8.6.47 A checklist of bacteria associated with inf

8.6.47 A checklist of bacteria associated with infection in humans 1307

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in humans John Paul ESSENTIALS In addition to a relatively small number of well-known pathogenic bacteria that infect otherwise healthy people (e.g. Staphylococcus aureus, Mycobacterium tuberculosis, and Streptococcus pyogenes), there is a steadily growing list of less well-known organisms, many of which cause disease only under special circumstances. Bacteria associated with infections in humans are listed in the table that forms the bulk of this chapter, which has been de- signed to serve as a single port of call for clinicians who seek concise information on the less well-known clinically signifi- cant bacteria. Every name in the table has been checked to see that it has ‘standing in nomenclature’: widely used names that do not have standing in nomenclature (at the time of writing) are included, but written in inverted commas (e.g. ‘Spirillum minus’—one of the causes of rat bite fever). For an up-to-date check on nomenclature, the reader is referred to http://www.bacterio.net. Reported antibiotic susceptibilities and treatments are listed as a rough guide only: for some organisms the only available published information consists of in vitro test results for small numbers of strains, or apparent clinical response to therapy for a single case. There is no substitute for the determination of the susceptibilities of organisms as they are cultured on a case- by-case basis in tandem with the monitoring of therapeutic response. Geographical restriction and particular exposures—some patho- genic bacteria (e.g. Burkholderia pseudomallei, the cause of meli- oidosis), are associated with special geographical areas; others are associated with particular forms of exposure (e.g. with animal bites), and Rickettsia species with tick bites. Bacterial commensals and usually harmless environmental or- ganisms as causes of disease—given the right kind of help, bac- teria that live usually as harmless human commensals can cause disease (e.g. skin commensals such as Staphylococcus epidermidis can cause line sepsis and infect prosthetic devices; gut com- mensals such as Bacteroides species can grow in abscesses; and

oral commensals such as Streptococcus salivarius can cause endocarditis). Immunosuppressed patients, ventilated patients,
and patients undergoing continuous ambulatory peritoneal dia- lysis are vulnerable to infection by a wide range of otherwise harmless environmental organisms. Improved understanding of disease processes and discovery of ‘new’ pathogens—a refined understanding of, say, periodontal dis- ease, has resulted in the characterization of new organisms such as Pseudoramibacter alactolyticus, Johnsonella ignava, Centipeda periodontii, and Capnocytophaga gingivalis: some of these have subsequently been identified in systemic infections such as bacteraemia. Impact of new laboratory techniques—these have revealed the presence of new species and new disease associations (e.g. Tropheryma whipplei) was associated with Whipple’s disease by molecular methods before the organism was cultured; molecular methods have detected oddities like Bradyrhyzobium elkanii in aortic aneurysm tissue, although its role as potential pathogen is doubtful. Changes in nomenclature—amidst the discovery of new bacteria, taxonomic rearrangements, and changes in nomenclature pile on additional layers of confusion for the clinician. For example, it was recognized that organisms formerly known as Burkholderia cepacia are actually a complex of several genomospecies, which have been given individual names. It is also confusing when a well- known genus is split to reflect the recognition that its composite species are several groups that are only distantly related (e.g. many organisms that were once known as Bacteroides species). New
organisms will continue to be described and name changes will continue to occur.

section 8 Infectious diseases 1308 Table 8.6.47.1 A check list of bacteria associated with infection in humans Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) A [Abiotrophia adiacens—see Granulicatella adiacens] Abiotrophia A. defectiva Endophthalmitis, brain abscess, osteomyelitis, peritonitis, endocarditis Vancomycin, ceftriaxone (plus gentamicin or rifampicin) Previously known as nutritionally deficient or variant streptococci [Abiotrophia elegans—see Granulicatella elegans] [‘Abiotrophia para-adiacens’—see Granulicatella notes] Achromobacter (Alcaligenes) A. aegrifaciens A. animicus A. anxifer A. denitrificans A. dolens A. insolitus A. insuavis A. mucicolens A. piechaudii A. pulmonis A. ruhlandii A. spanius A. spiritinus A. xylosoxidans Septicaemia, CAPD peritonitis, pneumonia, ear infection, pulmonary infection in cystic fibrosis, keratitis, vascular line sepsis Ureidopenicillins, ceftazidime, carbapenems [Achromobacter CDC group Vd and Achromobacter groups A, C, and D—see Ochrobactrum] [Achromobacter groups B and E—see Pannonibacter] Acidaminococcus A. fermentans A. intestini Abscesses, postsurgical infections Metronidazole Acidovorax (Pseudomonas) A. avenae A. delafieldii A. facilis A. temperans A. wautersii Wound infection, UTI, bacteraemia, meningitis, septic arthritis Acinetobacter
A. baumannii A. beijerinckii A. bereziniae A. calcoaceticus A. guillouiae A. gyllenbergii
A. haemolyticus A. johnsonii A. junii A. lwoffi A. nosocomialis A. parvus A. pittii A. radioresistens
A. schindleri A. seifertii A. ursingii Septicaemia, UTI, wound infections, abscesses, endocarditis, meningitis, osteomyelitis Aminoglycosides, ureidopenicillins, ceftazidime, carbapenems, tigecycline May be multidrug-resistant Nosocomial outbreaks reported Infections associated with debilitated patients [Actinobacillus actinomycetemcomitans—see Aggregatibacter actinomycetemcomitans] Actinobacillus A. equuli A. lignieresii A. suis Wound infection, abscesses, endocarditis, meningitis Ampicillin (plus gentamicin for endocarditis) Associated with animal contact and bites A. hominis Septicaemia, empyema Amoxicillin–clavulanate A. ureae (Pasteurella ureae) Meningitis, pneumonia, endocarditis, hepatitis, peritonitis Ampicillin (plus gentamicin for endocarditis),

chloramphenicol Respiratory tract commensal in humans [Actinobaculum massiliense—see Actinotignum schaali] [Actinobaculum schaali—see Actinotignum schaali] [Actinobaculum urinale—see Actinotignum urinale] (continued)

8.6.47 A checklist of bacteria associated with infection in humans 1309 Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) Actinomadura A. latina A. madurae A. pelletieri A. sputi A. vinacea Actinomycetoma, Madura foot, pulmonary infection Co-trimoxazole, dapsone Actinomyces A. cardiffensis A. dentalis A. europaeus A. funkei A. georgiae A. gerencseriae A. graevenitzii A. hominis A. hongkongensis A. israelii A. johnsonii A. massiliensis A. meyeri A. naeslundii A. neuii neuii A. neuii anitratus A. odontolyticus A. oricola A. oris A. radicidentis A. radingae A. timonensis A. turicensis A. urogenitalis A. viscosus Actinomycosis β-Lactams Actinotignum (Actinobaculum) A. schaalii (A. massiliense) A. sanguinis A. urinale Pyelonephritis, UTI, septicaemia, superficial skin infection Penicillin, cefuroxime, nitrofurantoin, tetracycline, clindamycin Advenella A. incenata Pulmonary infection, bacteraemia Aerococcus A. sanguinicola A. urinae A. urinaehominis A. viridans Endocarditis, UTI, wounds, meningitis, abscesses, CAPD peritonitis, lymphadenitis, spondodactylitis Penicillin, vancomycin (plus gentamicin for endocarditis) Aeromonas A. allosaccharophila A. bestiarum A. diversa A. enteropelogenes A. hydrophila A. jandaei A. media A. punctata (A. caviae) A. salmonicida A. sanarellii A. schubertii A. taiwanensis A. tecta A. trota (A. tructi) A. veronii Wound infection, abscesses, septicaemia, meningitis, leech-bite infection, alligator-bite infection, acute diarrhoea Aminoglycosides, chloramphenicol, ceftazidime, co-trimoxazole Infections associated with aquatic exposure. A. veroniiincludes biovars Veronii and Sobria. The taxonomic status of some species is unclear. The status of A. allosaccharophila is controversial. A. trota may be a synonym of A. enteropelogenes Afipia A. felis Cat-scratch disease Imipenem, aminoglycosides Cat-scratch disease is associated also with Bartonella spp. A. broomeae Bone marrow infection, septic arthritis Imipenem, aminoglycosides Role as pathogen uncertain A. clevelandensis Bone infection Imipenem, aminoglycosides Role as pathogen uncertain A. birgiae A. massiliensis Pneumonia Imipenem, aminoglycosides Roles as pathogens uncertain (continued) Table 8.6.47.1 Continued

section 8 Infectious diseases 1310 Aggregatibacter A. actinomycetemcomitans (Actinobacillus actinomycetemcomitans, Haemophilus actinomycetemcomitans) Periodontitis, endocarditis, abscesses, pericarditis, meningitis Penicillin (plus gentamicin for endocarditis), ceftriaxone, coamoxiclav Human oral commensal. Some strains reported to be penicillin-resistant A. aphrophilus (Haemophilus aphrophilus, H. paraphrophilus) A. segnis (Haemophilus segnis) Sinusitis, otitis media, pneumonia, abscesses, endocarditis Ceftriaxone, cefotaxime, chloramphenicol, ampicillin, aminoglycosides Agrobacterium A. radiobacter (A. tumefaciens) Endocarditis, CAPD peritonitis, UTI, line sepsis Co-trimoxazole, gentamicin, amikacin, piperacillin-tazobactam The nomenclature of this taxon is unsettled. The names A. tumefaciens and A. radiobacter both have standing in nomenclature. Transfer of Agrobacterium to Rhizobium has been proposed [Alcaligenes denitrificans—see Achromobacter denitrificans] Alcaligenes A. faecalis Pneumonia, otitis, UTI, osteomyelitis, bacteraemia Amoxicillin–clavulanate, cephalosporins, fluoroquinolones [Alcaligenes xylosoxidans—see Achromobacter xylosoxidans xylosoxidans] [Alcaligenes piechaudii—see Achromobacter piechaudii]

