983-05)
Unialgal, Clonal, T.Hiwatari (1983-06)
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Indicator, Freshwater
AQP-1
References: 39, 173

Pediastrum duplex var. ***gracillimum*** W. et G.S.West

211 Lake Kasumigaura / Ibaraki (1983-08)
Axenic, Clonal, F.Kasai (1983-08)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

214 Tsukuba / Ibaraki (1983-08)
Unialgal, Clonal, T.Hiwatari (1983-08)
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Indicator, Freshwater

Pediastrum simplex Meyen

215 Lake Biwa / Shiga (1982-07)
Axenic, Clonal, M.H.Watanabe (1982-07)
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Indicator, Freshwater

302 Lake Kasumigaura / Ibaraki (1983-08)
Axenic, Clonal, F.Kasai (1983-08)
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

Pediastrum tetras (Ehrenberg) Ralfs

216 Lake Kasumigaura / Ibaraki (1982-12)
Unialgal, Clonal, M.H.Watanabe (1982-12)
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Indicator, Freshwater

Pedinomonas minor Korschikov

363 Tsukuba / Ibaraki (1984-05)
Axenic, Clonal, S.Suda (1984-05)
Culture conditions: C, CYT(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Penium margaritaceum (Ehrenberg) ex Brébisson

217 Rumalbhara / Nepal (1965-11)
C-397(IAM), Axenic, Clonal, T.Ichimura (1972-05)
Culture conditions: C, 20°C, 1000 lx, 2M, (25°C, 3000 lx)
Characteristics: Freshwater
Reference: 48

303 Tsukiyono / Gunma (1984-06)
Axenic, Clonal, F.Kasai (1984-06)
Culture conditions: C, 20°C, 1000 lx, 3M, (25°C, 1500 lx)
Characteristics: Freshwater

Peridinium bipes f. ***globosum*** Lindemann

495 Lake Onogawa / Fukushima (1985-07)
Unialgal, Clonal, T.Sawaguchi (1985-08)
Culture conditions: Carefoot, 15°C, 3000 lx, 2M
Characteristics: Freshwater, Untransportable

Peridinium bipes f. ***occultatum*** (Lindemann) Lefèvre

364 Lake Unagiike / Kagoshima (1985-02)
Axenic, Clonal, T.Sawaguchi (1985-02)
Culture conditions: Carefoot, 15°C, 3000 lx, 2M
Characteristics: Red tide, Freshwater, Untransportable

496 Isobe / Mie (1986-10)
Unialgal, Clonal, T.Sawaguchi (1986-11)
Culture conditions: Carefoot, 15°C, 3000 lx, 2M
Characteristics: Red tide, Freshwater, Untransportable

497 Lake Kizaki / Nagano (1988-04)
Unialgal, Clonal, T.Sawaguchi (1988-04)
Culture conditions: Carefoot, 15°C, 3000 lx, 2M
Characteristics: Red tide, Freshwater, Untransportable

Peridinium cunningtonii Lemmermann

498 Shiogama / Miyagi (1988-07)
Unialgal, Clonal, T.Sawaguchi (1988-07)
Culture conditions: MW/5, 20°C, 3000 lx, 1M
Characteristics: Freshwater, Homothallic, Untransportable

Peridinium inconspicuum subsp. ***remotum*** (Lefèvre) Lefèvre

499 Iwai / Ibaraki (1985-10)
Unialgal, Clonal, T.Sawaguchi (1985-11)
Culture conditions: MW/5, 15°C, 3000 lx, 2M
Characteristics: Freshwater, Untransportable

Peridinium penardiforme Lindemann

386 Kochi / Kochi (1982-02)
Unialgal, S.Yoshimatsu

Culture conditions: W, 15°C, 2000 lx, 2M
Characteristics: Red tide, Freshwater, Unstable, Untransportable

Peridinium polonicum Woloszynska

500 Shiogama / Miyagi (1988-07)
Axenic, Clonal, T.Sawaguchi (1988-07)
Culture conditions: MW/5, 20°C, 3000 lx, 1M
Characteristics: Freshwater, Untransportable

Peridinium volzii Lemmermann

365 Ajiro / Iwate (1984-09)
Axenic, Clonal, T.Sawaguchi (1984-09)
Culture conditions: Carefoot, 15°C, 3000 lx, 2M
Characteristics: Freshwater, Untransportable

501 Tsuchiura / Ibaraki (1986-02)
Unialgal, Clonal, T.Sawaguchi (1986-05)
Culture conditions: Carefoot, 15°C, 3000 lx, 2M
Characteristics: Freshwater, Homothallic, Untransportable

Peridinium wierzejskii Woloszynska

502 Tsuchiura / Ibaraki (1985-04)
Unialgal, Clonal, T.Sawaguchi (1985-04)
Culture conditions: MW/5, 15°C, 3000 lx, 2M
Characteristics: Freshwater, Homothallic, Untransportable

Peridinium willei Huitfeldt-Kaas

304 Tsukiyono / Gunma (1984-06)
Axenic, Clonal, T.Sawaguchi (1984-06)
Culture conditions: Carefoot, 15°C, 3000 lx, 2M
Characteristics: Freshwater, Homothallic, Untransportable

