Synonymy of *Alcaligenes aquamarinus*, *Alcaligenes faecalis* subsp. *homari*, and *Deleya aesta*: *Deleya aquamarina* comb. nov. as the Type Species of the Genus *Deleya*

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Alcaligenes aquamarinus and *Alcaligenes faecalis* subsp. *homari* proved to be identical to *Deleya aesta* in respiratory quinone type, cellular fatty acid profiles, and biochemical and physiological characteristics and as determined by deoxyribonucleic acid-deoxyribonucleic acid relatedness studies. The name *Alcaligenes aquamarinus* has priority. Therefore, the name *Deleya aquamarina* comb. nov. is proposed for the type species of the genus *Deleya*; the type strain should be changed from strain IAM 12551 (= ATCC 27128) (type strain of *Deleya aesta*) to strain IAM 12550 (= ATCC 14400) (type strain of *Alcaligenes aquamarinus*).

A study of the relationships of marine and other species of the genera *Alcaligenes* and *Deleya* was initiated to determine the correct taxonomic placement of the marine species. Of particular interest in this group were *Alcaligenes aquamarinus* (ZoBell and Upham 1944) Hendrie, Holding, and Shewan 1974 (Approved Lists), *Alcaligenes faecalis* subsp. *homari* Austin, Rodgers, Forns, and Colwell 1981, and *Deleya aesta* (Baumann, Baumann, Mandel, and Allen 1972) Baumann, Bowditch, and Baumann 1983, which is the type species of the genus *Deleya* Baumann, Bowditch, and Baumann 1983. As a result of chemotaxonomic studies (Miyazaki et al., manuscript in preparation), all of the marine strains of the genus *Alcaligenes* can be expected to be classified in the genus *Deleya*.

MATERIALS AND METHODS

The bacterial strains which we studied are listed in Table 1. Cultures were preserved by freeze-drying. The suspension fluid used for freeze-drying was a 1:1 mixture of horse serum and a sucrose-salts aqueous solution containing 20% (wt/vol) sucrose, 0.4% (wt/vol) NaCl, and 0.2% (wt/vol) MgCl₂. Cultures were maintained on slopes of modified marine agar (MMA) at 5°C by transfer every month. MMA was composed of 5.0 g of peptone (Kyokuto), 1.0 g of yeast extract (Oriental), 15.0 g of Bacto-Agar (catalog no. 0410; Difco Laboratories, Detroit, Mich.) and 1,000 ml of 0.75× seawater (75% seawater in distilled water) adjusted to pH 7.4 before autoclaving. For the moderately halophilic strain of *Deleya halophila*, NaCl was added to a final concentration of 10% (wt/vol).

The Gram stain reaction was determined by using smears from cultures grown for 1 day on MMA plates at 25°C. Flagellar arrangement was determined by transmission electron microscopy of cultures that were grown on MMA for 1 or 2 days at 25°C and suspended in 2 or 3 ml of a 3% NaCl solution. Cell suspensions were placed on Formvar-coated grids, fixed, and negatively stained with 1% phosphotungstic acid adjusted to pH 7.0 by using a 1 N NaOH solution. Immediately after blot drying, the grid was observed by using a model JEOL 200CX electron microscope at 100 kV.

Production of acid from glucose and mannitol under aerobic and anaerobic conditions was determined in medium composed of 1.0 g of Casitone (catalog no. 0259; Difco), 0.1 g of yeast extract (catalog no. 0127; Difco), 0.5 g of

(NH₄)₂SO₄, 0.5 g of tris(hydroxymethyl) aminomethane, 10.0 g of carbohydrate, and 1,000 ml of 0.5× seawater adjusted to pH 7.4. Carbohydrates were autoclaved separately. The cultures were incubated for 3 days. GasPak anaerobic systems (BBL Microbiology Systems, Cockeysville, Md.) were used for anaerobic incubation. Growth was observed visually, and acid production was confirmed by adding cresol red to aerobic cultures and bromothymol blue to anaerobic cultures. The inocula for tests were prepared from cultures that were grown on MMA slopes or in modi-

