Two Alternative Proposals for Abbreviations of Names of Genera Suggested for Coding Microbiological Data

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Two alternative proposals for abbreviations of names of genera are suggested for coding microbiological data and are compared to that of Johnson et al. (1976).

The proposal for abbreviations of generic names by Johnson et al. (1) offers a solution to a continual problem facing systems analysts and computer programmers: a type of "inverse Parkinson's Law" problem where "the amount of data must be contracted to fit the available computer space." In this instance the problem is caused by the variable length of names of taxa.

However, the list of abbreviations as proposed by Johnson et al. does provide a difficulty for the computer programmer who wishes to use the computer to perform changes from generic names to abbreviations and vice versa and to automatically arrange the names or abbreviations in alphabetical order for indexing purposes. The problem is that the letters in each abbreviation are not in alphabetic sequence. This is significant for the following reason.

When performing interchanges of this nature by computer it is the normal procedure to arrange the information in a two-column table within the computer memory; in this case generic names are placed in column 1 and abbreviations are placed in column 2. To find an abbreviation for any generic name, one has simply to search down column 1 for the name, and then obtain the abbreviation from the same row in column 2. The procedure by which the search is performed is significant. If the generic names are in any order and a sequential searching method is applied (i.e., the names are looked at in turn, starting with the first, and following with the second, third, etc.), then a list of 64 names would require an average of 32 comparisons to find any given name. If, however, the names are in alphabetic order, a procedure such as the binary search in the Appendix can be applied. This procedure would find any name in an ordered list of length of 64 names in no more than 8 comparisons. Such savings in the number of comparisons needed can become extremely important where repeated searches of large lists are required.

The proposed list of Johnson et al. is perfectly

satisfactory for conversion from generic name to abbreviation using the binary search technique, as the generic names are in alphabetic order. However, to convert from abbreviation to generic name requires either of the following:

(i) a second table, with column 1 being the abbreviations in alphabetic order and column 2 being the generic names.

This second table of approximately 300 genera and abbreviations would require additional computer memory. (On the PDP-10 computer used by the World Data Center for Microorganisms at the University of Queensland, Brisbane, Australia, each table would occupy 5% of the normally available main memory space).

(ii) a sequential search down column 2 of the original table, causing an increase in computer time through increased numbers of comparisons.

Both of the above become unnecessary if the list of abbreviations is also compiled in alphabetic sequence to correspond to the list of generic names. With both names and abbreviations in alphabetic sequence (i) only one table is required in the computer memory and a single searching procedure (the binary search) can be used for conversions from generic name to abbreviation and vice versa, and (ii) the abbreviations can be used for indexing.

Such a four-character abbreviation list is specified in Table 1. In producing this list, an attempt was made to follow the original list and the code of abbreviations of Johnson et al.

Johnson et al. admit their list contains some inconsistencies. Further inconsistencies were, by necessity, introduced to force alphabetic ordering into the four-character abbreviation. Of particular note is the change in the Code for Abbreviations (Table 1 of reference 1)—BACILLUS becomes BA and BACTER etc. becomes BC. Johnson et al. only use letters in the abbreviation which are present in the full generic name. This has not been possible in the alphabetic list; thus, BARTONELLA becomes BDTL, ACTINOPYCNIDIUM becomes ACTQ.