366 Tsuchiura / Ibaraki (1985-04)
Axenic, Clonal, T.Sawaguchi (1985-04)
Culture conditions: Carefoot, 15°C, 3000 lx, 2M
Characteristics: Freshwater, Homothallic, Untransportable

Phacus agilis Skuja

387 Kashiwa / Chiba (1986-09)
Axenic, Clonal, M.M.Watanabe (1986-09)
Culture conditions: MAF-6, AF-6, 20°C, 4000 lx, 1M
Characteristics: Freshwater

Phaeocystis pouchetii (Hariot) Lagerheim

388 Hachijo Isl. / Tokyo (1984-04)
Unialgal, T.Sawaguchi (1984-04)
Culture conditions: f/2, 15°C, 2000 lx, 20D, (20°C, 4000 lx)
Characteristics: Red tide, Marine, Unstable, Untransportable

Phormidium foveolarum Gomont

32 Lake Shirakaba / Nagano
M-43(IAM), Unialgal, M.Ishikawa
Identified by: H.Fukushima
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
Reference: 48

34 Sendai / Miyagi
M-59(IAM), Unialgal, M.Ishikawa
Identified by: K.Maruyama
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater

503 Mt.Tsukuba / Ibaraki (1987-04)
Unialgal, F.Kasai (1987-05)
Identified by: M.M.Watanabe
Culture conditions: MDM, CSi+Cu(S), 20°C, 500 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater
(1)-48
Reference: 134

504 Miyata River / Ibaraki (1987-03)
Unialgal, F.Kasai (1987-05)
Identified by: M.M.Watanabe
Culture conditions: CSi, CSi+Cu(S), 20°C, 500 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater
2st-2-4
References: 133, 134

505 Watarase River / Gunma (1987-08)
Unialgal, F.Kasai (1987-10)
Identified by: M.M.Watanabe
Culture conditions: CSi, CSi+Cu, 20°C, 500 lx, 2M, (20°C, 1500 lx)
Characteristics: Freshwater
AT4-17
Reference: 134

Phormidium jenkelianum G.Schmid

506 Watarase River / Gunma (1987-08)
Unialgal, F.Kasai (1987-09)
Identified by: M.M.Watanabe
Culture conditions: CSi, CSi+Cu, 20°C, 500 lx, 2M, (20°C, 1500 lx)
Characteristics: Freshwater
AT5-37
Reference: 134

507 Watarase River / Gunma (1987-08)
Unialgal, F.Kasai (1987-08)
Identified by: M.M.Watanabe
Culture conditions: CSi, CSi+Cu, 20°C, 500 lx, 2M, (20°C, 1500 lx)
Characteristics: Freshwater
Ast-1-4
Reference: 134

Phormidium luridum (Kützing) Gomont

508 Takatori River / Ibaraki (1984-12)
Unialgal, Clonal, S.Suda (1984-12)
Identified by: M.M.Watanabe
Culture conditions: C, 20°C, 1500 lx, 1M
Characteristics: Indicator, Freshwater

Phormidium molle Gomont

509 Watarase River / Gunma (1987-08)
Unialgal, F.Kasai (1987-08)
Identified by: M.M.Watanabe
Culture conditions: CSi, CSi+Cu, 20°C, 500 lx, 2M, (20°C, 1500 lx)
Characteristics: Freshwater
AT2-17
Reference: 134

Phormidium mucicola Huber-Pestalozzi et Naum

510 Mt.Tsukuba / Ibaraki (1987-04)
Unialgal, F.Kasai (1987-05)
Identified by: M.M.Watanabe
Culture conditions: MDM, CSi+Cu(S), 20°C, 500 lx, 4M, (20°C, 1500 lx)
Characteristics: Freshwater
(1)-23
Reference: 134

Phormidium ramosum Boye-Petersen

305 Takatori River / Ibaraki (1984-12)
Unialgal, Clonal, S.Suda (1984-12)
Culture conditions: CSi, CSi+Cu(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater
References: 133, 134

511 Watarase River / Gunma (1987-08)
Unialgal, F.Kasai (1987-10)
Identified by: M.M.Watanabe
Culture conditions: CSi, CSi+Cu, 20°C, 500 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater
AT1-9
Reference: 134

Phormidium tenue (Meneghini) Gomont

30 Akita / Akita
M-40(IAM), Unialgal, M.Ishikawa
Identified by: H.Fukushima

Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater

512 Nagoya / Aichi (1981-11)
Axenic, N.Yamada (1985-05)
Culture conditions: CT, 20°C, 500 lx, 1M, (25°C, 1500 lx)
Characteristics: Offensive taste and odor, Freshwater
PM-81A(Yamada)

Pinnularia acrosphaeria var. ***acrosphaeria*** W.Smith

367 Tsukiyono / Gunma (1984-06)
Unialgal, Clonal, T.Sawaguchi (1984-07)
Culture conditions: M Chu No.10, 15°C, 2000 lx, 2M
Characteristics: Freshwater