TABLE 1. Bacterial strains used in this study

Species and strain no. when received	Other names previously assigned	Other designations
<i>Alcaligenes aquamarinus</i> IAM 12550 ^a	" <i>Achromobacter aquamarinus</i> "	ATCC 14400 ^T , DSM 30161 ^T , NCMB 557 ^T , ZoBell and Upham 558 ^T
<i>Deleya aesta</i> IAM 12551 ^T	<i>Alcaligenes aestus</i>	ATCC 27128 ^T , NCMB 1980 ^T , Baumann 134 ^T
<i>Deleya cupida</i> IAM 12552 ^T	<i>Alcaligenes cupidus</i>	ATCC 27124 ^T , NCMB 1978 ^T , Baumann 79 ^T
<i>Deleya pacifica</i> IAM 12553 ^T	<i>Alcaligenes pacificus</i>	ATCC 27122 ^T , NCMB 1977 ^T , Baumann 62 ^T
<i>Deleya venusta</i> IAM 12554 ^T	<i>Alcaligenes venustus</i>	ATCC 27125 ^T , NCMB 1979 ^T , Baumann 86 ^T
<i>Alcaligenes faecalis</i> subsp. <i>homari</i> IAM 12645 ^T		ATCC 33127 ^T , NCMB 2116 ^T , Austin L-1 ^T
<i>Deleya halophila</i> IAM 13009 ^T		CCM 3662 ^T , Quesada F5-7 ^T
<i>Deleya marina</i> IAM 12928	<i>Pseudomonas marina</i>	ATCC 27129, DSM 50416, NCMB 1966, Baumann 140
<i>Alcaligenes faecalis</i> IAM 12369 ^T		ATCC 8750 ^T , NCIB 8156 ^T , CIP 60.80 ^T
<i>Pseudomonas aeruginosa</i> IAM 1514 ^T		ATCC 10145 ^T , NCIB 8295 ^T , NCTC 10332 ^T
<i>Pseudomonas fluorescens</i> IAM 12022 ^T		ATCC 13525 ^T , NCTC 10038 ^T , NCIB 9046 ^T
<i>Serratia marcescens</i> IAM 12142 ^T		ATCC 13880 ^T , NCIB 9155 ^T , NCTC 10211 ^T
<i>Gluconobacter cerinus</i> IAM 1832		

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^a T = type strain.