Many of the inconsistencies can be removed

TABLE 1. Abbreviations for bacterial genera

Genus	Johnson et al. proposal (1)	4-Char- acter al- pha- betic pro- posal	5-Charac- ter alpha- betic pro- posal	Genus	Johnson et al. proposal (1)	4-Char- acter al- pha- betic pro- posal	5-Charac- ter alpha- betic pro- posal
<i>Acetobacter</i>	ACBT	ACBC	ACEBC	<i>Cristispira</i>	CRSP	CRSP	CRTSP
<i>Acholeplasma</i>	ACPL	ACHL	ACHLP	<i>Cystobacter</i>	CSBT	CSBC	CYSBC
<i>Achromatium</i>	ACMT	ACHM	ACHMT	<i>Cytophaga</i>	CTFG	CTFG	CYTFG
<i>Achromonema</i>	ACNM	ACHR	ACHRO	<i>Dactylosporangium</i>	DTSO	DCSO	DCTSO
<i>Acidaminococcus</i>	AACO	ACIC	ACICO	<i>Dermatophilus</i>	DMFL	DEMF	DEMFL
<i>Acinetobacter</i>	ANBT	ACNB	ACNBC	<i>Derxia</i>	DRXA	DERX	DERXA
<i>Actinobacillus</i>	ATBC	ACTB	ACTBA	<i>Desmanthos</i>	DMTS	DESM	DESMT
<i>Actinobifida</i>	ATBI	ACTF	ACTBI	<i>Desulfomonas</i>	Not listed	DESN	DESNS
<i>Actinomyces</i>	ATMY	ACTN	ACTMY	<i>Desulfotomaculum</i>	DSMC	DEST	DESTM
<i>Actinoplanes</i>	ATPN	ACTP	ACTPN	<i>Desulfovibrio</i>	DSVB	DESV	DESVB
<i>Aegyptianella</i>	AGTL	AEGT	AEGTL	<i>Ectothiorhodospira</i>	ETSP	ECSP	ECTSP
<i>Aerococcus</i>	ARCO	AERC	AERCO	<i>Edwardsiella</i>	EDWL	EDWL	EDWSL
<i>Aeromonas</i>	ARMN	AERM	AERMN	<i>Ehrlichia</i>	EHRL	EHRL	EHRLC
<i>Agrobacterium</i>	AGBT	AGBC	AGRBC	<i>Enterobacter</i>	ENBT	ENBC	ENTBC
<i>Alcaligenes</i>	ALC	ALCA	ALCAL	<i>Eperythrozoon</i>	EPRZ	EPRZ	EPRYZ
<i>Alysella</i>	ALSL	ALSL	ALYSL	<i>Erwinia</i>	ERWN	ERWN	ERWNA
<i>Amoebobacter</i>	AMBT	AMBC	AMBBC	<i>Erysipelothrix</i>	ESTX	ERYT	ERYTX
<i>Amorphosporangium</i>	AMSP	AMFS	AMFSP	<i>Escherichia</i>	ESCH	ESCH	ESCHR
<i>Ampullariella</i>	APRL	AMPL	AMPRL	<i>Eubacterium</i>	EUBT	EUBC	EUABC
<i>Anaerovibrio</i>	Not listed	ANAE	ANAEV	<i>Flavobacterium</i>	FVBT	FLVB	FLVBC
<i>Anaplasma</i>	ANPL	ANAP	ANAPL	<i>Flexibacter</i>	FXBT	FLXB	FLXBC
<i>Ancalomicrobium</i>	ANMI	ANMI	ANCMi	<i>Flexithrix</i>	FXTX	FLXT	FLXTX
<i>Arachnia</i>	ARAC	ARAC	ARACH	<i>Francisella</i>	FRCL	FRCL	FRNCL
<i>Archangium</i>	ACNG	ARCN	ARCNG	<i>Frankia</i>	FRNK	FRNK	FRNKA
<i>Arthrobacter</i>	ARBT	ARTB	ARTBC	<i>Fusobacterium</i>	FSBT	FSOB	FSOBC
<i>Asticcacaulis</i>	ASCL	ATCL	ASTCL	<i>Gallionella</i>	GLNL	GALN	GALNL
<i>Azomonas</i>	AZMN	AZMN	AZOMN	<i>Gemella</i>	GMLL	GEMA	GEMLA
<i>Azotobacter</i>	AZBT	AZTB	AZTBC	<i>Geodermatophilus</i>	GDMF	GEMF	GEODF
<i>Bacillus</i>	BC	BACL	BACLS	<i>Gluconobacter</i>	GNBT	GNBC	GLNBC
<i>Bacterionema</i>	BTNM	BCNM	BACNM	<i>Grahamella</i>	GRML	GRML	GRHML