Pinnularia gentilis (Donkin) Cleve

368 Tsukiyono / Gunma (1985-07)
Unialgal, Clonal, T.Sawaguchi (1985-07)
Culture conditions: M Chu No.10, 15°C, 2000 lx, 2M
Characteristics: Freshwater

Pinnularia gibba Ehrenberg

513 Shirai River / Sapporo (1987-07)
Unialgal, F.Kasai (1987-07)
Identified by: M.Idei
Culture conditions: CSi, 10°C, 1500 lx, 2M
Characteristics: Freshwater
Tst-1-20
Reference: 134

Planktonema lauterbornii Schmidle

514 Lake Kasumigaura / Ibaraki (1988-08)
Axenic, Clonal, Y.Niiyama (1988-08)
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Freshwater
K880818

Plectonema radiosum (Schiederm.) Gomont

515 Nikko / Tochigi (1987-04)
Unialgal, F.Kasai (1987-04)
Identified by: M.M.Watanabe
Culture conditions: CSi, 20°C, 500 lx, 3M, (20°C, 1500 lx)
Characteristics: Freshwater
NK-12
Reference: 134

Pleurotaenium cylindricum var. *stuhlmannii* (Hieronymus) Krieger

306 Niimi / Okayama (1983-09)
Unialgal, Clonal, F.Kasai (1983-09)
Culture conditions: MG, 25°C, 1500 lx, 1M
Characteristics: Freshwater, Homothallic

Pleurotaenium ehrenbergii var. *curtum* Krieger

307 Nakagun / Wakayama (1969-10)
C-378(IAM), Axenic, Clonal, T.Ichimura (1969-11)
Culture conditions: CA, 20°C, 1000 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +

308 Nakagun / Wakayama (1969-10)
C-379(IAM), Axenic, Clonal, T.Ichimura (1969-11)
Culture conditions: CA, 20°C, 1000 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -

311 Iriomote Isl. / Okinawa (1973-06)
C-430(IAM), Unialgal, Clonal, T.Ichimura (1973-11)
Culture conditions: MG, 20°C, 1000 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +

Pleurotaenium ehrenbergii var. *ehrenbergii* (Brébisson) De Bary

309 Iriomote Isl. / Okinawa (1973-06)
C-467(IAM), Unialgal, Clonal, T.Ichimura (1973-10)
Culture conditions: MG, 20°C, 1000 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type +
Reference: 48

310 Iriomote Isl. / Okinawa (1973-06)
C-468(IAM), Unialgal, Clonal, T.Ichimura (1973-10)
Culture conditions: MG, 20°C, 1000 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater, Heterothallic, Mating type -
Reference: 48

Pleurotaenium nodosum var. *nodosum* (Bailey) Lundell

312 Higashihiroshima / Hiroshima (1983-10)
Unialgal, Clonal, F.Kasai (1983-10)
Culture conditions: CAM, 20°C, 1000 lx, 3M, (25°C, 1500 lx)
Characteristics: Freshwater

Pleurotaenium ovatum Nordstedt

313 Niimi / Okayama (1983-09)
Unialgal, Clonal, F.Kasai (1983-09)
Culture conditions: C, 20°C, 1000 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Polyedriopsis spinulosa (Schmidle) Schmidle

232 Tsukuba / Ibaraki (1984-05)
Unialgal, Clonal, F.Kasai (1984-05)
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Prorocentrum balticum (Lohmann) Loeblich III

516 Hachinohe / Aomori (1988-08)
Unialgal, Clonal, T.Sawaguchi (1988-09)
Culture conditions: ESM, 15°C, 3000 lx, 1M
Characteristics: Marine, Untransportable

Prorocentrum dentatum Stein

314 Hiuchi-Nada / Seto Inland Sea (1979-12)
Unialgal, Clonal, S.Yoshimatsu
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

Prorocentrum gracile Schütt

315 Harima-Nada / Seto Inland Sea
Axenic, Clonal, S.Yoshimatsu (1984-08)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

Prorocentrum lima (Ehrenberg) Dodge

517 Lake Obuchinuma / Aomori (1987-08)
Unialgal, Clonal, T.Sawaguchi (1987-08)
Culture conditions: WESM, 20°C, 4000 lx, 1M
Characteristics: Benthic, Marine,
Untransportable

Prorocentrum mexicanum Osorio Tafall

317 Harima-Nada / Seto Inland Sea
Axenic, Clonal, S.Yoshimatsu (1984-08)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

Prorocentrum micans Ehrenberg

12 Osaka Bay / Osaka (1981-07)
Axenic, Clonal, S.Yamochi
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
Reference: 143

218 Yashima Bay / Kagawa (1978-08)
Axenic, Clonal, K.Yuki
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

316 Matoya Bay / Mie (1984-09)
Axenic, Clonal, T.Sawaguchi (1984-09)
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

Prorocentrum minimum (Pavillard) Schiller

237 Osaka Bay / Osaka (1982-08)
Axenic, Clonal, M.M.Watanabe (1982-08)
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