[Alcaligenes ruhlandii—see Achromobacter ruhlandii] Alicyclobacillus A. consociatus From blood culture Clinical significance uncertain Alishewanella A. fetalis From fetal necropsy specimen Clinical significance uncertain Alistipes A. finegoldii (Bacteroides finegoldii) A. indistinctus A. onderdonkii A. putredinis (Bacteroides putredinis) A. shahii A. timonensis Appendicitis, peritonitis, abdominal abscess Metronidazole, ertapenem β-Lactamase producers. Abdominal infections, found in association with other anaerobes Alloiococcus A. otitis (Alliococcus otitis) Otitis media Vancomycin Alloprevotella A. rava A. tanneri Dental plaque, atheromatous plaque Alloscardovia A. omnicolens UTI [Amycolata autotrophica—see Pseudonocardia autotrophica] Amycolatopsis A. orientalis (Nocardia orientalis) Role as pathogen uncertain A. palatopharyngis Palatopharyngeal infection Clinical significance poorly defined Anaerobiospirillum A. succiniproducens A. thomasii Diarrhoea, bacteraemia Cefuroxime, tetracycline, chloramphenicol Infection may be related to exposure to cat or dog faeces Anaerococcus (Peptostreptococcus) A. hydrogenalis A. lactolyticus A. murdochii A. octavius A. prevotii A. senegalensis A. tetradius A. vaginalis Mixed anaerobic infections, abscesses β-Lactams, metronidazole Anaeroglobus A. geminatus From postoperative collection Role as pathogen uncertain Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 Anaerorhabdus (Bacteroides) A. furcosa (A. furcosus) Lung abscess, appendix, and abdominal abscesses [‘Anguillina coli’—see Serpulina pilosicoli] Anaplasma A. phagocytophilum Anaplasmosis Doxycycline Previously known as human granulocytic ehrlichiosis [Arachnia propionica—see Propionibacterium propionicus] [Arcanobacterium bernardiae—see Trueperella bernardiae] [Arcanobacterium pyogenes—see Trueperella pyogenes] Arcanobacterium A. haemolyticum (Corynebacterium haemolyticum) Tonsillitis, cellulitis, lymphadenopathy, brain abscess, septicaemia, osteomyelitis Penicillin, erythromycin Arcobacter (Campylobacter) A. butzleri A. cryaerophilus Abdominal cramps, diarrhoea Self-limiting Arthrobacter A. albus A. creatinolyticus A. cumminsii A. luteolus A. oxydans A. sanguinis A. scleromae A. woluwensis UTI, bacteraemia, skin infection Vancomycin, penicillins Arthrobacter sp. has been implicated in Whipple’s syndrome, a disease usually associated with Tropheryma whipplei Atopobium A. deltae A. minutum (Lactobacillus minutus) A. parvulum (Streptococcus parvulus) A. rimae (Lactobacillus rimae) A. vaginae UTI, dental abscesses, pelvic abscesses, wound infection, blood cuture of patient with Fournier’s gangrene Bacterial vaginosis Isolates from periodontal sites suggest possible role in periodontal disease [Aureobacterium—see Microbacterium] Auritidibacter A. ignavus Otitis externa Azospirillum A. brasilense (Roseomonas fauriae) CAPD peritonitis, line sepsis Imipenem, aminoglycosides, ceftriaxone, ciprofloxacin B Bacillus B. anthracis Anthrax Penicillin, erythromycin Ciprofloxacin for postexposure prophylaxis [Bacillus brevis—see Brevibacillus agri] [Bacillus sphaericus—see Lysinibacillus sphaericus] B. circulans B. coagulans B. idriensis B. infantis B. megaterium B. mycoides B. thuringiensis Pneumonia, septicaemia, corneal infections, meningitis, food poisoning, eye infection, lung infection Vancomycin, clindamycin, aminoglycosides, imipenem, penicillin Other than the well-known B. anthracis and B. cereus, Bacillus spp. are rare causes of focal and systemic sepsis. Some isolates are resistant to vancomycin. Isolates may represent specimen or laboratory contamination. B. thuringiensis is a biological insecticide which has caused corneal infection B. cereus B. cytotoxicus B. licheniformis B. pumilus B. subtilis Food poisoning, wound infection, cutaneous lesions, bacteraemia, endocarditis, eye infection Clindamycin, vancomycin, gentamicin Diarrhoea is self-limiting.

B. cereus is resistant to β-lactams Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

section 8 Infectious diseases 1312 Bacteroides B. caccae B. coagulans B. eggerthii B. finegoldii B. fragilis B. massiliensis B. nordii B. ovatus B. pyogenes (B. tectus) B. salyersae B. stercoris B. thetaiotaomicron B. uniformis B. vulgatus Abscesses, bacteraemia, bite infections, wound infections, chronic otitis media, pelvic inflammatory disease, neonatal sepsis Ureidopenicillins, carbapenems, metronidazole Resistance to metronidazole and β-lactams has been reported. Many species previously classified as Bacteroides have been transferred to other genera: see Alistipes, Anaerorhabdus, Campylobacter, Dialister Mitsuokella, Odoribacter, Parabacteroides, Prevotella, Porphyromonas, Pseudoflavonifractor, and Tannerella Balneatrix B. alpica Pneumonia, bacteraemia, meningitis Ceftriaxone, ofloxacin, amoxicillin, netilmicin Infection associated with exposure to hot spring water Bartonella B. bacilliformis Oroya fever, verruga peruana Chloramphenicol, streptomycin B. elizabethae (Rochalimaea elizabethae) Endocarditis Gentamicin, imipenem, co-trimoxazole B. clarridgeiae B. henselae (Rochalimaea henselae) Cat-scratch disease, bacillary angiomatosis Aminoglycosides, doxycycline Cat-scratch disease is associated also with Afipia felis B. quintana (Rochalimaea quintana) Trench fever, bacillary angiomatosis Aminoglycosides, doxycycline B. rochalimae Bacteraemia, anaemia, splenomegaly Levofloxacin Cause of canine endocarditis B. schoenbuchensis Deer ked dermatitis Evidence to associate this organism with deer ked dermatitis is circumstantial B. vinsonii arupensis Bacteraemia Ceftriaxone Zoonosis from rodents Bergeyella B. zoohelcum (Weeksella zoohelcum) Wound infection, septicaemia, meningitis Cefotaxime, penicillins, ciprofloxacin, tetracycline Associated with dog and cat bites Bifidobacterium B. adolescentis B. angulatum B. breve B. bifidumB. dentium B. longum longum B. longum infantis B. pseudocatenulatum B. scardovii Bacteraemia, abscesses, peritonitis, otitis, paronychia, UTI, dental caries Clindamycin, penicillins, cefoxitin Reported risk factors include surgery, malignancy, steroid therapy, intravenous drug use, and acupuncture. Some strains used as probiotics [Bifidobacterium inopinatum—see Scardovia inopinata] Bilophila B. wadsworthia Appendicitis, abscesses, bacteraemia, biliary tract sepsis, mastoiditis Metronidazole, amoxicillin/clavulanate, ureidopenicillins, cephalosporins Bordetella B. bronchiseptica Respiratory tract infection Tetracycline, fluoroquinolones Zoonosis from dogs and other animals B. hinzii B. holmesii B. trematum Bacteraemia, otitis, wound infection B. hinzii is a pathogen of poultry B. parapertussis B. pertussis Whooping cough, respiratory tract infection Erythromycin B. parapertussis causes less severe disease The genus Borreliella has been proposed for species associated with Lyme disease Borrelia B. americana B. afzelii B. andersoni B. bavariensis B. bissettiae B. burgdorferi Lyme disease Amoxicillin, doxycycline, ceftriaxone Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

8.6.47 A checklist of bacteria associated with infection in humans 1313 B. carolinensis B. garinii B. japonica B. kurtenbachii B. lusitaniae B. sinica B. spielmanii B. tanukii B. turdi B. valaisiana B. caucasica B. crocidurae B. duttonii B. graingeri B. hermsii B. hispanica B. latyschewii B. mazzottii B. parkeri B. persica B. recurrentis B. turicatae B. venezuelensis Relapsing fever Tetracycline, erythromycin, chloramphenicol, penicillin B. recurrentis is louse-borne; other agents are tick-borne Bosea B. massiliensis Linked with ventilator- associated pneumonia Doxycycline, telithromycin Amoeba-resisting bacterium from hospital water supplies Brachyspira B. aalborgi B. pilosicoli

(Serpulina pilosicoli, ‘Anguillina coli’) Intestinal spirochaetosis Of uncertain significance Bradyrhizobium B. elkanii Detected in tissue from aortic aneurysm Potential role as pathogen uncertain [Branhamella catarrhalis—see Moraxella catarrhalis] Brevibacillus B. centrosporus Bacteraemia Vancomycin Previously confused with B. laterosporus and reported as such in clinical literature B. massiliensis B. parabrevis Bacteraemia, abscess Vancomycin Brevibacterium B. casei B. epidermidis B. luteolum (B. lutescens) B. massiliense B. mcbrellneri B. otitidis B. paucivorans Bacteraemia, endocarditis, meningitis, chest infection, pericarditis, vascular catheter sepsis Glycopeptides Brevundimonas (Pseudomonas) B. diminuta B. vancanneytii B. vesicularis Septicaemia, endocarditis Cefazolin, ceftriaxone, piperacillin (plus gentamicin for endocarditis) Brucella B. abortus B. canis B. melitensis B. suis Brucellosis Doxycycline (plus streptomycin or rifampicin) The four species names used for clinical purposes represent biovars of a single species, B. melitensis Brucella B. ceti B. pinnipedalis Brucellosis Causes of brucellosis in marine mammals with potential to infect humans Brucella inopinata Breast implant infection Bulleidia B. extructa Necrotizing ulcerative periodontitis in HIV patients Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 Burkholderia (Pseudomonas) B. ambifaria B. anthina B. cenocepacia B. cepacia (Pseudomonas cepacia) B. dolosa B. multivorans B. pseudomultivorans B. pyrrocinia B. stabilis B. vietnamiensis Lung infection in cystic fibrosis, bacteraemia, endocarditis, septic arthritis, UTI Ureidopenicillins, ceftazidime, aztreonam, carbapenems, fluoroquinolones, co-trimoxazole B. cepacia sensu stricto and other taxa listed are genomospecies of the B. cepacia species complex (B. cepacia sensu lato). Hard to differentiate by routine methods. Differences in disease progression in cystic fibrosis may relate to different genomospecies B. gladioli (Pseudomonas gladioli) Lung infection in cystic fibrosis Ureidopenicillins, ceftazidime, aztreonam, carbapenems, fluoroquinolones, co-trimoxazole B. fungorum Septic arthritis, bacteraemia, meningitis Amoxicillin, cefuroxime, ceftazidime, ciprofloxacin, meropenem, co-trimoxazole B. mallei (Pseudomonas mallei) Glanders Sulfadiazine, co-amoxiclav, tetracycline, co-trimoxazole B. pseudomallei (Pseudomonas pseudomallei) Melioidosis Ceftazidime, co-trimoxazole, chloramphenicol, imipenem Buttiauxella B. agrestis B. noackiae Appendicitis, wound infection Aminoglycosides, doxycycline Cephalosporin resistance reported Butyrivibrio B. fibrisolvens Endophthalmitis Penicillin, chloramphenicol From rumina of farm animals C [Calymmatobacterium granulomatis—see Klebsiella granulomatis] [Campylobacter butzleri—see Arcobacter butzleri] [Campylobacter cinaedi—see Helicobacter cinaedi] [Campylobacter fennelliae—see Helicobacter fennelliae] [Campylobacter pyloridis—see Helicobacter pylori] Campylobacter C. coli C. jejuni jejuni C. jejuni doylei C. mucosalis Gastroenteritis, bacteraemia Erythromycin, fluoroquinolones Infections are usually self-limiting C. concisus C. curvus (Wolinella curva) C. gracilis (Bacteroides gracilis) C. rectus (Wolinella recta) C. showae C. sputorum C. ureolyticus (Bacteroides ureolyticus) Periodontitis, appendicitis, peritonitis, head and neck infections, abscesses Ureidopenicillins, amoxicillin/ clavulanate, carbapenems, fluoroquinolones, metronidazole C. fetus fetus Fever, diarrhoea, meningoencephalitis, endocarditis, abscesses Erythromycin, ampicillin, chloramphenicol, gentamicin Exposure to reptiles or Asian food C. fetus testudinum Bacteraemia, wound infection, diarrhoea Cephalosporins C. fetus venerealis Bacterial vaginosis Role as human pathogen poorly defined. Reported from faeces of homosexual men C. hyointestinalis C. lari (C. laridis) C. upsalensis