<i>Bacteroides</i>	BTRD	BCRD	BACRD	<i>Haemobartonella</i>	HMBL	HAMB	HAMBL
<i>Bartonella</i>	BRTL	BDTL	BARTL	<i>Haemophilus</i>	HMFL	HAMP	HAMPL
<i>Bdellovibrio</i>	BDVB	BDVB	BDLVB	<i>Hafnia</i>	HAFN	HFNA	HFNIA
<i>Beggiatoa</i>	BGGT	BEGT	BEGIT	<i>Halobacterium</i>	HLBT	HLBC	HLOBC
<i>Beijerinckia</i>	BEIJ	BEIJ	BEIJK	<i>Halococcus</i>	HLCO	HLCO	HLOCO
<i>Bifidobacterium</i>	BIBT	BIBC	BIFBC	<i>Herpetosiphon</i>	HPSN	HRSN	HRTSN
<i>Blastobacter</i>	BSBT	BSLB	BLSBC	<i>Hyphomicrobium</i>	HFMI	HYMI	HYFMI
<i>Blattabacterium</i>	BLBT	BLTB	BLTBC	<i>Hyphomonas</i>	HFMN	HYMN	HYFMN
<i>Bordetella</i>	BDTL	BORD	BORDL	<i>Kingella</i>	Not listed	KING	KINGL
<i>Borrelia</i>	BRRL	BORL	BORRL	<i>Kitasatoa</i>	KTST	KITS	KITST
<i>Brachyarcus</i>	BRAC	BRAC	BRACY	<i>Klebsiella</i>	KLEB	KLEB	KLEBS
<i>Branhamella</i>	BNHL	BRAN	BRANH	<i>Kurthia</i>	KURT	KURT	KURTA
<i>Brucella</i>	BRCL	BRUC	BRUCL	<i>Kusnezovia</i>	KNZO	KUSZ	KUSNZ
<i>Butyrivibrio</i>	BUVB	BUVB	BUTVB	<i>Lachnospira</i>	LCSP	LACS	LACSP
<i>Calymmatobacterium</i>	CMBT	CALY	CALBC	<i>Lactobacillus</i>	LCBC	LACT	LACTB
<i>Campylobacter</i>	CPBT	CAMP	CAMBC	<i>Lamprocystis</i>	LMCS	LAMC	LAMCS
<i>Cardiobacterium</i>	CDBT	CARD	CARBC	<i>Lampropedia</i>	LMPD	LAMP	LAMPD
<i>Caryophanon</i>	CARY	CARY	CARYF	<i>Leptospira</i>	LPSP	LESP	LEPSP
<i>Caulobacter</i>	CLBT	CAUB	CAUBC	<i>Leptothrix</i>	LPTX	LETH	LEPTX
<i>Caulococcus</i>	CLCO	CAUC	CAUCO	<i>Leptotrichia</i>	LPTC	LETT	LETTC
<i>Cellulomonas</i>	CEMN	CELM	CELMN	<i>Leuconostoc</i>	LEUC	LEUC	LEUCN
<i>Chlamydia</i>	CLMD	CHAM	CHAMD	<i>Leucothrix</i>	LETX	LEUX	LEUTX
<i>Chlorobium</i>	CLOR	CHLB	CHLBM	<i>Lieskeella</i>	LSKL	LISK	LISKL
<i>Chloropseudomonas</i>	CSMN	CHLP	CHLMN	<i>Listeria</i>	LIST	LSTR	LSTRA
<i>Chondromyces</i>	CNMY	CHNM	CHOMY	<i>Lucibacterium</i>	LUBT	LUBC	LUCBC
<i>Chromatium</i>	CMTM	CHRA	CHRAT	<i>Macromonas</i>	MAMN	MAMN	MACMN
<i>Chromobacterium</i>	CRBT	CHRB	CHRBC	<i>Megasphaera</i>	MGSF	MASF	MEGSF
<i>Citrobacter</i>	CTBT	CITB	CITBC	<i>Melittangium</i>	MLNG	MEIT	MEITN
<i>Clathrochloris</i>	CLCH	CLCH	CLATR	<i>Metallogenium</i>	MLOG	MELG	MELGN
<i>Clonothrix</i>	CNTX	CLNT	CLNTX	<i>Methanobacterium</i>	MEBT	MENB	MENBC
<i>Clostridium</i>	CLOS	CLOS	CLOST	<i>Methanococcus</i>	MECO	MENC	MENCO
<i>Corynebacterium</i>	CNBT	CNBC	CONBC	<i>Methanosarcina</i>	MESR	MENS	MENSA
<i>Cowdria</i>	CWDR	COWD	COWDR	<i>Methylococcus</i>	MLCO	MEYC	MEYCO
<i>Coxiella</i>	COXL	COXL	COXLA	<i>Methylomonas</i>	MLMN	MEYM	MEYMN
<i>Crenothrix</i>	CRTX	CRNX	CRNTX	<i>Microbispora</i>	MBSO	MICB	MICBS