238 Harima-Nada / Seto Inland Sea (1983-04)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable,
Untransportable

Prorocentrum triestinum Schiller

13 Osaka Bay / Osaka (1982-08)
Axenic, Clonal, M.M.Watanabe (1982-08)
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable

219 Nomi Bay / Kochi (1980-04)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine,
Untransportable
Reference: 143

Protoceratium reticulatum (Claparède et Lachmann) Bütschli

318 Matoya Bay / Mie (1984-09)
Axenic, Clonal, T.Sawaguchi (1984-09)
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

319 Naoshima Isl. / Kagawa (1982-07)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable
Reference: 143

Protogonyaulax affinis Inoue et Fukuyo

518 Harima-Nada / Seto Inland Sea (1980-09)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: ESM, WESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable

Protogonyaulax catenella (Whedon et Kofoid) Taylor

220 Tsuda Bay / Kagawa (1980-06)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

519 Owase Bay / Mie
Axenic, Clonal, T.Okaichi
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

520 Hachinohe Harbor / Aomori (1988-08)
Unialgal, Clonal, T.Sawaguchi (1988-08)
Culture conditions: ESM, 20°C, 3000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

Protogonyaulax tamarensis (Lebour) Taylor

239 Harima-Nada / Seto Inland Sea (1982-03)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: ESM, WESM, 15°C, 3000 lx, 1M
Characteristics: Red tide, Marine, Unstable, Untransportable

521 Hachinohe / Aomori (1988-08)
Unialgal, Clonal, T.Sawaguchi (1988-09)
Culture conditions: ESM, 15°C, 3000 lx, 1M
Characteristics: Marine, Untransportable

Pseudocarteria mucosa (Korschikov) Ettl

522 Izumi / Miyagi (1985-08)
Unialgal, Clonal, S.Suda (1985-08)
Culture conditions: AF-6, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Homothallic

523 Higashiyata River / Ibaraki (1983-07)
Unialgal, Clonal, S.Suda (1983-07)
Culture conditions: AF-6, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Homothallic
Reference: 128

524 Izumi / Miyagi (1985-08)
Unialgal, Clonal, S.Suda (1985-08)
Culture conditions: AF-6, 20°C, 2000 lx, 1M
Characteristics: Freshwater, Homothallic

Pseudopleurococcus printzii var. *longissimus* S.Watanabe

159 Kyoto (1975-03)
Unialgal, S.Watanabe (1975-03)
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Soil
KUC6-2(S.Watanabe)
Reference: 185

Pterosperma cristatum Schiller

221 Harima-Nada / Seto Inland Sea (1983-02)
Axenic, Clonal, S.Suda (1983-09)
Identified by: I.Inouye
Culture conditions: f/2, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine
Reference: 143

Pyramimonas aff. *amylifera*

251 Yashima Bay / Kagawa (1982-10)
Axenic, Clonal, S.Yoshimatsu
Identified by: S.Suda
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine
Reference: 143

320 Onagawa Bay / Miyagi (1984-08)
Axenic, Clonal, S.Suda (1984-09)
Culture conditions: f/2, ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine

Pyramimonas parkeae Norris et Pearson

254 Hachijo Isl. / Tokyo (1984-04)
Axenic, Clonal, S.Suda (1984-04)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Tide pool
Reference: 77

Pyramimonas tetrarhynchus Schmarda

525 Sapporo / Hokkaido (1986-04)
Axenic, Clonal, S.Suda (1986-04)
Culture conditions: AF-6, 20°C, 2000 lx, 1M
Characteristics: Freshwater

Pyrophacus steinii (Schiller) Wall et Dale

222 Harima-Nada / Seto Inland Sea (1981-07)
Axenic, Clonal, S.Yoshimatsu
Culture conditions: f/2, ESM, 20°C, 4000 lx, 2M
Characteristics: Red tide, Marine,
Untransportable
Reference: 143

321 Matoya Bay / Mie (1984-09)
Axenic, Clonal, T.Sawaguchi (1984-09)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Untransportable

Scenedesmus acuminatus var. ***tetradesmoides*** G.M.Smith

92 Lake Kasumigaura / Ibaraki (1983-08)
Axenic, Clonal, T.Hiwatari (1983-08)
Identified by: M.Watanabe
Culture conditions: CT, 20°C, 1000 lx, 2M
Characteristics: Indicator, Freshwater

Scenedesmus acutus Meyen

94 Kosaka River / Akita (1983-04)
Axenic, Clonal, A.Yuri (1983-05)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

95 Tsukuba / Ibaraki (1983-05)
Axenic, Clonal, S.Suda (1983-05)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater
Aq-S-1
References: 39, 173

120 Tsukuba / Ibaraki (1983-05)
Axenic, Clonal, S.Suda (1983-05)
Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater
Aq-S-2
Reference: 173

Scenedesmus dimorphus (Turpin) Kützing

93 Lake Kasumigaura / Ibaraki (1983-07)
Axenic, Clonal, F.Kasai (1983-07)

Identified by: M.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater
F-18-1
Reference: 173