fied marine broth prepared by removing agar from MMA and were incubated for 2 days at 25°C. Growth at 35, 40, and 45°C was observed on marine agar 2216 (catalog no. 0979; Difco) plates after incubation for 7 days. Growth at 5°C was tested for 3 weeks. Growth at pH 5.0, 6.0, 10.0, 11.0, and 12.0 (adjusted with a KOH solution) was checked for 14 days in marine broth 2216 (catalog no. 0791; Difco). When the growth was equivocal, the culture was transferred to fresh medium and incubated under the same conditions at least three times successively for confirmation. A requirement for sodium ions was determined by using the method of Baumann et al. (4) and glucose at a concentration of 0.5% (wt/vol). Nitrate reduction was tested in Casitone broth (10) containing 0.75× seawater instead of distilled water. Fluorescein production and pyocyanin production were tested on pseudomonas F agar (catalog no. 0448; Difco) and pseudomonas P agar (catalog no. 0449; Difco), respectively, prepared with 0.75× seawater. The *o*-nitrophenyl-β-D-galactopyranoside test was carried out by using the method of Cowan (7). Seawater-peptone broth that was composed of 10 g of Bacto-Peptone (catalog no. 0018; Difco) and 1,000 ml of 0.75× seawater was used in place of peptone broth. Esculin hydrolysis was detected on agar slopes containing 0.1% (wt/vol) esculin, 1% (wt/vol) Bacto-Peptone, 0.1% (wt/vol) sodium citrate, and 0.01% (wt/vol) ferric citrate in 0.75× seawater by using the method of Cowan (7) and Sneath (19). In tests for hydrolysis of Tween 80, gelatin, casein, starch, alginate, chitin, and agar, marine agar 2216 was used as the basal medium. (Deoxyribonucleic acid [DNA] hydrolysis was tested in deoxyribonuclease test agar [catalog no. 0632; Difco] prepared with 0.75× seawater.) Hydrolysis of alginate and hydrolysis of chitin were recorded after incubation for 1 month on marine agar 2216 containing 1% (wt/vol) sodium alginate or approximately 1% (wt/vol) colloidal chitin. We used commercially available crude chitin powder (Nakarai Chemicals, Ltd., Kyoto, Japan) for the colloidal chitin preparation and the method of Berger and Reynolds (5). Clear zones under and surrounding the colonies were recorded as positive. When results on sodium alginate plates were equivocal, the plates were flooded with ethanol to precipitate the remaining alginate. Hydrolysis of agar was judged by the appearance of depressed colonies on marine agar 2216 plates after 1 week of incubation. Decomposition of tyrosine and decomposition of xanthine were tested on a medium modified from a medium of Lelliott et al. (14); this medium contained 10 g of casein hydrolysate (catalog no. L41; Oxoid Ltd., London, England), 0.5 g of K₂HPO₄, 0.25 g of MgSO₄ · 7H₂O, 15 g of Bacto-Agar, and 1,000 ml of 0.75× seawater (pH 7.4) and was supplemented with 5 g of L-tyrosine or 4 g of xanthine. To test production of dark pigment, tyrosine (0.5%), phenylalanine (0.1%), tryptophan (0.1%), histidine (0.1%), proline (0.1%), or anthranilate (0.1%) was added to this medium, and cultures were incubated for 1 month. Tests for amidase for acetamide, urease, phosphatase, indole, H₂S, production of 2-ketogluconate from gluconate, production of 3-ketolactose from lactose, arginine hydrolysis, lysine decarboxylase, ornithine and glutamate utilization, reaction on litmus milk, hemolysis, citrate utilization, and susceptibility to 0.4% phenetyl alcohol were performed as described previously (22) except that 0.75× seawater was substituted for distilled water or saline. MMA was used to detect susceptibility to vibriostatic agent O/129 (2,4-diamino-6,7-diisopropylpteridine), deaminase activities for tryptophan and phenylalanine, levan production, and indophenol oxidase and catalase activities, and reduction of methylene blue was determined in modified marine broth;

TABLE 2. Quinone types and fatty acid compositions of *Deleya* species and other organisms

Strain	Quinone type	Fatty acid composition (%) ^a													
		Saturated acids					Monounsaturated acids					Iso acids			
		C ₁₀	C ₁₂	C ₁₄	C ₁₅	C ₁₇	C ₁₆	C ₁₈	C ₁₉	C ₁₂	C ₁₄	C ₁₆ ^b	C ₁₇	C ₁₈ ^b	C ₁₉
<i>Alcaligenes aquamarinus</i> IAM 12550 ^T	Q-9	r ^c	t	4			16	t		t	11	62	1	t	t
<i>Alcaligenes faecalis</i> subsp. <i>homari</i> IAM 12645 ^T	Q-9		T												
<i>Deleya aestiva</i> IAM 12551 ^T	Q-9	2	T	3		12	t			t	13	64	t	t	t
<i>Deleya cupida</i> IAM 12552 ^T	Q-9	2	T	3		9				t	9	67	2	t	T
<i>Deleya pacifica</i> IAM 12553 ^T	Q-9	t	4	t		19	t			t	21	54	t	T	t
<i>Deleya venusta</i> IAM 12554 ^T	Q-9	2	1	2		25	t			t	19	48	t		T
<i>Deleya halophila</i> IAM 13009 ^T	Q-9	1	2	2		13	t			t	22	53	T	t	T
<i>Deleya marina</i> IAM 12928	Q-9		2	t		28					20	52			
<i>Alcaligenes faecalis</i> IAM 12369 ^T	Q-8	3	4	2	t	25	T		1		35	29	T		T
<i>Achromobacter xylosoxidans</i> KM 543 ^T	Q-8		3	t		27			2		38	24			
<i>Agrobacterium radiobacter</i> IAM 12084 ^T	Q-10					45	1	3			34	11			
<i>Rhizobium leguminosarum</i> IAM 12609 ^T	Q-10					12		2	2		2	81			
	Q-10					5	t	12			2	80			27