Diarrhoea, bacteraemia, abscess Erythromycin, ampicillin, gentamicin Zoonoses from mammals and birds Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

8.6.47 A checklist of bacteria associated with infection in humans 1315 Canibacter C. oris Wound infection Ampicillin, clindamycin, ciprofloxacin, vancomycin, linezolid From dog bites Capnocytophaga C. canimorsus (CDC DF-1) C. cynodegmi (CDC DF-2) Wound infection, septicaemia, abscesses, meningitis, endocarditis Penicillin From dog bites C. gingivalis C. granulosa C. haemolytica C. leadbetteri C. ochracea C. sputigena Periodontitis, septicaemia, chorioamnionitis Penicillins, ciprofloxacin, tetracycline, chloramphenicol From oral flora. Infections associated with malignancy and neutropenia Cardiobacterium C. hominis C. valvarum Endocarditis, meningitis Penicillin (plus gentamicin for endocarditis) Catonella C. morbi Periodontitis, endodontic infection Role as pathogen unclear Cedecea C. davisae C. lapagei C. neteri Bacteraemia Chloramphenicol, cefamandole, gentamicin Two other species (sp. 3 and sp. 5) have been isolated from clinical specimens Cellulomonas C. denverensis C. hominis (CDC coryneform group A-3) Bacteraemia, meningitis, pilonidal abscess, wound infection, homograft valve infection Clarithromycin, clindamycin, imipenem, minocycline, rifampicin, vancomycin [Cellulomonas cellulans—see Cellulosomicrobium] [Cellulomonas turbata—see Oerskovia turbata] Cellulosimicrobium C. cellulans (Cellulomonas cellulans, Oerskovi xanthineolytica) C. funkei Meningitis, pyonephrosis, CAPD peritonitis, endophthalmitis Vancomycin and gentamicin or rifampicin Centipeda C. periodontii Periodontitis Role as pathogen unclear. Shown to inhibit lymphocytes Chlamydia C. trachomatis Trachoma, genital infection, neonatal infection, lymphogranuloma venereum Erythromycin, tetracycline, azithromycin Includes 18 serovars clustered into two biovars: trachoma and lymphogranuloma venereum Chlamydophila C. abortus (Chlamydia psittaci) Abortion Associated with contact with infected ruminants C. pneumoniae (Chlamydia pneumoniae) Chest infection Tetracycline Infections in humans associated with biovars TWAR C. psittaci (Chlamydia psittaci) Psittacosis Tetracycline Zoonosis from birds Chromobacterium C. violaceum Septicaemia, osteomyelitis, abscesses, eye infection Erythromycin, tetracycline, chloramphenicol, gentamicin Associated with exposure to soil and water Chryseobacterium (Flavobacterium) C. anthropi C. bernardetii C. gleum C. hominis C. indologenes C. nakagawai C. treverense Bacteraemia, abdominal sepsis, vascular catheter sepsis Piperacillin-tazobactam, minocycline, fluorquinolones, rifampicin Susceptibilities vary. Often multiresistant Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 [Chryseobacterium meningosepticum—see Elizabethkingia meningoseptica] [Chryseomonas luteola—see Pseudomonas luteola] Citrobacter C. amalonaticus C. braakii C. diversus C. farmeri C. freundii C. gilenii C. koseri C. murliniae C. rodentium C. sedlakii C. werkmanii C. youngae UTI, meningitis, bacteraemia, haemolytic–uraemic syndrome Aminoglycosides, β-lactams Variable susceptibility. May be multiresistant. Nosocomial outbreaks of infection reported. Citrobacter spp. are part of the normal faecal flora Clostridium C. argentinense C. baratii C. beijerinckii C. bifermentans C. bolteae C. butyricum C. cadaveris C. carnis C. celatum C. clostridioforme C. cochlearium C. cocleatum C. fallax C. ghonii C. haemolyticum C. histolyticum C. indolis C. innocuum C. irregulare C. leptum C. limosum C. malenominatum C. novyi C. oroticum C. paraputrificum C. piliforme C. putrefaciens C. ramosum C. sardiniense (C. absonum) C. septicum

C. sordellii C. sphenoides C. sporogenes C. subterminale C. symbiosum C. tertium Wound infection, bacteraemia, abscesses Penicillin, clindamycin, metronidazole Many Clostridium spp. have been isolated form clinical specimens. For most, their clinical significance is poorly defined. C. baratii and C. butyricum are rare causes of botulism. C. fallax, C. histolyticum, C. novyi, C. septicum, and C. sordellii are gas gangrene agents. Treatment of gas gangrene includes debridement and penicillin, clindamycin, or metronidazole. Recent studies have resulted in the proposed transfer of some of the species listed to new genera: Paraclostridium bifermentans, Paeniclostridium ghonii, Hathewaya histolytica, Hathewaya limosa, Faecalicatena orotica, Paraclostridium sordellii C. botulinum Botulism Antitoxin and respiratory support as treatment C. difficile Diarrhoea, pseudomembranous colitis Metronidazole, vancomycin Infection associated with antibiotic exposure. Recent phylogenetic studies resulted in the proposed transfer to the genus Clostridioides C. perfringens Food poisoning, necrotizing enterocolitis, gas gangrene Debridement and penicillin, clindamycin, or metronidazole for treatment of gas gangrene C. tetani Tetanus Metronidazole, penicillin Antitoxin and supportive treatment Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 [Clostridium glycolicum—see Terrisporobacter glycolicus] Collinsella C. aerofaciens From faecal flora. Clinical significance is undefined [Comamonas acidovorans—see Delftia acidovorans] Comamonas (Pseudomonas) C. kerstersii C. terrigena C. testosteroni Bacteraemia, UTI, conjunctivitis, endocarditis, wound infection, abdominal abscess, peritonitis, meningitis Ureidopenicillins, ceftazidime, ciprofloxacin, aminoglycosides, imipenem Infections in neutropenic patients. Infections associated with animal bite and exposure to tropical fish Corynebacterium C. accolens C. afermentans C. amycolatum C. aquatimens C. appendicis C. argentoratense C. atypicum C. aurimucosum (C. nigricans) C. auris C. bovis C. confusum C. coyleae C. durum C. falsenii C. freneyi C. glucuronolyticum C. imitans C. jeikeium C. kroppenstedtii C. kutscheri C. lipophiloflavum C. macginleyi C. massiliense C. matruchotii C. mucifaciens C. pilosum C. pilparense C. propinquum C. renale C. resistens C. riegelii ‘C. sanguinis’ C. singulare C. sputi C. striatum C. sundsvallense C. thomssenii C. tuberculostearicum C. tuscaniense C. urealyticum C. ureicelerivorans C. xerosis Septicaemia, peritonitis, UTI, eye infection, wound infection, endocarditis, osteomyelitis, septic arthritis, meningitis, abscesses Glycopeptides, β-lactam, erythromycin, rifampicin More than 40 Corynebacterium spp. have been isolated from clinical specimens. For many of them, clinical significance and empirical therapy are poorly defined. Many isolates are susceptible to β-lactams. Multiresistant, vancomycin-susceptible isolates of CDC coryneform group G-2, C. jeikeium and C. urealyticumhave been reported. Nosocomial outbreaks have been reported. Corynebacterium spp. may be specimen or laboratory contaminants. C. auriscanis C. canis C. feiburgense Wound infection Tetracycline From dog bites C. diphtheriae Diphtheria, cutaneous infection Penicillin, erythromycin Toxigenic infection requires treatment with antitoxin C. minutissimum Erythrasma, bacteraemia, endocarditis Role as an agent of erythrasma is poorly defined C. mycetoides Tropical ulcer, septicaemia Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 C. pseudodiphtheriticum UTI, endocarditis, lymphadenopathy, necrotizing tracheitis Penicillin C. pseudotuberculosis Lymphadenitis, pulmonary infection Penicillin,