119 Ozegahara / Gunma (1983-08)
Unialgal, Clonal, S.Suda (1983-09)
Identified by: T.Hiwatari
Culture conditions: C, 20°C, 1000 lx, 2M
Characteristics: Indicator, Freshwater

Scenedesmus quadricauda (Turpin) Brébisson sensu Chodat

96 Lake Shoji / Yamanashi (1981-08)
51-3B(TAC), Axenic, Clonal, M.Watanabe
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

Scenedesmus serratus (Corda) Bohlin

97 Lake Shoji / Yamanashi (1981-08)
51-3C(TAC), Unialgal, Clonal, M.Watanabe
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Indicator, Freshwater

Schroederia setigera (Schröder) Lemmermann

246 Lake Kasumigaura / Ibaraki (1983-08)
Axenic, Clonal, F.Kasai (1983-08)
Identified by: M.Watanabe
Culture conditions: C, 25°C, 3000 lx, 20D
Characteristics: Indicator, Freshwater

Scrippsiella precaria Montresor et Zingone

526 Hachinohe / Aomori (1988-08)
Unialgal, Clonal, T.Sawaguchi (1988-09)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Marine, Untransportable

Scrippsiella trochoidea (Stein) Loeblich III

369 Hachinohe Harbor / Aomori (1985-08)
Axenic, Clonal, T.Sawaguchi (1985-08)
Culture conditions: ESM, 20°C, 4000 lx, 1M
Characteristics: Red tide, Marine, Homothallic, Unstable, Untransportable

Selenastrum capricornutum Printz

35 Axenic, Clonal
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: AGP, Freshwater
References: 41, 86, 129, 186

Skeletonema costatum (Greville) Cleve

16 Harima-Nada / Seto Inland Sea (1982-02)
Unialgal, Clonal, M.M.Watanabe (1982-05)
Culture conditions: f/2, 5°C, 2000 lx, 1M
Characteristics: Red tide, Marine
Reference: 115

17 Harima-Nada / Seto Inland Sea (1983-02)
Unialgal, Clonal, M.M.Watanabe (1983-05)
Culture conditions: f/2, 5°C, 2000 lx, 1M
Characteristics: Red tide, Marine

223 Shodo Isl. / Kagawa (1979-07)
Unialgal, Clonal, K.Yuki
Culture conditions: f/2, 5°C, 2000 lx, 1M
Characteristics: Red tide, Marine

323 Off Kishiwada / Osaka Bay (1985-01)
Axenic, Clonal, S.Yamochi (1985-01)
Culture conditions: f/2, 5°C, 2000 lx, 1M
Characteristics: Red tide, Marine

324 Off Kobe / Osaka Bay (1985-07)
Axenic, S.Yamochi (1985-07)
Culture conditions: f/2, 5°C, 2000 lx, 1M
Characteristics: Red tide, Marine

Spinoclosterium cuspidatum (Bailey) Hirano

325 Higashihiroshima / Hiroshima (1983-10)
Unialgal, Clonal, T.Ichimura (1983-10)
Culture conditions: SW, 20°C, 1000 lx, 4M, (25°C, 1500 lx)
Characteristics: Freshwater, Homothallic
Reference: 51

Spirulina platensis (Nordstedt) Geitler

39 Lake Chad / Chad
M-135(IAM), Axenic, Clonal
Culture conditions: SOT, 20°C, 500 lx, 4M, (25°C, 1500 lx)
Characteristics: Salt water, Hydrogen evolution
References: 2, 48, 167, 169, 173

45 Lake Kasumigaura / Ibaraki (1975-11)
M-184(IAM), Unialgal, Clonal, M.M.Watanabe (1975-11)
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Water bloom, Freshwater
References: 48, 167, 169, 173

46 Lake Texcoco / Mexico
M-185(IAM), Axenic, Clonal
Culture conditions: SOT, 20°C, 500 lx, 4M, (25°C, 1500 lx)
Characteristics: Water bloom, Salt water, Hydrogen evolution
References: 2, 48, 167, 169, 173

Spirulina subsalsa Oersted

27 M-183(IAM), Axenic, Clonal
Culture conditions: MA, 25°C, 1500 lx, 1M
Characteristics: Freshwater
Reference: 48

527 Shikabe / Hokkaido (1976-04)
M-182(IAM), Unialgal, Clonal, M.M.Watanabe (1976-04)
Culture conditions: f/2, 25°C, 1500 lx, 1M
Characteristics: Marine

Reference: 48

Staurastrum dejectum (Brébisson) Ralfs

224 Lake Yamanaka / Yamanashi (1981-10)
53-1(TAC), Unialgal, Clonal, M.Watanabe
Culture conditions: C, 20°C, 1000 lx, 2M,
(20°C, 3000 lx)
Characteristics: Freshwater

Staurastrum inconspicuum Nordstedt

390 Oze / Gunma (1983-08)
Unialgal, Clonal, F.Kasai (1983-09)
Culture conditions: CAM, 20°C, 1000 lx, 3M,
(20°C, 1500 lx)
Characteristics: Freshwater