TABLE 1-Continued

Genus	Johnson et al. proposal (1)	4-Char- acter al- pha- betic pro- posal	5-Charac- ter alpha- betic pro- posal	Genus	Johnson et al. proposal (1)	4-Char- acter al- pha- betic pro- posal	5-Charac- ter alpha- betic pro- posal
<i>Micrococcus</i>	MICO	MICO	MICCO	<i>Saprosira</i>	SASP	SAPR	SAPRS
<i>Microcylus</i>	MICY	MICY	MICCY	<i>Sarcina</i>	SR	SARC	SARCN
<i>Microellobosporia</i>	MLSO	MILS	MILSO	<i>Selenomonas</i>	SEMNI	SELN	SELMN
<i>Micromonospora</i>	MOSO	MIMS	MIMSO	<i>Seliberia</i>	SEBR	SELR	SELRA
<i>Micropolyspora</i>	MPSO	MIPS	MIPSO	<i>Serratia</i>	SER	SERA	SERTA
<i>Moraxella</i>	MRXL	MRXL	MRXLA	<i>Shigella</i>	SHGL	SHGL	SHIGL
<i>Mycobacterium</i>	MYBT	MYBC	MYCBC	<i>Siderocapsa</i>	SDCP	SICA	SIDCA
<i>Mycoplasma</i>	MYPL	MYPL	MYCPL	<i>Siderococcus</i>	SDCO	SICO	SIDCO
<i>Myxococcus</i>	MXCO	MYXC	MYXCO	<i>Simonsiella</i>	SMSL	SIMS	SIMSL
<i>Nannocystis</i>	NACS	NACS	NANCS	<i>Sphaerotilus</i>	STTL	SPAR	SPART
<i>Naumannella</i>	NMNL	NAUM	NAUML	<i>Spirillospora</i>	SPSO	SPLS	SPLSO
<i>Neisseria</i>	NEIS	NEIS	NEISA	<i>Spirillum</i>	SP	SPLU	SPLUM
<i>Neorickettsia</i>	NERK	NERK	NERKT	<i>Spirochaeta</i>	SPCT	SPRC	SPRCT
<i>Neusikia</i>	NVSK	NEVS	NVSK	<i>Spiroplasma</i>	SPPL	SPRP	SPRPL
<i>Nitrobacter</i>	NIBT	NIBC	NITBC	<i>Sporichthya</i>	SOCH	SRCH	SRCHT
<i>Nitrococcus</i>	NICO	NICO	NITCO	<i>Sporocytophaga</i>	SOCY	SRCY	SRCYT
<i>Nitrosococcus</i>	NOCO	NOCO	NOSCO	<i>Sporolactobacillus</i>	SOLC	SRLB	SRLBA
<i>Nitrosolobus</i>	NOLB	NOLB	NOSLB	<i>Sporosarcina</i>	SOSR	SRSC	SRSRC
<i>Nitrosomonas</i>	NOMN	NOMN	NOSMN	<i>Staphylococcus</i>	SFCO	STAF	STAFS
<i>Nitrosospira</i>	NOSP	NOSO	NOSSO	<i>Stigmatella</i>	SGML	STAT	STMTL
<i>Nitrospina</i>	NISN	NOSP	NOSSP	<i>Streptobacillus</i>	STBC	STBA	STRBA
<i>Nocardia</i>	NOC	NRDA	NRDIA	<i>Streptococcus</i>	STCO	STCO	STRCO
<i>Ochrobium</i>	OCRB	OCHB	OSCBM	<i>Streptomyces</i>	STMY	STMY	STRMY
<i>Oscillospira</i>	OSSP	OSSP	OSCSP	<i>Streptosporangium</i>	STSO	STSO	STRSO
<i>Paracoccus</i>	PRCO	PACO	PARCO	<i>Streptothrix</i>	STTX	STTX	STRTX
<i>Paranaplasma</i>	PRPL	PAPL	PARPL	<i>Streptovorticillum</i>	STVC	STVC	STRVC
<i>Pasteurella</i>	PSTL	PASL	PASTL	<i>Succinimonas</i>	SCMN	SUCM	SUCMN
<i>Pasteuria</i>	PSIA	PAST	PASTR	<i>Succinivibro</i>	SCVB	SUCV	SUCVB
<i>Pediococcus</i>	PDCO	PDCO	PEDCO	<i>Sulfolobus</i>	SULB	SULB	SULFB
<i>Pedomicrobium</i>	PDMI	PDMI	PEDMI	<i>Symbiotes</i>	SMBI	SYMB	SYMBI