^a Data for terrestrial strains are from Miyazaki et al. (in preparation).^b Values include amounts of monounsaturated acid and derived cyclopropane acid.^c T, Between 0.5 and 1%; t, less than 0.5%.

TABLE 3. Differentiation of gram-negative, strictly aerobic, peritrichously flagellated rods

Group	Major respiratory quinone	Cellular fatty acid composition ^a	
		Major fatty acids	Detectable hydroxylated fatty acids
Q-8 (<i>Alcaligenes</i> and <i>Achromobacter</i> species)	Q-8	C _{16:0} , C _{16:1} , C _{18:1} (C _{16:1} > C _{18:1})	2-OH-C _{12:0} ~C _{16:0} , 3-OH-C _{14:0}
Q-9 (<i>Deleya</i> and marine <i>Alcaligenes</i> species)	Q-9	C _{16:0} , C _{16:1} , C _{18:1} (C _{16:1} < C _{18:1})	3-OH-C _{12:0}
Q-10 (<i>Agrobacterium</i> and <i>Rhizobium</i> species)	Q-10	C _{18:1}	3-OH-C _{14:0}

^a Data for *Alcaligenes* and *Achromobacter* species and for *Agrobacterium* and *Rhizobium* species are from Dees and Moss (8) and Miyazaki et al. (in preparation).

these tests have been described in detail previously (22). Voges-Proskauer and methyl red tests were carried out by using the method of Cowan (7) and 0.75× seawater in place of distilled water in the medium. Production of ammonia from peptone (22) was tested in medium containing 10 g of Proteose Peptone (catalog no. 0120, Difco), 3 g of yeast extract (Difco), and 1,000 ml of 0.75× seawater (pH 7.4). Luminescence was observed by using the method of Lee et al. (13). In addition, the following two media also were used: (i) no. 13 medium of the Institute Applied Microbiology Culture (IAM) Collection which contained 20 g of Polypeptone (Daigo Eiyo), 1 g of yeast extract (Difco), 5 g of glycerol, 10 g of meat extract (Kyokuto), 30 g of NaCl, 15 g of Bacto-Agar, and 1,000 ml of distilled water; and (ii) the luminous agar medium of Reichelt and Baumann (16).

To determine cellular fatty acid composition, cells were harvested at the mid-log growth phase from cultures that were grown in modified marine broth at 27°C with shaking. After the cells were washed twice with seawater, they were freeze-dried to complete dryness. A 20-mg portion of lyophilized cells was methylated for 3 h at 100°C with 2 ml of 5% HCl in anhydrous methanol, and the fatty acid methyl esters were extracted four times with 5 ml of hexane. Analysis was carried out with a Shimadzu model GC-8A gas chromatograph equipped with a flame ionization detector and a 30-m fused silica polar column (inside diameter, 0.24 mm) that was coated with Advance DS (Shinwa Kakou Co., Ltd., Tokyo, Japan). Nitrogen was the carrier gas, and the flow rate was 0.6 ml/min. The sample volume was 1 to 5 µl. The column temperature was isothermal at 170°C. The peaks were identified by comparing their retention times with those of known standards. Hydroxylated fatty acid methyl esters were separated from nonpolar fractions by thin-layer chromatography on Kieselgel F254 (E. Merck AG, Darmstadt, Federal Republic of Germany) using a hexane-diethyl ether (85:15) developing system. To detect the fatty acid methyl esters, the thin-layer chromatography plates were sprayed with a 0.02% 2',7'-dichlorofluorescein solution in ethanol. Colored spots were confirmed under ultraviolet light. Unsaturated fatty acid methyl esters were hydrogenated in chloroform-methanol (2:1) by using platinum dioxide as a catalyst. The nonpolar fraction also was subjected to further methanolysis to detect cyclopropanic fatty acid. The percentages of cellular fatty acid components were calculated on the basis of the total nonhydroxylated acids as described by Katayama-Fujimura et al. (11) because of the different locations and functions of the hydroxylated and nonhydroxylated acids.