Staurastrum paradoxum Meyen

528 Lake Kasumigaura / Ibaraki (1982-12)
Unialgal, Clonal, M.H.Watanabe (1982-12)
Culture conditions: C, 20°C, 1000 lx, 2M,
(20°C, 3000 lx)
Characteristics: Freshwater

Stephanopyxis palmeriana (Greville) Grunow

327 Hachijo Isl. / Tokyo (1984-04)
Unialgal, Clonal, T.Sawaguchi (1984-04)
Culture conditions: f/2, 10°C, 2000 lx, 1M
Characteristics: Marine

Stichococcus bacillaris Nägeli

529 Watarase River / Gunma (1987-08)
Unialgal, F.Kasai (1987-08)
Culture conditions: C, 15°C, 1500 lx, 3M
Characteristics: Freshwater
AT2-16
Reference: 134

530 Watarase River / Gunma (1987-08)
Unialgal, F.Kasai (1987-09)
Culture conditions: C, 15°C, 1500 lx, 3M
Characteristics: Freshwater

AT5-17
Reference: 134

Stigeoclonium aestivale (Hazen) Collins
531 Miyata River / Ibaraki (1987-03)
Unialgal, F.Kasai (1987-04)
Culture conditions: C, 20°C, 1000 lx, 3M
Characteristics: Freshwater
2st-3-12
References: 133, 134

Stigeoclonium fasciculare var. ***fasciculare*** Kützing
532 Lake Mashu / Hokkaido (1987-08)
Clonal, F.Kasai (1987-09)
Culture conditions: C, 10°C, 500 lx, 3M, (10°C, 1500 lx)
Characteristics: Freshwater
M-2
Reference: 134

Synedra ulna var. ***ulna*** (Nitzsch) Ehrenberg
370 Lake Kasumigaura / Ibaraki (1985-04)
Unialgal, Clonal, T.Sawaguchi (1985-04)
Culture conditions: M Chu No.10, 15°C, 2000 lx, 1M
Characteristics: Freshwater

Synura peterusenii Korschikov
233 Higashiyata River / Ibaraki (1983-07)
Axenic, Clonal, S.Suda (1983-07)
Culture conditions: C, 20°C, 1500 lx, 2M
Characteristics: Indicator, Freshwater

Synura spinosa Korschikov
234 Tsuchiura / Ibaraki (1983-07)
Axenic, Clonal, S.Suda (1983-07)
Culture conditions: C, 20°C, 1500 lx, 2M
Characteristics: Indicator, Freshwater

Tabellaria flocculosa (Roth) Kützing

225 Oze / Fukushima (1983-08)
Unialgal, Clonal, M.M.Watanabe (1983-09)
Culture conditions: CSi, M Chu No.10, 15°C, 2000 lx, 1M
Characteristics: Indicator, Freshwater
Reference: 115

371 Tsuchiura / Ibaraki (1985-04)
Unialgal, Clonal, T.Sawaguchi (1985-04)
Culture conditions: CSi, M Chu No.10, 15°C, 2000 lx, 1M
Characteristics: Indicator, Freshwater

Tetracystis chlorococcoides (Korschikov) S.Watanabe

155 Mt. Eboshidake / Nagasaki (1975-08)
Axenic, Clonal, S.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Soil
3-EBO-1(S.Watanabe)
Reference: 185

Tetraedron incus (Teiling) G.M.Smith

392 Tsukuba / Ibaraki (1984-05)
Unialgal, Clonal, F.Kasai (1984-05)
Identified by: M.Watanabe
Culture conditions: C, 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Freshwater

Tetraselmis cordiformis (Carter) Stein

18 Oniishi / Gunma (1980-04)
Axenic, Clonal, M.M.Watanabe (1980-04)
Identified by: I.Inouye
Culture conditions: C, 20°C, 4000 lx, 1M
Characteristics: Water bloom, Freshwater
SM-6-9(M.M.Watanabe)
Reference: 173

533 Mitsukaido / Ibaraki (1985-07)
Axenic, Clonal, S.Suda (1985-07)
Culture conditions: C, 20°C, 2000 lx, 1M
Characteristics: Freshwater

Thalassionema nitzschioides (Grunow) Hustedt

534 Matoya Bay / Mie (1984-09)
Unialgal, Clonal, T.Sawaguchi (1984-09)
Culture conditions: f/2, 15°C, 3000 lx, 1M
Characteristics: Marine
Reference: 115

Thalassiosira pacifica Gran et Angst

535 Hachinohe Harbor / Aomori (1987-03)
Unialgal, Clonal, T.Sawaguchi (1987-03)
Culture conditions: f/2, 10°C, 2000 lx, 1M
Characteristics: Marine

Tolypothrix tenuis Kützing

37 Borneo
M-29(IAM), Unialgal, A.Watanabe
Identified by: K.Negoro
Culture conditions: MDM(S), 20°C, 500 lx, 4M, (25°C, 3000 lx)
Characteristics: Freshwater, Nitrogen fixation, Chromatic adaptation
References: 7, 12, 13, 14, 15, 16, 17, 19, 33, 34, 35, 48, 70, 84, 126, 140, 142, 146, 147, 148, 149, 150, 151, 152, 154, 195