<i>Pelodictyon</i>	PEDT	PELT	PELDT	<i>Thermoactinomyces</i>	TMAT	TEAM	TEAMY
<i>Pelonema</i>	PENM	PENM	PELNM	<i>Thermomonospora</i>	TMMO	TEMO	TEMNS
<i>Peloploca</i>	PEPC	PEPC	PELPC	<i>Thermoplasma</i>	TMPL	TEPL	TEMLP
<i>Pelosigma</i>	PESM	PESM	PELSM	<i>Thermus</i>	TM	TERM	TERMS
<i>Peptococcus</i>	PTCO	PITC	PETCO	<i>Thiobacillus</i>	THBC	THBA	THIBA
<i>Peptostreptococcus</i>	PSCO	PJTS	PETSC	<i>Thiobacterium</i>	THBT	THBC	THIBC
<i>Pfeifferella</i>	Not listed	FRL	PFERL	<i>Thiocapsa</i>	THCP	THCP	THICP
<i>Photobacterium</i>	PHBT	PHBC	PHOBC	<i>Thiocystis</i>	THCS	THCS	THICS
<i>Phragmidiothrix</i>	PHTX	PHTX	PHRTX	<i>Thiodendron</i>	THDD	THDD	THIDD
<i>Pilimelia</i>	PIML	PIML	PILML	<i>Thiodictyon</i>	THDT	THDT	THIDT
<i>Planctomyces</i>	PTMY	PLCM	PLCMY	<i>Thiopedia</i>	THPD	THPD	THIPD
<i>Planobispora</i>	PBSO	PLOB	PLOBS	<i>Thioploca</i>	THPC	THPL	THIPL
<i>Planococcus</i>	PNCO	PLOC	PLOCO	<i>Thiosarcina</i>	THSR	THSC	THISC
<i>Planomonospora</i>	PMSO	PLOM	PLOMS	<i>Thiospira</i>	THSP	THSP	THISP
<i>Plesiomonas</i>	PLMN	PLSM	PLSMN	<i>Thiospirillum</i>	THSL	THSR	THISR
<i>Polyangium</i>	PONG	PONG	PONGM	<i>Thiothrix</i>	THTX	THTX	THITX
<i>Promicromonospora</i>	Not listed	PRAM	PRMSO	<i>Thiovulum</i>	THVL	THVL	THIVL
<i>Propionibacterium</i>	PRBT	PRBC	PRPBC	<i>Toxothrix</i>	TOTX	TOTX	TOXTX
<i>Prosthecochloris</i>	PCCL	PRSC	PRSCL	<i>Treponema</i>	TREP	TREP	TREPNI
<i>Prosthecomicrobium</i>	PCMI	PRSM	PRSMI	<i>Ureaplasma</i>	Not listed	URPL	UREPL
<i>Proteus</i>	PROT	PRTS	PRTUS	<i>Veillonella</i>	VEIL	VEIL	VEILN
<i>Pseudomonas</i>	PSMN	PSMN	PSDMN	<i>Vibrio</i>	VB	VIBR	VIBRO
<i>Pseudonocardia</i>	PSNC	PSNC	PSDNC	<i>Vitreoscilla</i>	VITR	VITR	VITRS
<i>Rhizobium</i>	RHIZ	RHIZ	RHIZB	<i>Wolbachia</i>	WLBC	WLBC	WOLBC
<i>Rhodomicrobium</i>	ROMI	RHMI	RHOMI	<i>Xanthomonas</i>	XNMN	XNMN	XANMN
<i>Rhodopseudomonas</i>	ROPS	RHPS	RHOPS	<i>Yersinia</i>	YERS	YERS	YERSN
<i>Rhodospirillum</i>	ROSP	RHSP	RHOSP	<i>Zoogloea</i>	ZOGL	ZOGL	ZOGLN
<i>Rickettsia</i>	RKTS	RICK	RICKT	<i>Zymomonas</i>	ZYMN	ZYMN	ZYMMN
<i>Rickettsiella</i>	RKSL	RISL	RKSL	Genera of uncertain standing			
<i>Rochalimaea</i>	RKLM	ROLM	ROCLM	<i>Achromobacter</i>	ACHR	ACHO	ACHRM
<i>Rothia</i>	ROTH	ROTH	ROTHA	<i>Actinomonospora</i>	ATMO	ACTM	ACTMS
<i>Ruminococcus</i>	RMCO	RUCO	RUMCO	<i>Actinopycnidium</i>	ATPN	ACTQ	ACTPY
<i>Saccharomonospora</i>	Not listed	SACS	SACSO	<i>Actinosclerotium</i>	ATSC	ACTR	ACTSC
<i>Salmonella</i>	SAML	SALM	SALMN	<i>Actinosporangium</i>	ATSO	ACTS	ACTSO

