

Supporting Information

Bacterial Culture Detection and Identification in Blood Agar Plates with an Optoelectronic Nose

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Table S1 Summary of bacteria species and strains tested. IS-# and ST-# represent clinical strains.

Species, strain	Total number of trials	Number of unique preparations	Average number of trials per unique preparation
Negative controls	57	7	8.1
<i>A. baumannii</i>	72	12	6.0
19608	24	4	6.0
IS-47	24	4	6.0
IS-86	24	4	6.0
<i>E. cloacae</i>	90	21	4.3
13047	12	4	3.0
IS-26	12	4	3.0
IS-37	12	4	3.0
IS-41	18	3	6.0
IS-42	18	3	6.0
IS-98	18	3	6.0
<i>E. coli</i>	228	31	7.4
25922	62	6	10.3
35218	44	6	7.3
700728	6	1	6.0
IS-2	22	4	5.5
IS-39	47	6	7.8
IS-44	6	1	6.0
IS-74	24	4	6.0
IS-99	17	3	5.7
<i>E. faecalis</i>	107	24	4.5
29212	18	5	3.6
51299	18	5	3.6

Table S1 (Contd).

Species, strain	Total number of trials	Number of unique preparations	Average number of trials per unique preparation
<i>E. faecalis</i>			
IS-103	18	3	6.0
IS-104	18	3	6.0
IS-105	17	3	5.7
IS-85	18	5	3.6
<i>E. faecium</i>	103	24	4.3
27270	15	5	3.0
IS-23	18	5	3.6
IS-24	24	4	6.0
IS-9	12	4	3.0
IS-91	16	3	5.3
IS-92	18	3	6.0
<i>K. pneumoniae</i>	203	27	7.5
33495	42	5	8.4
700603	52	5	10.4
BAA 1705	6	1	6.0
BAA 1706	6	1	6.0
IS-100	17	3	5.7
IS-20	23	4	5.8
IS-27	11	2	5.5
IS-7	46	6	7.7
<i>P. aeruginosa</i>	207	29	7.1
27853	41	5	8.2
IS-15	35	4	8.8
IS-22	42	5	8.4
ST-21	18	3	6.0
ST-22	18	3	6.0
ST-23	18	3	6.0
ST-24	18	3	6.0
ST-26	17	3	5.7
<i>P. mirabilis</i>	93	23	4.0
12453	14	5	2.8
43071	18	5	3.6
IS-101	17	3	5.7
IS-102	17	3	5.7
IS-18	10	4	2.5
IS-19	17	3	5.7
<i>S. aureus</i>	324	45	7.2
25923	74	7	10.6
29213	41	5	8.2

Table S1 (Contd).

Species, strain	Total number of trials	Number of unique preparations	Average number of trials per unique preparation
<i>S. aureus</i>			
43300	6	1	6.0
IS-13	42	5	8.4
IS-43	6	1	6.0
IS-69	6	1	6.0
ST-01	6	1	6.0
ST-02	6	1	6.0
ST-03	6	1	6.0
ST-04	6	1	6.0
ST-05	6	1	6.0
ST-06	6	1	6.0
ST-07	5	1	5.0
ST-08	6	1	6.0
ST-09	6	1	6.0
ST-11	6	1	6.0
ST-12	6	1	6.0
ST-13	6	1	6.0
ST-14	12	2	6.0
ST-15	12	2	6.0
ST-16	12	2	6.0
ST-17	12	2	6.0
ST-18	12	2	6.0
ST-19	18	3	6.0
<i>S. epidermidis</i>	84	20	4.2
12228	24	6	4.0
IS-60	12	4	3.0
IS-61	12	4	3.0
IS-63	18	3	6.0
IS-70	18	3	6.0
<i>S. lugdunensis</i>	90	15	6.0
49576	30	5	6.0
IS-34	24	4	6.0
IS-56	24	4	6.0
IS-77	12	2	6.0
<i>S. maltophilia</i>	47	8	5.9
51331	18	3	6.0
IS-25	17	3	5.7
IS-53	12	2	6.0
<i>S. marcescens</i>	77	13	5.9
13880	23	4	5.8

Table S1 (Contd).

Species, strain	Total number of trials	Number of unique preparations	Average number of trials per unique preparation
<i>S. marcescens</i>			
IS-4	24	4	6.0
IS-48	24	4	6.0
IS-5	6	1	6.0
<i>S. pneumoniae</i>	88	23	3.8
49619	45	11	4.1
IS-10	22	6	3.7
IS-14	21	6	3.5
<i>S. agalactiae</i>	81	20	4.1
12386	33	8	4.1
IS-11	24	6	4.0
IS-83	24	6	4.0
Total (average):	1,951	342 (3.5)	(5.7)

Table S2 List of chemically responsive indicators.