erythromycin Associated with sheep contact. May require drainage or excision C. ulcerans Diphtheria-like disease, pharyngitis Penicillin, erythromycin Toxigenic infection requires treatment with antitoxin C. vitaeruminis Associated with aortic aneurysm Role as pathogen uncertain [Corynebacterium group A-3—see Cellulomonas] [Corynebacterium groups A-4 and A-5—see Microbacterium] [Corynebacterium group 2—see Arcanobacterium bernardiae] Coxiella C. burnetii Q fever Tetracycline, ciprofloxacin, co- trimoxazole, rifampicin Cryptobacterium C. curtum Periodontitis Cupriavidus (Ralstonia) (Wautersia) C. gilardii C. pauculus C. respiraculi C. taiwanensis Meningitis, pulmonary infection in cystic fibrosis, line sepsis Cephalosporins, imipenem, co-trimoxazole, quinolones, amikacin D Delftia D. acidovorans (Comamonas acidovorans) Bacteraemia, endocarditis Ureidopenicillins, fluoroquinolones Dermabacter D. hominis Brain abscess, bacteraemia, wound infection Cephalosporins, glycopeptides Dermacoccus D. sp. Associated with aortic aneurysm Role as pathogen uncertain. Found on skin and mucous membranes Dermatophilus D. congolensis Cutaneous infection Penicillin Zoonosis from cattle, sheep, goats, and horses Desmospora D. activa From sputum Quinolones, carbapenems, vancomycin, linezolid, amikacin Clinical significance uncertain Desulfomicrobium D. orale Periodontitis Desulfomonas D. piger (D. pigra) Pilonidal cyst abscess, peritonitis From faecal flora Desulfovibrio D. desulfuricans D. vulgaris Bacteraemia, liver abscess Penicillin, clindamycin ‘D. fairfieldensis’ Cultured from urine of patient with UTI and meningoencephalitis Proposed name does not have standing in nomenclature Dialister D. invisus D. micraerophilus D. pneumosintes D. propionicifaciens Periodontitis, endodontic infection, bacteraemia Dichelobacter D. nodosus (Bacteroides nodosus) Pilonidal cyst, rectal fistula, wound infection Cause of ovine footrot. Isolates reported from humans may not be D. nodosus Dietzia D. aurantiaca D. cinnamea D. maris D. papillomatosis Prosthetic hip infection, bacteraemia, isolated from CSF Vancomycin, teicoplanin, rifampicin, amoxicillin, gentamicin, clindamycin, co-trimoxazole D. papillomatosis is associated with papillomatosis. Clinical response reported with macrolides or tetracyclines Dolosicoccus D. paucivorans Bacteraemia Cephalosporins Dolosigranulum D. pigrum Spinal cord infection, eye infection Significance as a pathogen poorly defined. Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 Dysgonomonas D. capnocytophagoides (CDC group DF-3) D. gadei D. mossii Diarrhoea, bacteraemia, abscess Tetracycline, clindamycin, imipenem E Edwardsiella E. hoshinae E. ictaluri E. tarda Wound infection, abscesses, gastroenteritis β-Lactams, aminoglycosides, fluoroquinolones Aquatic exposure, penetrating fish injury Eggerthella E. hongkongensis E. lenta (Eubacterium lentum) E. sinensis Rectal abscess, bacteraemia Penicillin, metronidazole Variable susceptibility to cefotaxime Eggerthia E. catenaformis (Lactobacillus catenaformis) Pulmonary infection . Ehrlichia E. chaffeensis E. ewingii Ehrlichiosis Tetracycline, doxycycline Antibodies to E. muris detected in healthy humans in Japan [Ehrlichia sennetsu—see Neorickettsia sennetsu] Eikenella E. corrodens Septicaemia, endocarditis, abscesses, septic arthritis Penicillin (plus gentamicin for endocarditis) Eisenbergiella E. tayi Bacteraemia Vancomycin, metronidazole Elizabethkingia E. anophelis E. meningoseptica (Chryseobacterium meningosepticum, Flavobacterium meningosepticum) Meningitis, bacteraemia, endocarditis, necrotizing fasciitis, pneumonia Quinolones, co-trimoxazole, minocycline, rifampicin Treatment with vancomycin is controversial Empedobacter E. brevis (Flavobacterium breve) Endophthalmitis, bacteraemia, UTI Broad spectrum cephalosporins Carbapenem-resistant. Phylogenetic data support inclusion in the genus Moheibacter Enterobacter

E. aerogenes E. amnigenus E. asburiae E. cancerogenus E. cloacae E. gergoviae E. hormaechei E. kobei E. ludwigii E. sakazakii Bacteraemia, respiratory tract infections, UTI Carbapenems, fluoroquinolones, aminoglycosides, ureidopenicillins May be multiresistant. Common cause of nosocomial infection Enterococcus E. avium E. casseliflavus (E. flavescens) E. cecorum E. dispar E. durans E. faecalis E. faecium E. gallinarum E. gilvus E. hirae E. malodoratus E. mundtii E. pallens E. pseudoavium E. raffinosus Bacteraemia, abscesses, endocarditis, meningitis, UTI, peritonitis, osteomyelitis, wound infection Penicillins, glycopeptides May be resistant to penicillins and glycopeptides. Nosocomial outbreaks reported [Enterococcus solitarius—see Tetragenococcus solitarius] Erwinia E. persicinus UTI Cephalosporins, fluoroquinolones, aminoglycosides The causative agent of necrosis of bean pods Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 Erysipelothrix E. rhusiopathiae Erysipeloid, septicaemia, endocarditis Penicillin Animal contact [Escherichia adecarboxylata—see Leclercia adecarboxylata] Escherichia E. albertii Diarrhoea Previously known as Hafnia alvei-like strains E. coli UTI, bacteraemia, wound infection, meningitis, enteric infection, haemolytic fluoroquinolones, uraemic syndrome β-Lactams, aminoglycosides, co-trimoxazole Susceptibilities variable E. fergusonii Bacteraemia, wounds, UTI Chloramphenicol, gentamicin Ampicillin-resistant E. hermanii Wounds Chloramphenicol, cephalosporins, gentamicin E. vulneris Wounds Ampicillin, cephalosporins, gentamicin Eubacterium E. brachy E. combesii E. contortum E. cylindroids E. infirmum E. limosum E. minutum E. moniliforme E. multiforme E. nitrogenes E. nodatum E. plautii E. rectale E. saburreum E. saphenum E. sulci E. tenue E. timidum E. tortuosum E. ventriosum E. yurii yurii E. yurii mararetiae E. yurii schtitka Wounds, abscesses, septicaemia, periodontitis Penicillins, clindamycin, metronidazole Ewingella E. americana Septicaemia, wounds, UTI Ureidopenicillins, aminoglycosides Exiguobacterium E. acetylicum E. aurantiacum Wound infection, bacteraemia F Facklamia F. hominis F. ignava F. languida F. sourekii UTI, bacteraemia, abscess Filifactor F. alocis F. vilosus Gingivitis, periodontitis Finegoldia F. magna (Peptostreptococcus) magnus [Flavimonas oryzihabitans—see Pseudomonas oryzihabitans] Flavobacterium F. mizutaii (Sphingobacterium mizutae) [Flavobacterium gleum—see Chryseobacterium gleum] [Flavobacterium indologenes—see Chryseobacterium indologenes] Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 [Flavobacterium meningosepticum—see Elizabethkingia meningoseptica] ‘Flexispira’ ‘F. rappini’ Bacteraemia, diarrhoea Not in approved lists of bacterial names. There is a growing consensus that ‘Flexispira’ actually represents several Helicobacter spp. [Fluoribacter bozemanae—see Legionella bozemanae] [Fluoribacter dumoffii—see Legionella dumoffii] [Fluoribacter gormanii—see Legionella gormanii] Francisella F. hispaniensis F. philomiragia (Yersinia philomiragia) F. tularensis holarctica F. tularensis mediasiatica F. tularensis novicida F. tularensis tularensis Septicaemia, invasive systemic infection, tularaemia Fluoroquinolones, aminoglycosides, chloramphenicol, cefoxitin, streptomycin, tetracycline Fusobacterium F. gonidiaformans F. mortiferum F. naviforme F. necrogenes F. necrophorum necrophorum F. necrophorum fundiliforme F. nucleatum nucleatum F. nucleatum fusiforme F. nucleatum polymorphum F. nucleatum vincentii F. periodonticum F. russii F. ulcerans F. varium Abscesses, bacteraemia, periodontitis, endocarditis, necrobacillosis

Metronidazole, penicillins, carbapenems, cephalosporins G Gardnerella G. vaginalis Intrauterine and neonatal sepsis β-Lactams, clindamycin Associated with bacterial vaginosis Gemella G. asaccharolytica G. bergeri G. haemolysins G. morbillorum (Streptococcus morbillorum) G. parahaemolysans G. sanguinis G. taiwanensis Bacteraemia, endocarditis Penicillin or vancomycin (plus gentamicin for endocarditis) Globicatella G. sanguinis Bacteraemia, UTI, meningitis Vancomycin Gordonia (Gordona) (Rhodococcus) G. aichensis G. araii G. bronchialis G. effuse G. iterans G. otitidis G. polyisoprenivorans G. rubropertinctus G. sputi G. terrae Pulmonary infection, cholecystitis, breast abscess, sternal wound sepsis, brain abscess, bacteraemia, otitis Co-trimoxazole, ceftriaxone, imipenem, fluoroquinolones Granulicatella G. adiacens (Abiotrophia adiacens) G. elegans (Abiotrophia elegans) Endocarditis, septic arthritis, endodontic infection Penicillin or cefazolin or vancomycin plus gentamicin (plus rifampicin) Previously known as nutritionally deficient or variant streptococci; the proposed name ‘Abiotrophia para- adiacens’ for strains allied to what is now known as Granulicatella adiacens does not have standing in nomenclature Grimontia G. hollisae (Vibrio hollisae) Diarrhoea β-Lactams, quinolones Infection associated with ingestion of shellfish Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 H [Haemophilius aphrophilus—see Aggregatibacter aphrophilus] [Haemophilius paraphrophilus—see Aggregatibacter aphrophilus] [Haemophilius segnis—see Aggregatibacter segnis] Haemophilus H. aegyptius Brazilian purpuric fever Ampicillin, cephalosporins, chloramphenicol Treated by some authors as a biotype of H. influenzae H. parainfluenzae H. pittmaniae Sinusitis, otitis media, pneumonia, abscesses, endocarditis Cefotaxime, chloramphenicol, ampicillin, aminoglycosides The genus Aggregatibacter has been proposed to accommodate H. aphrophilus (including H. paraphrophilus as a heterotypic synonym of H. aphrophilus), H. signis, and Actinobacillus actinomycetemcomitans H. ducreyi Chancroid Macrolides, ceftriaxone, fluoroquinolones H. influenzae Bacteraemia, meningitis, epiglottitis Cephalosporins, penicillins, fluoroquinolones Many strains produce penicillinases Hafnia H. alvei H. paralvei Bacteraemia Doubtful enteropathogen. Susceptibility variable. Halomonas H. stevensii H. ‘phocaensis’ H. venusta Bacteraemia, fish bite infection Penicillins, cephalosporins, quinolones Hazenella H. coriacea Bacteraemia Helcobacillus H. massiliensis From cutaneous discharge Helcococcus H. kunzii ‘H. pyogenica’ H. sueciensis Sebaceous cyst infection, breast abscess, wound infection Penicillins, vancomycin From skin flora. The name H. pyogenica does not have standing in nomenclature Helicobacter H. bilis (‘Flexispira rapinni’ corrig. taxon 9) Cholecystitis, bacteraemia Zoonosis from rodents H. canis Gastroenteritis Zoonosis from dogs H. cinaedi (Campylobacter cinaedi) H. fennelliae (Campylobacter fennelliae) Proctitis in homosexual men, septicaemia Ampicillin, gentamicin Zoonoses from hamsters H. bizzozeronii H. felis H. salomonis ‘Candidatus H. bovis’ H. heilmannii (‘Gastrospirillum hominis’) H. suis Gastritis Zoonoses from domestic and farm animals. Some organisms known as ‘Flexipsira rapini’ may belong to this group of Helicobacter spp. H. canadensis H. pullorum Gastroenteritis Zoonoses from birds (or possibly rodents) H. pylori (Campylobacter pyloridis) Gastritis Omeprazole plus clarithromycin and metronidazole Numerous similar treatment combinations have been recommended ‘H. westmeadii’ Bacteraemia in AIDS Name does not have standing in nomenclature ‘H. winghamensis’ Gastroenteritis Name does not have standing in nomenclature. Possibly a zoonosis from rodents Herbaspirillum H. sp. Associated with aortic

aneurism Detected by 16S gene analysis. Of doubtful clinical significance Holdemania H. filiformis From faecal flora. Clinical significance is unclear Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