TABLE 1-Continued

Genus	Johnson et al. proposal (1)	4-Char- acter al- pha- betic pro- posal	5-Charac- ter al- pha- betic pro- posal
<i>Ampullaria</i>	APUL	*	*
<i>Aquaspirillum</i>	AQSP	AQSP	AQASP
<i>Beneckea</i>	SNKA	BENK	BENKA
<i>Betabacterium</i>	BEBT	BETB	BETBC
<i>Betacoccus</i>	BECO	BETC	BETCO
<i>Blastocaulis</i>	BSCL	BLSC	BLSCA
<i>Brevibacterium</i>	BVBT	BREVB	BREVB
<i>Catenabacterium</i>	CABT	CATB	CATBC
<i>Cellvibrio</i>	CEVB	CELV	CELVB
<i>Chlorochromatium</i>	CLMT	CHLC	CHLCM
<i>Cillobacterium</i>	CILB	CILB	CILBC
<i>Cladothrix</i>	CLTX	CLAD	CLADX
<i>Diplococcus</i>	DPCO	DIPC	DIPCO
<i>Eikenella</i>	EKNL	EKNL	EKNLA
<i>Elytrosporangium</i>	ELSO	ELSO	ELYSO
<i>Ferribacterium</i>	FRBT	FERB	FERBC
<i>Fusiformis</i>	FSFM	FSIF	FSIFM
<i>Fusocillus</i>	FSCL	FSOC	FSOCL
<i>Gaffkya</i>	GFKY	**	**
<i>Herellea</i>	HERL	**	**
<i>Hydrogenomonas</i>	HYMN	HYDM	HYDMN
<i>Intrasporangium</i>	ITSO	ITSO	ITRSO
<i>Levinea</i>	LEVN	LEVN	LEVNA
<i>Lingelsheimia</i>	LNGM	LNGM	LNGSM
<i>Methanospirillum</i>	MESP	MENU	MENSP
<i>Methylovibrio</i>	MLVB	MEYV	MEYVB
<i>Microbacterium</i>	MIBT	MIBA	MICBA
<i>Microtetraspora</i>	MTSO	MITO	MITSO
<i>Mima</i>	MIMA	**	**
<i>Myxobacter</i>	MYBT	MYXB	MYXBC
<i>Oceanomonas</i>	OCMN	OCMN	OCEMN
<i>Oceanospirillum</i>	OCSP	OCNS	OCENS
<i>Odontomyces</i>	ODMY	ODMY	ODTMY
<i>Oscillaria</i>	OSLR	*	*
<i>Oscillatoria</i>	OSLT	*	*
<i>Pectobacterium</i>	PCBT	PCBC	PCTBC
<i>Providencia</i>	PRVD	PRVD	PRVDN
<i>Pseudobacterium</i>	PSBT	PSBC	PSDBC
<i>Ramibacterium</i>	RMBT	RABC	RAMBC
<i>Rhodotheca</i>	ROTC	RHTC	RHTCE
<i>Ristella</i>	RSTL	RIST	RISTL
<i>Saccharomonas</i>	SAMN	SACM	SACMN
<i>Siderobacter</i>	SDBT	SIBC	SIDBC
<i>Sideromonas</i>	SDMN	SIDM	SIDMN
<i>Sideronema</i>	SDNM	SIDN	SIDNM
<i>Siderophacus</i>	SDFC	SIDP	SIDPC
<i>Siderosphaera</i>	SDSF	SIDS	SIDSF
<i>Sorangium</i>	SRNG	SONG	SORNG
<i>Sphaerophorus</i>	SFFR	SPAF	SPAFR
<i>Spironema</i>	SPNM	SPRN	SPRNM
<i>Spiroschaudinina</i>	SPSD	SPSD	SPSCD
<i>Stelangium</i>	SLNG	STAG	STANG
<i>Streptobacterium</i>	STBT	STBC	STRBC
<i>Streptopycnidium</i>	STPN	STPN	STRPN
<i>Sulfomonas</i>	SUMN	SUMN	SULMN
<i>Sulfospirillum</i>	SUSP	SUSP	SULSP
<i>Thermobacterium</i>	TMBT	TEBC	TEMBC
<i>Thermopolyspora</i>	TMPO	TEPO	TEMPO
<i>Thermotremptomyces</i>	TMSM	TEPT	TEMPT
<i>Vertillomyces</i>	VTMY	VEMY	VERMY
<i>Wakmania</i>	WKMA	WKMA	WAKMA
<i>Zymbacterium</i>	ZYBT	ZYBC	ZYMBC
<i>Zymosarcina</i>	ZYSR	ZYSR	ZYMSR