Treubaria triappendiculata Bernard

394 Lake Kasumigaura / Ibaraki (1983-10)
Axenic, Clonal, F.Kasai (1983-10)
Identified by: Y.Niiyama
Culture conditions: C, 20°C, 500 lx, 2M, (25°C, 3000 lx)
Characteristics: Freshwater

Ulothrix variabilis Kützing

329 Takatori River / Ibaraki (1984-12)
Unialgal, Clonal, S.Suda (1984-12)
Identified by: M.M.Watanabe

Culture conditions: C, 20°C, 1500 lx, 3M
Characteristics: Freshwater
References: 133, 134

Ulothrix zonata (Weber et Mohr) Kützing

536 Hitachi / Ibaraki (1987-05)
Unialgal, F.Kasai (1987-06)
Culture conditions: C, 10°C, 500 lx, 3M, (10°C, 1500 lx)
Characteristics: Freshwater
4st-1-24
Reference: 134

537 Shirai River / Sapporo (1987-10)
Unialgal, F.Kasai (1987-10)
Culture conditions: C, 10°C, 500 lx, 3M, (10°C, 1500 lx)
Characteristics: Freshwater
2Tst-1-1
Reference: 134

Urnella terrestris Playfair

156 Pokhara / Nepal (1975-10)
Axenic, Clonal, S.Watanabe
Culture conditions: C(S), 20°C, 500 lx, 3M, (25°C, 3000 lx)
Characteristics: Soil
NPL-111(S.Watanabe)
Reference: 184

Uroglena americana Calkins

395 Lake Biwa / Shiga (1978-05)
Monoxenic, Y.Ishida (1978-05)
Culture conditions: URO, 15°C, 2000 lx, 1M
Characteristics: Water bloom, Phagotrophic, Freshwater, Untransportable
Strain 78
References: 68, 69

Uronema confervicolum Lagerheim

538 Miyata River / Ibaraki (1987-05)
Unialgal, F.Kasai (1987-05)

Culture conditions: C, 20°C, 1000 lx, 3M
Characteristics: Freshwater
4st-2-10
References: 133, 134

Uronema gigas Vischer

539 Miyata River / Ibaraki (1987-05)
Unialgal, F.Kasai (1987-05)
Culture conditions: C, 20°C, 1000 lx, 3M
Characteristics: Freshwater
4st-3-5
Reference: 134

Uronema gigas Visher

540 Miyata River / Ibaraki (1987-05)
Unialgal, F.Kasai (1987-05)
Culture conditions: C, 20°C, 1000 lx, 3M
Characteristics: Freshwater
4st-0-16
Reference: 134

Volvox aureus Ehrenberg

241 Nagatoro / Saitama (1969-11)
C-419(IAM), Unialgal, Clonal, T.Ichimura
Culture conditions: VT, 25°C, 3000 lx, 20D
Characteristics: Freshwater, Untransportable
Reference: 48

396 Koshokugun / Nagano (1983-08)
Unialgal, Y.Ogasawara (1983-08)
Culture conditions: VT, 20°C, 3000 lx, 20D
Characteristics: Freshwater, Homothallic,
Untransportable

Volvox aureus var. ***aureus*** Ehrenberg

541 Lake Yamanaka / Yamanashi (1981)
Axenic, Clonal, H.Nozaki (1981-07)
Culture conditions: VT, 20°C, 1500 lx, 1M
Characteristics: Freshwater

542 Lake Yamanaka / Yamanashi (1981)
Axenic, Clonal, H.Nozaki (1981-07)
Culture conditions: VT, 20°C, 1500 lx, 1M
Characteristics: Freshwater

Volvox carteri Stein

397 Ichinomiya / Aichi (1983-06)
Unialgal, Clonal, Y.Ogasawara (1983-06)
Culture conditions: VT, 25°C, 3000 lx, 20D
Characteristics: Freshwater, Female,
Untransportable

398 Ichinomiya / Aichi (1983-06)
Unialgal, Clonal, Y.Ogasawara (1983-06)
Culture conditions: VT, 25°C, 3000 lx, 20D
Characteristics: Freshwater, Male,
Untransportable

Volvox prolificus Iyengar

543 Unialgal, Clonal, Y.Ogasawara
Identified by: S.Suda
Culture conditions: VT, 25°C, 3000 lx, 1M
Characteristics: Freshwater

Volvox tertius Meyer

544 Kisofukushima / Nagano (1986-08)
Unialgal, Y.Ogasawara (1986-08)
Culture conditions: MG, VT, 20°C, 3000 lx, 20D
Characteristics: Freshwater, Homothallic

Volvulina steinii Playfair

545 Hayama / Kanagawa (1980-12)
Axenic, Clonal, H.Nozaki (1981-01)
Culture conditions: VTAC, 20°C, 1000 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type -