For the analysis of respiratory quinones, cells from the early stationary growth phase were washed twice and lyophilized. Quinones were extracted with chloroform-methanol (2:1) and were partially purified by thin-layer chromatography on silica gel, using a benzene-diethyl ether (8:2) solvent system. The species of a quinone molecule was determined from its *R_f* value, and the number of isoprenoid units in the

molecule was determined by high-performance liquid chromatography as described by Tamaoka et al. (20).

DNA was isolated from cells in the early stationary growth phase and was purified by using the method of Saito and Miura (18). The guanine-plus-cytosine (G+C) content of the DNA was estimated by using the thermal denaturation method (22). DNA from *Escherichia coli* IAM 1264 (strain K-12) (G+C content, 51.6 mol%) (21) was used as the reference DNA. Hybridization was carried out by using the membrane filter method described by Denhardt (9) and Bonner et al. (6). Reference DNAs were labeled with [³H]deoxycytidine triphosphate by nick translation (17), using a nick translation kit (Amersham International plc, Buckinghamshire, United Kingdom). Reassociation mixtures consisted of 25 µg of unlabeled single-stranded DNA immobilized on nitrocellulose membrane filters (type TM-3; pore size, 0.3 µm; diameter, 25 mm; Toyo Roshi Co., Ltd., Tokyo, Japan) and labeled reference DNA (which emitted approximately 9 × 10³ cpm of specific radioactivity) suspended in 0.1% sodium dodecyl sulfate–2× SSC (0.3 M NaCl plus 0.03 M trisodium citrate). After incubation for 40 h at 65°C, the filters were washed and dried. The radioactivity of the filters was measured with a model 300C Tri-Carb liquid scintillation counter (Packard Instrument Co., Inc., Rockville, Md.).

RESULTS AND DISCUSSION

All of the strains were strictly aerobic, gram-negative rods. Peritrichous flagella were observed in all of the strains except the *Deleya marina* strain, which had a polar flagellum (2). Vegetative cells were straight or slightly curved with rounded ends. In some strains lightly stained granular inclusions were observed by transmission electron microscopy.

All of the strains from marine sources had ubiquinone 9 (Q-9) as a major quinone molecule (Table 2). Terrestrial *Alcaligenes* and *Achromobacter* species have Q-8 and *Agrobacterium* and *Rhizobium* species have Q-10 as their major quinone molecules (Miyazaki et al., in preparation). *Alcaligenes aquamarinus* and *Alcaligenes faecalis* subsp. *homari* were included in the Q-9 marine group together with the *Deleya* species, and thus we believed that these organisms were related to the genus *Deleya* rather than to the genus *Alcaligenes*. Menaquinone was not detected in any of the strains tested. On the basis of these results, it appears that the taxonomic relationship between the Q-9 marine group and terrestrial *Alcaligenes* and *Achromobacter* species is at or above the generic level.