8.6.47 A checklist of bacteria associated with infection in humans 1323 I Ignatzschineria larvae Bacteraemia Penicillins, cephalosporins, quinolones Associated with myiasis Ignavigranum I. ruoffiae Wound infection, ear abscess Role as pathogen poorly defined Inquilinus I. limosus Pulmonary infection in cystic fibrosis, endocarditis Imipenem, quinolones, gentamicin An additional undescribed Inquilinus sp. reported from clinical material J Janibacter J. melonis Bacteraemia Vancomycin, β-lactams, fluoroquinolones An undescribed Janibacter sp. was isolated from a leukaemia patient Johnsonella J. ignava Periodontitis K Kerstersia K. gyiorum K. similis Wound infection, abscess, otitis Variable antibiotic susceptibilities Kingella K. denitrificans K. kingae K. oralis K. potus Septic arthritis, endocarditis, bite infection Penicillins (plus gentamicin for endocarditis) [Kingella indologenes—see Suttonella indologenes] Klebsiella K. granulomatis (Calymmatobacterium granulomatis) Donovanosis Tetracycline, co-trimoxazole [Klebsiella ornitholytica, K. planticola, K. terrigena—see Raoultella] K. oxytoca K. pneumoniae ssp. pneumoniae K. pneumoniae ssp. ozaenae K. quasipneumoniae K. variicola UTI, bacteraemia, wound infection, respiratory tract infection β-Lactams, aminoglycosides, fluoroquinolones Susceptibilities vary. Nosocomial outbreaks reported K. pneumoniae ssp. rhinoscleromatis Rhinoscleroma Ciprofloxacin, rifampicin, co-trimoxazole Kluyvera K. ascorbate K. cryocrescens K. georgiana K. intermedia (Enterobacter intermedius) Bacteraemia, UTI, mediastinitis, line sepsis Aminoglycosides, ceftazidime, imipenem, ciprofloxacin Kocuria (Micrococcus) K. kristinae K. rosea K. varians Cholecystitis, line-related sepsis Penicillin, clindamycin, vancomycin [Koserella trabulsii—see Yokenella regensburgei] Kurthia ‘K. bessonii’ Bacteraemia, endocarditis Penicillin Not in approved lists of bacterial names K. gibsonii K. zopfii Urethritis associated with piglet contact Isolated from faeces of patients with diarrhoea Kytococcus (Micrococcus) K schroeteri K. sedentarius Endocarditis, cerebral cyst infection Imipenem, vancomycin, rifampicin L Lactobacillus L. acidophilus L. brevis L. casei L. coleohominis L. crispatus L. fermentum L. gasseri L. iners L. jensenii Abscesses, bacteraemia, endometritis, endocarditis, lung infection, UTI Cephalosporins, vancomycin, penicillins, aminoglycosides, clindamycin Reported risk factors for infection include surgery, malignancy, diabetes, and immunodeficiency. May be vancomycin-resistant Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

section 8 Infectious diseases 1324 Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) L. leichmannii L. oris L. paracasei L. paraplantarum L. plantarum L. rhamnosus L. salivarius L. vaginalis Lactococcus (Streptococcus) L. garvieae L. lactis Bacteraemia, endocarditis, UTI Penicillin (plus gentamicin for endocarditis) Lautropia L. mirabilis Role as potential pathogen unclear. From oral flora of HIV patients and sputum of cystic fibrosis patient Leclercia L. adecarboxylata (Escherichia adecarboxylata) Bacteraemia, wound infection Variable susceptibility Legionella L. anisa L. birminghamensis L. bozemanae (L. bozemanii) L. cardiaca L. cincinnatiensis L. dumoffii L. feeleii L. gormanii L. hackeliae L. israelensis L. jordanis L. lansingensis L. longbeachae L. lytica L. maceachernii L. micdadei (L. pittsburghensis)

L. nagasakiensis L. oakridgemsis L. pneumophila L. quinlivanii L. rubrilucens L. sainthelensi L. steelei L. tucsonensis L. wadsworthia L. worsleiensis Legionnaires' disease, Pontiac fever Macrolides, fluoroquinolones, rifampicin Infections caused by species other than L. pneumophila and L. micdadei are seldom reported. L. cardiaca isolated from patient with endocarditis Leifsonia L. aquatica (Corynebacterium aquaticum) UTI, endocarditis, meningitis, CAPD peritonitis Ampicillin, chloramphenicol, gentamicin Previously confused with Aureobacterium (which has been united with Microbacterium) Leminorella L. grimontii L. richardii UTI, bacteraemia, surgical site infection, peritonitis Imipenem, chloramphenicol, tetracycline, gentamicin Leptospira L. biflexa L. borgpetersenii L. broomii L. hongkonensis L. idonii L. inadai L. interrogans L. licerasiae L. mayottensis L. kirschneri L. noguchii L. santarosai L. weilii L. wolfii Leptospirosis Penicillin, tetracycline L. interrogans is composed of severalnamed serogroups, including: australis, bataviae, canicola, copenhageni, cynopteri, hurstbridge, hardjo, grippotyphosa, icterohaemorrhagiae, panama, pomona, pyrogenes, sejroe, tarassovi (continued)

8.6.47 A checklist of bacteria associated with infection in humans 1325 Leptotrichia L. buccalis L. goodfellowii L. shahii L. trevisanii Bacteraemia, endocarditis β-Lactams, metronidazole Associated with dental plaque and gingivitis. 'L. amnionii' from amniotic fluid does not have standing in nomenclature and may belong in the genus Sneathia Leuconostoc L. citreum L. lactis L. mesenteroides ssp. cremoris L. mesenteroides ssp. dextranicum L. mesenteroides ssp. mesenteroide L. pseudomesenteroides Meningitis, bacteraemia, pulmonary infection Penicillin and gentamicin or clindamycin Vancomycin-resistant Listeria L. ivanovii L. grayi L. monocytogenes L. seeligeri Septicaemia, meningitis, intrauterine infection, enteric infection Ampicillin and gentamicin [Listonella damsela—see Photobacterium damselae] Luteibacter L. anthropi Bacteraemia Luteococcus L. peritonei L. sanguinis Peritonitis, bacteraemia Lysinibacillus L. meyeri L. massiliensis L. sphaericus (Bacillus sphaericus) M Massilia M. consociata M. haematophila (Naxibacter haematophilus) M. oculi M. timonae M. varians (Naxibacter varians) Bacteraemia, wound infection, eye infection Megasphaera M. elsdenii M. micronuciformis Endocarditis, abscess Metronidazole Mesorhizobium M. amorphae Pneumonia Methylobacterium M. extorquens M. mesophilicum (Pseudomonas mesophilica) Bacteraemia, CAPD peritonitis, UTI, septic arthritis Ureidopenicillins, imipenem, aminoglycosides, chloramphenicol, fluoroquinolones Detected in aortic aneurysm Microbacterium (Aureobacterium) M. arborescens M. binotii M. imperiale (CDC coryneform groups A-4 and A-5) M. liquefaciens (Aureobacterium liquefaciens) M. oxydans M. paraoxydans M. resistens M. trichothecenolyticum Endophthalmitis, UTI, endocarditis, soft tissue infection, hypersensitivity pneumonitis, meningitis, CAPD peritonitis, bacteraemia Glycopeptides, β-lactams, chloramphenicol, gentamicin M. resistens is vancomycin-resistant. Microbacterium isolates have been misidentified as 'Corynebacterium aquaticum' a taxon now known as Leifsonia aquatica Micrococcus M. luteus M. lytae Bacteraemia, endocarditis, septic arthritis Vancomycin, penicillin, rifampicin From skin flora. Common specimen contaminants Mitsuokella M. multocida (Bacteroides multiacidus) Role as human pathogen poorly defined Mobiluncus M. curtisii curtisii M. curtisii holmesii M. mulieris Endometritis, chorioamnionitis Ampicillin, cephalosporins, clindamycin Associated with bacterial vaginosis Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

section 8 Infectious diseases 1326 Moellerella M. wisconsensis Diarrhoea Of uncertain significance Mogibacterium M. diversum M. neglectum Endodontic infection Moheibacter M. brevis