546 Hayama / Kanagawa (1980-12)
Axenic, Clonal, H.Nozaki (1981-01)
Culture conditions: VTAC, 20°C, 1000 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type +

542 Lake Yamanaka / Yamanashi (1981)
Axenic, Clonal, H.Nozaki (1981-07)
Culture conditions: VT, 20°C, 1500 lx, 1M
Characteristics: Freshwater

Volvox carteri Stein

397 Ichinomiya / Aichi (1983-06)
Unialgal, Clonal, Y.Ogasawara (1983-06)
Culture conditions: VT, 25°C, 3000 lx, 20D
Characteristics: Freshwater, Female,
Untransportable

398 Ichinomiya / Aichi (1983-06)
Unialgal, Clonal, Y.Ogasawara (1983-06)
Culture conditions: VT, 25°C, 3000 lx, 20D
Characteristics: Freshwater, Male,
Untransportable

Volvox prolificus Iyengar

543 Unialgal, Clonal, Y.Ogasawara
Identified by: S.Suda
Culture conditions: VT, 25°C, 3000 lx, 1M
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Volvox tertius Meyer

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Culture conditions: MG, VT, 20°C, 3000 lx, 20D
Characteristics: Freshwater, Homothallic

Volvulina steinii Playfair

545 Hayama / Kanagawa (1980-12)
Axenic, Clonal, H.Nozaki (1981-01)
Culture conditions: VTAC, 20°C, 1000 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type -

546 Hayama / Kanagawa (1980-12)
Axenic, Clonal, H.Nozaki (1981-01)
Culture conditions: VTAC, 20°C, 1000 lx, 1M
Characteristics: Freshwater, Heterothallic,
Mating type +

PROTOZOA

Aspidisca costata Dujardin

399 Tsukuba / Ibaraki (1986-04)
Monoxenic, Y.Kuniyasu (1986-04)
Identified by: Y.Kuniyasu/Y.Inamori
Culture conditions: LE, 10°C, 20D, (20°C)
Characteristics: Freshwater, Bio-film, Untransportable

Oxytricha fallax Stein

400 Tsukuba / Ibaraki (1986-06)
Y.Kuniyasu (1986-06)
Identified by: Y.Kuniyasu/Y.Inamori
Culture conditions: LE, 10°C, 20D, (20°C)
Characteristics: Freshwater, Bio-film, Untransportable

Paramecium bursaria Forke

401 Tsukuba / Ibaraki (1986-04)
Monoxenic, Y.Kuniyasu (1986-04)
Identified by: Y.Kuniyasu/Y.Inamori
Culture conditions: LE, 10°C, 20D, (20°C)
Characteristics: Freshwater, Bio-film, Untransportable

Tetrahymena pyriformis Ehrenberg

403 Lake Kasumigaura / Ibaraki (1976-08)
Mixed, R.Sudo (1976-08)
Culture conditions: LE, 10°C, 20D, (20°C)
Characteristics: Freshwater, Untransportable

Vorticella convallaria Linné

404 Tsukuba / Ibaraki (1986-04)
Mixed, Y.Kuniyasu (1986-04)
Identified by: Y.Kuniyasu/Y.Inamori
Culture conditions: LE, 10°C, 20D, (20°C)
Characteristics: Freshwater, Untransportable

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510 *Phormidium mucicola*
511 *Phormidium ramosum*
512 *Phormidium tenue*
513 *Pinnularia gibba*
514 *Planktonema lauterbornii*
515 *Plectonema radiosum*
516 *Prorocentrum balticum*
517 *Prorocentrum lima*
518 *Protogonyaulax affinis*
519 *Protogonyaulax catenella*
520 *Protogonyaulax catenella*
521 *Protogonyaulax tamarensis*
522 *Pseudocarteria mucosa*
523 *Pseudocarteria mucosa*
524 *Pseudocarteria mucosa*
525 *Pyramimonas tetrarhynchus*
526 *Scrippsiella precaria*
527 *Spirulina subsalsa*
528 *Staurastrum paradoxum*
529 *Stichococcus bacillaris*
530 *Stichococcus bacillaris*
531 *Stigeoclonium aestivale*
532 *Stigeoclonium fasciculare* var. *fasciculare*
533 *Tetraselmis cordiformis*
534 *Thalassionema nitzschioides*
535 *Thalassiosira pacifica*
536 *Ulothrix zonata*
537 *Ulothrix zonata*
538 *Uronema confervicolum*
539 *Uronema gigas*
540 *Uronema gigas*
541 *Volvox aureus* var. *aureus*
542 *Volvox aureus* var. *aureus*
543 *Volvox prolificus*
544 *Volvox tertius*
545 *Volvulina steinii*
546 *Volvulina steinii*
547 *Cyanophora paradoxa*

2. Systematic index

ALGAE

Cyanophyceae

Glaucophyceae

Rhodophyceae

Cryptophyceae

Dinophyceae

Chrysophyceae

Bacillariophyceae

Haptophyceae

Raphidophyceae

Euglenophyceae

Prasinophyceae

Chlorophyceae

Oligohymenophorea

Polyhymenophorea

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