Deleya species, *Alcaligenes aquamarinus*, and *Alcaligenes faecalis* subsp. *homari* also exhibited a common fatty acid composition pattern that defines a group that is separate from terrestrial *Alcaligenes* and *Achromobacter* species or *Agrobacterium* and *Rhizobium* species (Table 2). Straight-chain saturated C_{16:0} and unsaturated C_{18:1} acids, including

TABLE 4. DNA base compositions and levels of DNA relatedness among *Deleya* species

Strain	G+C content (mol%)	% Homology with ³ H-labeled DNA from:				
		IAM 12550 ^T	IAM 12645 ^T	IAM 12551 ^T	IAM 12554 ^T	IAM 12369 ^T
<i>Alcaligenes aquamarinus</i> IAM 12550 ^T	57	100	80	76	17	18
<i>Alcaligenes faecalis</i> subsp. <i>homari</i> IAM 12645 ^T	57	100	100	66	25	16
<i>Deleya aesta</i> IAM 12551 ^T	56	93	84	100	19	17
<i>Deleya venusta</i> IAM 12554 ^T	52	41	34	23	100	15
<i>Deleya cupida</i> IAM 12552 ^T	60	16	8	9	10	13
<i>Deleya pacifica</i> IAM 12553 ^T	66	12	13	10	12	15
<i>Deleya halophila</i> IAM 13009 ^T	67 ^a			12		
<i>Deleya marina</i> IAM 12928	63	12	13	8	12	15
<i>Alcaligenes faecalis</i> IAM 12369 ^T	56	7	5		14	100
<i>Pseudomonas aeruginosa</i> IAM 1514 ^T	66	4	4		13	14
<i>Pseudomonas fluorescens</i> IAM 12022 ^T	61	6	4		9	11
<i>Serratia marcescens</i> IAM 12142 ^T	61	7			13	
<i>Gluconobacter cerinus</i> IAM 1832	56	3			12	14

^a Recalculated from the data of Quesada et al. (15).

C_{19:0} cyclopropanic acid, accounted for 52 to 77% of the total fatty acids in all of the marine strains, and 3-OH-substituted C_{12:0} acid was found in all of the marine strains at levels up to 9%. Terrestrial *Alcaligenes* and *Achromobacter* species have straight-chain saturated C_{16:0} and unsaturated C_{16:1} acids as major components, as well as both 2-OH and 3-OH fatty acids (8). *Agrobacterium* and *Rhizobium* species have high contents of straight-chain unsaturated C_{18:1} acid (including C_{19:0} cyclopropanic acid), ranging from 60 to 87% of the total, and 3-OH-C_{14:0} acid (8) (Table 3).

The marine bacteria had G+C contents ranging from 52 to 67 mol% (Table 4). The type strains of *Alcaligenes aquamarinus*, *Alcaligenes faecalis* subsp. *homari*, and *D. aesta* formed a compact cluster, with the DNA relatedness values ranging from 66 to 100%, demonstrating that these strains constitute a single species that is distinct from other species of the genus *Deleya*. *Alcaligenes faecalis* subsp. *homari* IAM 12645 (type strain) exhibited little relatedness to the type strain of *Alcaligenes faecalis* (strain IAM 12369) (5 to 18% binding), although it was described as a subspecies of *Alcaligenes faecalis* because of its similar phenotypic properties and G+C content (1). Baumann et al. reported that certain *Pseudomonas* species were phylogenetically more closely related to marine *Alcaligenes* species than to terres-

trial *Alcaligenes* or *Pseudomonas* species on the basis of DNA-ribosomal ribonucleic acid homology (3). However, the levels of homology between the *Alcaligenes aquamarinus* cluster and two pseudomonads and *Alcaligenes faecalis* showed little DNA relatedness.