(Empedobacter brevis, Flavobacterium breve) Endophthalmitis, bacteraemia, UTI Broad spectrum cephalosporins Carbapenem-resistant Moraxella M. atlantae M. catarrhalis (Branhamella catarrhalis) M. lacunata M. nonliquefaciens M. osloensis Conjunctivitis, wound infection, endocarditis, abscesses, osteomyelitis, respiratory infections, endocarditis, bacteraemia Penicillin, cefuroxime Penicillin resistance has been reported. Some authors retain Branhamella catarrhalis [Moraxella phenylpyruvica—see Psychrobacter phenylpyruvicus] [Moraxella urethralis—see Oligella urethralis] Morganella M. morganii morganii M. morganii sibonii Bacteraemia, UTI, wound infection β-Lactams, aminoglycosides Susceptibilities vary. Morganella pyschrotolerans associated with histamine fish poisoning Moryella M. indoligenes Abscess Murdochiella M. asaccharolytica Wound infection Mycobacterium M. chimaera M. chubuense M. colombiense M. conceptionense M. confluentis M. conspicuum M. cookii M. cosmeticum M. doricum M. engbaekiiM. elephantis M. europaeum M. flavescens M. florentinum M. fortuitum M. fragae M. gadium M. gastri M. genavense M. goodii M. gordonae M. haemophilum M. hassiacum M. heckeshornense M. heidelbergense M. heraklionense M. hodleri M. holsaticum M. houstonense M. immunogenum M. insubricum M. interjectum M. intracellulare M. iranicum ‘M. jacuzzii’ M. kansasii M. koreense M. kubicae M. kumamotonense M. kyorense M. lacus M. lentiflavum M. leprae M. longobardum Isoniazid, rifampicin, ethambutol, pyrazinamide, streptomycin, azithromycin, clarithromycin, quinolones, dapsone, clofazimine, imipenem, co-trimoxazole, amikacin Many Mycobacterium spp. have been associated with infection. M. tuberculosis, M. africanum, and M. bovis are the agents of tuberculosis. M. scrofulaceum causes cervical adenitis. The agent of Buruli ulcer is M. ulcerans. M. marinum causes fish-tank granuloma. M. lepraecauses leprosy. M. malmoense, M. szulgai, M. shimoidei, M. kansasii, and M. xenopi cause pulmonary infection. M. intracellulareand M. avium cause systemic infection mainly in immunocompromised patients. The rapid growers, M. chelonae, M. abscessus, and M. fortuitum cause local postinoculation injury and systemic infection Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 M. mageritense M. malmoense M. mantenii M. marinum M. marseillense M. microgenicum M. microti M. monacense M. mucogenicum M. neoaurum M. nebraskense M. neworleansense M. nonchromogenicum M. noviomagense M. novocastrense M. palustre M. paraense M. paragordonense M. parakoreense M. paraseoulense M. parascrofulaceum M. parmense M. peregrinum M. phlei M. phocaicum M. porcinum M. riyadhense M. saskatchewanense M. scrofulaceum M. seoulense M. septicum M. senuense M. setense M. sherrisii M. shimoidei M. shinjukuense M. simiae M. smegmatis M. szulgai M. terrae M. thermoresistibile M. timonense M. triplex M. triviale M. tuberculosis M. tusciae M. ulcerans M. vaccae M. vulneris M. wolinskyi M. xenopi M. yongonense Mycoplasma M. amphoriforme M. buccale M. faucium M. fermentans M. genitalium M. hominis M. lipophilum M. orale M. penetrans M. pirum M. pneumoniae M. primatum M. salivarium M. spermatophilum Respiratory infection, postpartum fever, pyelonephritis, pelvic inflammatory disease, myocarditis, pericarditis, meningitis Tetracycline, macrolides, fluoroquinolones May be resistant to macrolides. M. pneumoniaeinfection may be complicated by haemolytic anaemia, intravascular coagulation, Stevens– Johnson syndrome, or erythema multiforme Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

section 8 Infectious diseases 1328 M. phocicerebrale (M. phocacerebrale) Seal finger Tetracycline Other Mycoplasma spp. from seals are M. phocae and M. phocirhinis Myroides (Flavobacterium) M. odoratimimus M. odoratus UTI, wound infection Minocycline May be multiresistant N Negativicoccus N. succinicivorans Bacteraemia Penicillins Isolated from skin and soft tissue samples Neisseria N. animaloris (CDC group EF-4a) N. canis N. weaveri (CDC group M-5, 'Neisseria parelongata') N. zoodegmatis (CDC group EF4-b) Wound infections, abscesses, endocarditis, meningitis, bacteraemia Amoxicillin Zoonoses from animal bites N. bacilliformis N. cinerea N. elongata elongata N. elongata glycolytica N. elongata nitroreductens N. flavescens N. lactamica N. mucosa N. oralis N. polysaccharea N. shayeganii N. sicca N. subflava N. wadsworthii Meningitis, bacteraemia, endocarditis, osteomyelitis Penicillin, cephalosporins Bacteraemia in AIDS reported for several species. Penicillin resistance rarely reported in commensal Neisseriaspp. N. subflava includes biovars flava, perflava, and subflava N. gonorrhoeae Gonorrhoea, septicaemia, ophthalmia neonatorum Cephalosporins Susceptibility varies geographically. The name 'Neisseria gonorrhoeae ssp. kochii' was proposed for isolates from conjunctivitis cases in rural Egypt N. meningitidis Septicaemia, meningitis, conjunctivitis, genital infection, epiglottitis Penicillin, cefotaxime Rifampicin, ciprofloxacin, or ceftriaxone to clear carriage Neorickettsia N. sennetsu (Erhlichia sennetsu) Sennetsu fever Doxycycline Associated with eating raw fish in Asia Nocardia N abscessus N. africana N. amikacinitolerans N. anaemiae N. aobensis N. araoensis N. arthritides N. asiatica N. asteroides N. blacklockiae N. beijingensis N. brasiliensis N. brevicatena N. carnea N. concave N. cyriacigeorgica N. elegans N. exalbida N. farcinica N. higoensis N. inohanensis N. kroppenstedtii N. kruczakiae N. mexicana N. mikamii Nocardiosis (including bacteraemia, pulmonary, and soft tissue infections) Sulphonamides,
co-trimoxazole, amikacin, imipenem Nocardia amikacinitolerans is amikacin-resistant
Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 N. niigatensis N. ninae N. niwae N. nova N. otitidiscaviarum N. paucivorans N. pneumoniae N. pseudobrasiliensis N. puris N. sienata N. takedensis N. thailandensis N. terpenica N. testaceus N. transvalensis N. vermiculata N. veterana N. vulneris N. wallacei N. yamanashiensis Nocardiopsis N. dassonvillei N. synnemataformans Mycetoma, cutaneous infection, pulmonary infection, conjunctivitis Fluoroquinolones, piperacillin O Ochrobactrum (Achromobacter CDC group Vd; Achromobacter groups A, C, and D) O. anthropi O. haematophilum O. intermedium O. pseudogrignonense O. pseudointermedium Bacteraemia, endophthalmitis, liver abscess Imipenem, fluoroquinolones, aminoglycosides Nosocomial infections in debilitated patients Odoribacter O. splanchinicus (Bacteroides splanchinicus) Oerskovia O. turbata (Cellulomonas turbata) Bacteraemia, endocarditis Amikacin, co-trimoxazole, chloramphenicol Vancomycin resistance reported Oligella O. ureolytica (CDC IVe) O. urethralis (Moraxella urethralis) UTI, septicaemia Aminoglycosides, cephalosporins Associated with urinary catheters Olsenella O. uli (Lactobacillus uli) Orientia O. tsutsugamushi (Rickettsia tsutsugamushi) Scrub typhus Tetracycline, chloramphenicol P Paenibacillus P. alvei P. konsidensis P. macerans M. massiliensis P. polymyxa P. popilliae P. provencensis P. sanguinis P. sputi P. timonensis P. urinalis P. vulneris Septicaemia, meningitis, pneumonia, UTI, wound infection Vancomycin Pannonibacter P. phragmitetus (Achromobacter groups B and E) Bacteraemia Pantoea P. agglomerans (Enterobacter agglomerans) P. ananatis P. brenneri P. conspicua P. eucrina P. dispersa P. septica Bacteraemia, endocarditis, wound infection, cellulitis, alligator-bite infection,

endophthalmitis Carbapenems, fluoroquinolones, ureidopenicillins, aminoglycosides Susceptibilities vary. May be multiresistant Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

section 8 Infectious diseases 1330 Parabacteroides P. distasonis P. goldsteinii (Bacteroides goldsteinii) P. merdae Abscesses Metronidazole Parachlamydia P. acanthamoebae Humidifier fever Paracoccus P. sanguinis P. yeei Bacteraemia Ampicillin, cephalosporins, ciprofloxacin Parascardovia P. denticolens (Bifidobacterium denticolens) Dental caries Parvimonas P. micra (Peptostreptococcus micros) Pasteurella P. aerogenes P. bettyae P. canis P. dagmatis P. gallinarum P. haemolytica P. multocida multocida P. multocida gallicida P. multocida septica P. pneumotropica P. stomatis Wound infection, septicaemia, abscesses, pneumonia, endocarditis, meningitis Penicillin, tetracycline, ciprofloxacin Pasteurella infections in humans relate to species usually associated with animals. There may be no history of an animal bite or contact [Pasteurella ureae—see Actinobacillus ureae] Pediococcus P. acidilactici P. damnosus P. dextrinicus P. parvulus P. pentosaceus Bacteraemia, abscesses, pulmonary infection Imipenem, gentamicin, chloramphenicol Debilitated hospital patients. Resistant to vancomycin Peptococcus P. niger Abdominal sepsis Penicillin, clindamycin Peptoniphilus (Peptostreptococcus) P. asaccharolyticus P. coxii P. duerdenii P. gorbachii P harei P. indolyticus P. ivorii P. koenoeneniae P. lacrimalis P. olsenii P. tyrrelliae Mixed anaerobic infections, abscesses β-Lactams, metronidazole, chloramphenicol Peptostreptococcus P. anaerobius P. stomatis ‘P. trisimilis’ Mixed anaerobic infections, abscesses, endocarditis β-Lactams, metronidazole, chloramphenicol See also Peptoniphilus, Anaerococcus, Finegoldia Phocaeicola P. abscessus Brain abscess Photobacterium P. damselae (Listonella damsela and Vibrio damsela) Necrotizing wound infection, bacteraemia Penicillins, tetracycline, chloramphenicol Infection associated with penetrating fish injury. May require debridement Photorhabdus (Xenorhabdus) P. luminescens Bacteraemia, wound infection Cefoxitin, oxacillin, gentamicin Plesiomonas P. shigelloides Gastroenteritis, septicaemia, meningitis, endophthalmitis Ciprofloxacin, trimethoprim, cephalosporins Infections associated with contaminated food and water Porphyromonas (Bacteroides) P. asaccharolytica P. bennonis P. cangingivalis P. canoris P. cansulci P. catoniae P. circumdentaria P. crevioricanis P. endodontalis Mixed anaerobic infections at various sites, periodontitis, human and animal bites Metronidazole, ureidopenicillins, amoxicillin/clavulanate, carbapenems, cephalosporins, chloramphenicol Members of the oral flora of humans and animals Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