* Not bacterial genera.

** Nomina rejicienda.

by increasing the length of the abbreviation from four characters to five characters. To those not familiar with computers this is not necessarily as serious as may initially appear. Firstly, the number of characters has still been reduced from a maximum of 19 (STREPTOVERTICILLIUM) to 5 (almost a 75% reduction). Secondly, many computers (such as the PDP-10) store at least five characters in each "word" of memory (if only four characters are inserted in a word the remaining character positions are set as blanks) and comparisons are performed on a word-by-word basis. Therefore, these computers would take exactly the same time to compare four characters as they would to compare five characters.

An alphabetic five-character list is also specified (Table 1). This (i) has removed many of the inconsistencies of the alphabetic four-character list, (ii) corresponds more closely with the Code

TABLE 2. Amended code for the abbreviations of names of bacterial genera appearing in the eighth edition of Bergey's Manual

AC = ACETO
AR = AERO, AR
AT = ACTINO
AZ = AZOTO, AZO
BA ^a = BACILLUS
BC ^b = BACTER, BACTERIUM, BACT, BACTERIO
BI = BIFID
CE = CELLULO
CO = COCCUS
CS = CYSTIS, CYSTO
DP = DIPLO
EN = ENTERO
HL = HALO
HM = HAEMO
LC = LACTO
LE = LEUCO
LP = LEPTO
ME = METHANO
MI = MICRO
ML = METHYLO
MN = MONAS, MONAD
MY = MYCO, MYCES
NI = NITRO
NM = NEMA
NO = NITROSO
PD = PEDIO, PEDIA
PL = PLASMA
PR = PARA
PS = PSEUDO
RO = RHODO
SF = SPHAERA, SPHAERO
SO = SPORO, SPORA, SPORIA, SPORANGIUM
SP = SPIRO, SPIRA, SPIRILLUM
ST = STREPTO
SU = SULPHUR, SULFO
TH = THIO
TM = THERMO, THERMUS
TX = THRIX
VB = VIBRIO

^a Changed from BC=BACILLUS in Johnson et al. (1).^b Changed from BT=BACTER, BACTERIUM, BACT, BACTERIO in Johnson et al. (1).

for Abbreviations (Table 2), (iii) provides better correspondence between the generic name and abbreviation which is of importance for performing "human" conversions.

Johnson et al. specify an upper limit of four characters for each abbreviation; some have two or three characters. The proposed four- and five-character lists do not allow such variation. In many cases computer programming becomes much simpler if it is known that all abbreviations are always a fixed length (either four or five, whichever proposal is adopted).

APPENDIX

FORTRAN listing of subroutine to perform
binary search by computer

SUBROUTINE SRCH (LOC, ARRAY,
DIMEN, INDEX, \$)

```
C   THIS SUBROUTINE SEARCHES TA-
      BLE 'ARRAY' OF LENGTH 'DI-
      MEN' FOR THE VALUE CON-
C   TAINED IN 'LOC'
C   IF FOUND, 'INDEX' IS SET TO THE
      ROW NUMBER IN TABLE
C   IF NOT FOUND, THE $ RETURN IS
      TAKEN
```

INTEGER LOC, INDEX, P, Q, DI-
MEN, ARRAY (DIMEN)

P = 1

Q = DIMEN + 1

100 INDEX = (P + Q)/2

IF (LOC.EQ.ARRAY (INDEX)) RE-
TURN

IF (LOC.GT.ARRAY (INDEX)) GO TO
200

IF (Q.EQ.INDEX) RETURN 5

Q = INDEX

GO TO 100

200 IF (P.EQ.INDEX) RETURN 5

P = INDEX

GO TO 100

END

REPRINT REQUESTS

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