All *Deleya* species are strictly aerobic, gram-negative rods; produce catalase, phosphatase, acid from glucose, 2-ketogluconate from gluconate, and ammonia from peptone; and require sodium ions for good growth. They show negative reactions in tests for denitrification, nitrate reduction, hemolysis, production of fluorescein and pyocyanin, levan, tryptophan deaminase, 3-ketolactose production from lactose, indole, and acetoin. Hydrolysis of Tween 80, hydrolysis of gelatin, hydrolysis of chitin, and hydrolysis of agar also are negative. These organisms are susceptible to 0.4% phenethyl alcohol but not to vibriostatic agent O/129. *Alcaligenes aquamarinus*, *Alcaligenes faecalis* subsp. *homari*, and *D. aesta* closely resembled each other phenotypically and in DNA-DNA homology values. The phenotypic differences among these three organisms included differences in production of H₂S, amidase, urease, and phenylalanine deaminase and reduction of methylene blue. These characteristics must be regarded as strain variations. The *Alcaligenes aquamarinus* cluster can be differentiated

TABLE 5. Phenotypic characteristics of differential value at specific or lower levels

Strain	Starch hydrolysis	Citrate utilization	Tyrosine decomposition	Oxidase	Acid from mannitol	Growth at 5°C	NO ₃ → NO ₂	ONPG ^a	Esculin hydrolysis	Casein hydrolysis	Xanthine decomposition	Melaninlike pigment	Methyl red test	Deoxyribonuclease	Alginase	Phenylalanine deaminase	Amidase	Urease	H ₂ S production	Methylene blue reduction
<i>Alcaligenes aquamarinus</i> IAM 12550 ^T	+	-	-	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Alcaligenes faecalis</i> subsp. <i>homari</i> IAM 12645 ^T	+	-	-	+	+	+	+	-	-	-	-	-	-	-	-	+	+	+	+	+
<i>Deleya aesta</i> IAM 12551 ^T	+	-	-	+	+	+	+	-	-	-	-	-	-	-	-	+	-	+	+	+
<i>Deleya venusta</i> IAM 12554 ^T	-	+	+	+	+	+	+	-	-	+	+	-	W	-	-	-	+	+	W	+
<i>Deleya cupida</i> IAM 12552 ^T	-	+	+	+	+	+	+	+	+	+	-	-	+	-	-	-	+	+	-	+
<i>Deleya pacifica</i> IAM 12553 ^T	-	+	+	+	-	+	-	-	-	-	+	-	-	-	-	-	+	+	-	+
<i>Deleya halophila</i> IAM 13009 ^T	-	+	+	+	-	+	+	-	+	-	-	+	-	-	-	-	-	+	+	+
<i>Deleya marina</i> IAM 12928	-	+	+	-	+	-	-	+	-	+	-	-	-	+	+	-	-	+	-	+

^a ONPG, *o*-Nitrophenyl-β-D-galactopyranoside.

from other *Deleya* species by the several phenotypic characteristics shown in Table 5.

Our data show that the type strains of *Alcaligenes aquamarinus* (ZoBell and Upham 1944) Hendrie, Holding, and Shewan 1974 (Approved Lists), *Alcaligenes faecalis* subsp. *homari* Austin, Rodgers, Forns, and Colwell 1981, and *Deleya aesta* (Baumann, Baumann, Mandel, and Allen 1972) Baumann, Bowditch, and Baumann 1983 are members of a single species of the genus *Deleya*. The specific epithet *aquamarina* has priority and is the correct epithet for the species (Principle 6, Rules 23a and 51b [12]). The genus *Deleya* Baumann, Bowditch, and Baumann was created in 1983 with *Deleya aesta* (basonym, *Alcaligenes aestus*) as the type species of the genus; however, our data show that this name is a later synonym of *Alcaligenes aquamarinus*, as is *Alcaligenes faecalis* subsp. *homari*. We conclude that the name *Deleya aquamarina* comb. nov. must be used for the type species of the genus *Deleya* in place of the name *Deleya aesta*. The change of name necessarily changes the type strain of the species from the type strain of *Deleya aesta* (strain IAM 12551 [= ATCC 27128]) to the type strain of *Deleya aquamarina* (strain IAM 12550 [= ATCC 14400]) (Principle 5 [12]). This change of name is strictly confined to nomenclature and does not change the concepts of the species and the genus as previously defined by Baumann et al. (2, 7).

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