8.6.47 A checklist of bacteria associated with infection in humans 1331 P. gingivalis P. gingivicanis P. levii P. macacae P. somerae P. uenonis Prevotella (Bacteroides) P. amnii P. bergensis P. bivia P. buccae P. buccalis P. corporis P. dentalis P. denticola P. disiens P. enoeca P. heparinolytica P. intermedia P. loeschii P. melaninogenica P. multiformis P. multisaccharivorax P. nanceiensis P. nigrescens P. oralis P. oris P. oulorum P. pleuritidis P. timonensis P. veroralis P. zoogleoformans Abscesses, bacteraemia, wound infection, bite infections, genital tract infections, periodontitis, endodontic infection Metronidazole, amoxicillin/ clavulanate, ureidopenicillins, carbapenems, cephalosporins, clindamycin, chloramphenicol A genus that includes the well-known former Bacteroides melaninogenicusand allied species of anaerobes Propionibacterium P. acnes P. avidum P. granulosum P. propionicum (Arachnia propionicus) Abscesses, endocarditis, bacteraemia, septic

arthritis, endophthalmitis Glycopeptides, penicillin, macrolides Associated with acne vulgaris Propionimicrobium P. lymphophilum (Propionibacterium lymphophilum) UTI Isolated from lymph nodes in Hodgkin’s disease Proteus P. mirabilis P. penneri P. vulgaris UTI, bacteraemia, wound infection, abscesses β-Lactams, aminoglycosides, fluoroquinolones Susceptibilities vary Providencia P. alcalifaciens P. rettgeri P. rustigianii P. stuartii UTI, wound infection, bacteraemia β-Lactams, aminoglycosides, fluoroquinolones Susceptibilities vary. P. alcalifaciens has been associated with gastroenteritis Pseudoflavonifractor P. capillosus (Bacteroides capillosus) [Pseudomonas acidivorans—see Delftia acidivorans] Pseudomonas P. aeruginosa P. alcaligenes P. chlororaphis P. fluorescens P. mendocina P. monteilii P. mosselii P. oleovorans (P. pseudalcaligenes) P. otitidis P. pertocinogena P. putida P. stutzeri Bacteraemia, UTI, wound infection, abscesses, septic arthritis, conjunctivitis, endocarditis, meningitis, otitis Ureidopenicillins, aminoglycosides, ceftazidime, fluoroquinolones, carbapenems Nosocomial infections associated with invasive devices in debilitated patients. Nosocomial outbreaks reported. May be multiresistant Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 [Pseudomonas cepacia—see Burkholderia cepacia] [Pseudomonas diminuta—see Brevundimonas diminuta] [Pseudomonas mallei—see Burkholderia mallei] [Pseudomonas maltophilia—see Stenotrophomonas maltophilia] [Pseudomonas mesophilica—see Methylobacterium mesophilicum] P. luteola (Chryseomonas luteola) Bacteraemia, endocarditis, CAPD peritonitis Ureidopenicillins, ceftazidime, ciprofloxacin, aminoglycosides P. oryzihabitans (Flavimonas oryzihabitans) Septicaemia, eye infection, CAPD peritonitis Ampicillin, tetracycline, gentamicin, cefotaxime [Pseudomonas paucimobilis—see Sphingomonas paucimobilis] [Pseudomonas pickettii—see Ralstonia pickettii] [Pseudomonas pseudomallei—see Burkholderia pseudomallei] [Pseudomonas putrefaciens—see Shewanella putrefaciens] [Pseudomonas terrigena—see Comamonas terrigena] [Pseudomonas testosteroni—see Comamonas testosteroni] [Pseudomonas vesicularis—see Brevundimonas vesicularis] Pseudonocardia P. autotrophica (Amycolata autotrophica) Role as pathogen uncertain Pseudoramibacter P. alactolyticus Periodontal disease, wound infection, abscesses Penicillin, clindamycin, chloramphenicol Psychrobacter P. faecalis P. immobilis P. phenylpyruvicus (Moraxella phenylpyruvica) P. pulmonis P. sanguinis Meningitis, bacteraemia, eye infection Penicillins, aminoglycosides, chloramphenicol R Rahnella R. aquatilis UTI, septicaemia Ciprofloxacin Immunocompromised patients Ralstonia R. insidiosa R. mannitolilytica R. pickettii (Pseudomonas pickettii) R. taiwanensis Meningitis, peritonitis, bacteraemia, UTI, pulmonary infection Co-trimoxazole, imipenem, ceftazidime, quinolones Raoultella (Klebsiella) R. ornithinolytica R. planticola R. terrigena Bacteraemia, UTI, surgical sepsis, pancreatitis Cephalosporins, carbapenems, aztreonam, quinolones, aminoglycosides β-Lactamase producers. Associated with histamine (scombrotoxin) fish poisoning ‘Rasbo’ ‘R. bacterium’ Pneumonia, pericarditis Proposed name does not have standing in nomenclature Rhodococcus R. hoagi, R. equi, Corynebacterium equi) Bacteraemia, osteomyelitis, lung abscesses Vancomycin, erythromycin, aminoglycosides In immunocompromised patients, including AIDS Rickettsia R. africae R. akari R. australis R. conorii R. felis R. honei R. japonica ‘R. mongolotimonae’ R. prowazekii R. rickettsiae R. sibirica R. slovaca R. typhi Rickettsial spotted fever, tick typhus, tick-bite fever, rickettsialpox Tetracycline Transmitted by arthropods. Agents of Astrakhan fever, Israeli tick typhus, and Thai tick typhus await designation of scientific names. Other Rickettsia spp. are of uncertain clinical significance Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC

alphanumeric groups) (continued)

8.6.47 A checklist of bacteria associated with infection in humans 1333 Roseomonas R. cervicalis R. gilardii ssp. gilardii R. gilardi ssp. rosea R. mucosa Bacteraemia, wound infection, peritonitis Aminoglycosides, imipenem, ciprofloxacin, ticarcillin-clavulanate [Roseomonas fauriae—see Azospirillum brasilense] Rothia R. dentocariosa Endocarditis, abscesses Penicillin and gentamicin R. mucilaginosa (Micrococcus mucilaginosus) (Stomatococcus mucilaginosus) Endocarditis, meningitis, neutropenic sepsis, necrotizing fasciitis Glycopeptides, imipenem, rifampicin, ceftriaxone Ruminococcus R. flavefaciens R. hansenii (Streptococcus hansenii) R. luti R. productus (Peptostreptococcus productus) Abdominal sepsis, abscesses Penicillins S Saccharopolyspora S. rosea Salmonella S. bongori S. choleraesuis ssp. arizonae S. choleraesuis ssp. choleraesuis S. choleraesuis ssp. diarizonae S. choleraesuis ssp. houtenae S. choleraesuis ssp. indica S. choleraesuis ssp. salamae S. enteritidis S. paratyphi S. typhi S. typhimurium Gastroenteritis, enteric fever, osteomyelitis β-Lactams, fluoroquinolones, chloramphenicol Salmonella nomenclature is complicated by the existence of two sets of names, both of which have standing in nomenclature and which reflect two different schemes of classification. One scheme supported by phylogenetic data recognizes three distinct species, S. subterranea (an environmental organism), S. bongori (associated with reptiles and a cause of diarrhoea in humans) and S. enterica (which includes several subspecies). Users of this scheme recognize several clinically important taxa (including the agent of typhoid fever) as serovars of S enterica ssp. Enterica—e.g. Salmonella enterica ssp. enterica serovar Typhi. As a form of shorthand, the serovars can be written thus: Salmonella Typhi, Salmonella Paratyphi, and so on. The alternative scheme recognizes S. typhi, S. paratyphi, S. enteritidis, S. typhimurium and S. choleraesuis (including several subspecies). Names from both schemes are included in the table S. enterica ssp. arizonae S. enterica ssp. diarizonae S. enterica ssp. enterica S. enterica ssp. houtenae S. enterica ssp. indica S. enterica ssp. salamae Scardovia S. inopinata (Bifidobacterium inopinatum) S. wiggsiae Dental caries, wound infection Selenomonas S. artemidis S. dianae S. flueggei S. infelix S. noxia S. sputigena Bacteraemia, lung abscess Clindamycin, chloramphenicol, metronidazole Malignancy and alcohol abuse reported as risk factors for infection [Serpulina—see Brachyspira] Serratia S. ficaria S. fonticola S. grimesii S. liquefaciens Septicaemia, abscesses, burn infections, osteomyelitis Imipenem, aminoglycosides, fluoroquinolones, ureidopenicillins, ceftazidime Nosocomial outbreaks reported. May be multiresistant. At time of writing a proposal to use the name S. rubidae in place of S. rubidaea has not been validly published Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

section 8 Infectious diseases 1334 S. marcescens S. odorifera S. plymuthica S. proteamaculans S. quinivorans S. rubidaea Shewanella S. algae S. putrefaciens (Alteromonas putrefaciens) (Pseudomonas putrefaciens) Abdominal sepsis, meningitis, bacteraemia Ampicillin, cefotaxime, gentamicin, chloramphenicol Debilitated patients Shigella S. boydii S. dysenteriae S. flexneri S. sonnei Enteric infection Co-trimoxazole, fluoroquinolones Simkania S. negevensis Bronchiolitis, pneumonia Slackia S. exigua (Eubacterium exiguum) Periodontitis Sneathia S. sanguinegens (Leptotrichia sanguinegens = L. microbii) Sphingobacterium (Flavobacterium) S. multivorum S. spiritivorum S. thalpophilum Bacteraemia, pulmonary infection Co-trimoxazole, chloramphenicol, tetracycline, cephalosporins, quinolones [Sphingobacterium mizutae—see Flavobacterium mizutaii] Sphingomonas S. parapaucimobilis S. paucimobilis (Pseudomonas paucimobilis) S. sanguinis

(S. sanguis) S. yanoikuyae Septicaemia, UTI, wound infections, CAPD peritonitis Ceftazidime, aminoglycosides Nosocomial infections Spirillum ‘S. minus’ Rat bite fever Penicillin Streptobacillus moniliformis is also a rat bite fever agent. The name ‘Spirillum minus’ does not have standing in nomenclature Staphylococcus S. argenteus S. aureus S. auricularis S. capitis capitis S. capitis ureolyticus S. caprae S. cohnii cohnii S. cohnii urealyticus S. delphini S. epidermidis S. equorum S. gallinarum S. haemolyticus S. hominis hominis S. hominis novobiosepticius S. hyicus S. intermedius S. jettensis S. lugdunensis S. massiliensis S. pasteuri S. petrasii S. pettenkoferi S. saccharolyticus S. saprophyticus S. schleiferi schleiferi S. schleiferi coagulans S. sciuri S. simulans S. vitulinus Bacteraemia, wound infection, endocarditis, catheter-related sepsis, UTI, toxic shock syndrome, food poisoning, eye infection, osteomyelitis Glycopeptides, β-lactams, aminoglycosides, tetracycline, macrolides, rifampicin, fluoroquinolones, daptomycin, linezolid, fusidic acid, mupirocin Staphylococci are surface commensals of humans and animals. S. aureus is also a major pathogen, causing focal and systemic sepsis, toxic shock syndrome, and food poisoning. S. epidermidis infection is often associated with foreign bodies (e.g. catheters and implants). S. saprophyticus causes UTI. S. lugdunensis is a rare cause of endocarditis. S. intermedius, S. hyicus, and others are from animals. Susceptibilities are variable but glycopeptide resistance is as yet rare Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

 S. pulvereri S. warneri S. xylosus Stenotrophomonas S. maltophilia (Pseudomonas maltophila) (Xanthomonas maltophila) (Stenotrophomonas africana) Bacteraemia, meningitis, wound infection, UTI, pneumonia Fluoroquinolones, chloramphenicol, co-trimoxazole Resistance to aminoglycosides, penicillins, and carbapenems reported [Stomatococcus mucilaginosus—see Rothia mucilaginosa] Stomatobaculum S. longum Dental plaque Streptobacillus S. moniliformis S. hongkongensis Rat bite fever, Haverhill fever Qunisy, septic arthritis Penicillin, erythromycin ‘Spirillum minus’ is also a causative agent of rat bite fever Streptococcus S. acidominimus Pneumonia, pericarditis, meningitis β-Lactams From cattle S. agalactiae S. canis S. dysgalactiae dysgalactiae S. dysgalactiae equisimilis S. equi equi S. equi zooepidemicus S. hongkongensis S. iniae (S. shiloi) S. porcinus S. pseudoporcinus S. pyogenes S. urinalis Pharyngitis, bacteraemia, pyogenic infection, necrotizing infection, septic arthritis, UTI, glomerulonephritis, meningitis β-Lactams, macrolides S. pyogenes (Lancefield group A), S. agalactiae (group B), and S. dysgalactiae equisimilis (groups C and G) are commensals and pathogens of humans. S. pseudoporcinus is known to colonize the female genital tract and has been reported to cause wound infection. S. iniae and S. hongkongensis are associated with fish. Others are from mammals S. anginosus S. constellatus constellatus S. constellatus pharyngis S. intermedius Abscesses, bacteraemia, endocarditis, pharyngitis β-Lactams, macrolides Often termed ‘S. milleri’ or microaerophilic streptococci. From human oral flora S. equinus (S. bovis) S. gallolyticus ssp. gallolyticus S. gallolyticus ssp. pateurianus S. infantarius ssp. coli S. infantarius ssp. infantarius S. lutetiensis S. pasteurianus Endocarditis, CAPD peritonitis β-Lactams (plus gentamicin for endocarditis) Intestinal streptococci from animals and humans. Some taxonomic problems relating to this group (the ‘bovis’ streptococci) await resolution S. criceti S. mutans S. ratti S. sobrinus Dental caries, endocarditis β-Lactams From the tooth-surface flora of humans and mammals S. cristatus S. gordonii S. massiliensis S. mitis S. oralis S. parasanguinis S. salivarius S. sanguinis S. sinensis S. tigurinus S. vestibularis Bacteraemia, endocarditis, wound infection β-Lactams, macrolides Human oral streptococci including taxa sometimes known as the ‘viridans

streptococci’. Streptococcus tigurinus has been isolated from patients with infective endocarditis, spondylodiscitis, bacteraemia, meningitis, prosthetic joint infection, and empyema S. pneumoniae S. pseudopneumoniae Pneumonia, bacteraemia, sinusitis, peritonitis, otitis, conjunctivitis β-Lactams, macrolides, chloramphenicol Penicillin resistance locally common S. suis Meningitis β-Lactams Associated with pig contact Streptomyces S. albus S. anulatus ‘S. paraguayensis’ S. somaliensis Actinomycetoma Dapsone, co-trimoxazole Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

section 8 Infectious diseases 1336 S. bikiniensis S. griseus Bacteraemia, abscess, pericarditis, endocarditis Vancomycin, tetracycline, penicillin Treatment options poorly defined Succinivibrio S. dextrinosolvens Bacteraemia, pneumonia Penicillin From faecal and gingival flora Sutterella S. wadsworthensis Appendicitis, peritonitis, abscesses, osteomyelitis Amoxicillin/clavulanate, ticarcillin/clavulanate, meropenem, ceftriaxone One-third of isolates reported to be metronidazole resistant Suttonella S. indologenes (Kingella indologenes) Endocarditis, eye infection Penicillin (plus gentamicin for endocarditis) T Tannerella T. forsythensis (T. forsythia, T. forsythus) Endodontic infection [Tatlockia maceachernii—see Legionella maceachernii] [Tatlockia micdadei—see Legionella micdadei] Tatumella T. ptyseos T. saanichensis Bacteraemia, UTI Ampicillin, tetracycline, chloramphenicol, gentamicin T. saanichensis was isolated from a patient with cystic fibrosis Terrisporobacter T. glycolicus (Clostridium glycolicum) Abdominal sepsis Tetragenococcus T. solitarius (Enterococcus solitarius) Tissierella T. praeacuta (Bacteroides praeacuta) (Clostridium hastiforme) Bacteraemia Metronidazole Trabulsiella T. guamensis Diarrhoea Co-trimoxazole, gentamicin, chloramphenicol Role as possible pathogen uncertain Treponema T. amylovorum T. denticola T. lecithinolyticum T. maltophilum T. medium T. parvum T. pectinovorum T. putidum T. scoliodontum T. socranskii ‘T. vincentii’ Associated with periodontal disease. Role as potential pathogens unclear ‘T. carateum’ Pinta Penicillin Name does not have standing in nomenclature T. minutum ‘T. phagedenis’ ‘T. refringens’ From genital flora. Considered nonpathogenic but have been isolated from genital lesions T. pallidum ‘T. pallidum endemicum’ Syphilis Penicillin ‘T. pallidum endemicum’ is the agent of nonvenereal endemic syphilis T. pertenue (‘T. pallidum pertenue’) Yaws Penicillin Tropheryma T. whipplei (T. whippelii) Whipple’s disease Uncultured organism Trueperella (Arcanobacterium, Actinomyces) T. bernardiae UTI, septicaemia, septic arthritis β-Lactams Previously known as CDC coryneform group 2 T. pyogenes Septic arthritis β-Lactams Tsukamurella T. inchonensis T. paurometabola T. pulmonis T. strandjordii (T. strandjordae) T. tyrosinosolvens Septicaemia, cutaneous infections, lung infections β-Lactam (plus aminoglycoside) Line-associated infections in debilitated patients. T. pulmonis isolated from the sputum of a tuberculosis patient Turicella T. otitidis Otitis, cervical abscess Glycopeptides, β-lactams U Ureaplasma U. parvum U. urealyticum Urethritis Tetracycline, erythromycin Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups) (continued)

8.6.47 A checklist of bacteria associated with infection in humans 1337 V Vagococcus V. fluvialis Ampicillin, vancomycin cefotaxime Possible role as pathogen poorly defined Varibaculum V. cambriensis Abscesses Veillonella V. atypical V. dentocariosi V. dipsar V. montpellierensis V. parvula V. rogosae Abscesses, bacteraemia Metronidazole V. dentocariosi and V. rogosae associated with tooth decay and dental plaque Vibrio V. alginolyticus Wound infection, ear infection Chloramphenicol, tetracycline Infection associated with aquatic exposure V. cholerae Cholera

Tetracycline V. cincinnatiensis Bacteraemia Moxalactam, chloramphenicol, cephalosporins Risk factors for infection not defined [Vibrio damsela—see Photobacterium damselae] V. fluvialis V. furnissii V. metschnikovii V. mimicus V. parahaemolyticus Diarrhoea, septicaemia Tetracycline, chloramphenicol Infection associated with ingestion of contaminated water or shellfish V. harveyi (V. carchariae) Wound infection Cephalosporins, chloramphenicol, gentamicin Infection associated with shark bite. May require debridement [Vibrio hollisae—see Grimontia hollisae] V. vulnificus Wound infection, septicaemia, meningitis, endometritis Tetracycline, penicillins, gentamicin, chloramphenicol Risk factors include aquatic exposure and penetrating fish injury. May require debridement W Wautersiella W. falsenii Bacteraemia, wound infection Phylogenetic data support inclusion in the genus Moheibacter [Weeksella zoohelcum—see Bergeyella zoohelcum] Weissella W. confusa Endocarditis Williamsia W. muralis Pulmonary infection Wohlfahrtiimonas W. chitiniclastica Bacteraemia Ceftriaxone Associated with myiasis Wolbachia W. sp. filariasis doxycycline Endosymbiont of filarial nematodes [Wolinella curva—see Campylobacter curvus] [Wolinella recta—see Campylobacter rectus] X Xanthomonas X. campestris Bacteraemia [Xenorhabdus luminescens—see Photorhabdus luminescens] Y Yersinia Y. aldovae Y. bercovieri Y. enterocolitica Y. frederiksenii Y. intermedia Y. kristensenii Y. mollaretii Y. pseudotuberculosis Y. rohdei Y. similis Y. wautersii Enterocolitis, soft tissue infections, mesenteric lymphadenitis Tetracycline, chloramphenicol, aminoglycosides, fluoroquinolones, cephalosporins Medical significance of manyYersinia spp. is unclear. Antibiotic treatment is not indicated for uncomplicated enteric infection Y. pestis Plague Streptomycin, tetracycline Yokenella Y. regensburgei (Koserella trabulsii) Bacteraemia, wound infection Aminoglycosides, chloramphenicol CAPD, continual ambulatory peritoneal dialysis; CDC, Centers for Disease Control and Prevention; sp. species; ssp. subspecies; UTI, urinary tract infection. Table 8.6.47.1 Continued Nomenclature Associated infections Reported susceptibilities and treatments Notes Genus Species and subspecies (synonyms, CDC alphanumeric groups)

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