Spot #	Name
1	5,10,15,20-Tetraphenyl-21H,23H-porphine zinc
2	5,10,15,20-Tetraphenyl-21H,23H-porphine copper (II)
3	5,10,15,20-Tetraphenyl-21H,23H-porphine manganese(III) chloride
4	2,3,7,8,12,13,17,18-Octaethyl-21H,23H-porphine iron(III) chloride
5	5,10,15,20-Tetraphenyl-21H,23H-porphine cobalt (II)
6	5,10,15,20-Tetraphenyl-21H,23H-porphine
7	Nitrazine Yellow + TBAOH
8	Methyl Red + TBAOH
9	Chlorophenol Red + TBAOH
10	Naphthyl Blue Black
11	Bromothymol Blue + TBAOH
12	Thymol Blue + TBAOH
13	<i>m</i> -Cresol Purple + TBAOH
14	Zn(II) acetate + <i>m</i> -Cresol Purple + TBAOH
15	Mercury(II) chloride + Bromophenol Blue + TBAOH
16	Mercury(II) chloride + Bromocresol Green + TBAOH
17	Pb(II)acetate
18	Tetraiodophenolsulfonephthalein
19	Fluorescein
20	Bromocresol Green
21	Methyl Red
22	Bromocresol Purple
23	Bromophenol Red
24	Brilliant Yellow
25	Lissamine Green B
26	Pyrocatechol Violet
27	<i>o</i> -dianisidine + TsOH
28	<i>N,N'</i> -Diphenyl- <i>N,N'</i> -di- <i>p</i> -tolylbenzene-1,4-diamine + TsOH
29	4-(4-Nitrobenzyl)pyridine + <i>N</i> -benzylaniline
30	<i>o</i> -Tolidine
31	Lithium nitrate + Cresol Red
32	2,3-Diaminonaphthalene
33	Silver nitrate + Bromophenol Blue + TBAOH
34	Silver nitrate + Bromocresol Green + TBAOH
35	Cresol Red + TsOH
36	Disperse Orange 25
37	Cresol Red
38	Bromothymol Blue + TsOH
39	Tetracyanoethylene
40	Reichardt's Dye + TBAOH
41	Mercury(II) bromide + <i>meso</i> -tetra(2,4,6-trimethylphenyl)porphine
42	Chlorophenol Red
43	Bromophenol Red + TBAOH

Table S2 (Contd.)

Spot #	Name
44	Diphenylamine + TsOH
45	Malachite Green
46	Bismuth neodecanoate
47	Nile Red
48	Chlorophenol Red + TBAOH
49	Methyl Red + TBAOH
50	<i>o</i> -Phenylenediamine
51	Lead (II) acetate trihydrate
52	Bromophenol Blue
53	Brilliant Yellow + TBAOH
54	Malachite Green
55	Cresol Red
56	Copper (II) neodecanoate
57	Bromophenol Red + TsOH
58	3,3'-Dimethoxybenzidine
59	Phenol Red + TBAOH
60	Bromophenol Blue + TsOH
61	Copper (II) naphthenate
62	Nitrazine Yellow + TsOH
63	Bromocresol Green
64	Cresol Red + TBAOH
65	5,10,15,20-Tetraphenyl-21H,23H-porphine ruthenium(II) carbonyl
66	Copper(II) acetylacetonate
67	2,4-Dinitrohydrazine
68	Palladium (II) sulfate
69	Phloroglucinol
70	2,7-Dichlorofluoresceine
71	Bromocresol Purple
72	Methyl Red
73	Alizarin
74	<i>m</i> -Cresol Purple
75	Nitrazine Yellow
76	Cresol Red
77	Bromocresol Green
78	Phenol Red
79	Thymol Blue
80	Bromophenol Blue

TBAOH: 1.0 M Tetrabutylammonium hydroxide in 2-methoxyethanol

TsOH: 1.0 M *p*-Toluenesulfonic acid in 2-methoxyethanol

Table S3 Summary of the CSA time to detection for each strain tested.

Species, strain	Total number of trials	Detection Accuracy	Average TTD (h)	Standard deviation
<i>A. baumannii</i>				
19608	24	100%	5.2	0.6
IS-47	24	100%	4.5	0.2
IS-86	24	100%	4.5	0.2
<i>E. cloacae</i>				
13047	12	100%	4.7	0.2
IS-26	12	100%	4.7	0.0
IS-37	12	100%	4.5	0.2
IS-41	18	100%	4.5	0.2
IS-42	18	100%	4.7	0.1
IS-98	18	100%	5.1	0.2
<i>E. coli</i>				
25922				
10 ² cfu/plate	18	100%	6.8	1.4
10 ⁴ cfu/plate	21	100%	5.5	0.4
10 ⁶ cfu/plate	23	100%	4.7	0.2
35218				
10 ² cfu/plate	11	100%	7.0	0.6
10 ⁴ cfu/plate	12	100%	5.2	0.3
10 ⁶ cfu/plate	21	100%	4.6	0.2
700728	6	100%	4.9	0.1
IS-2	22	100%	5.2	0.2
IS-39				
10 ² cfu/plate	11	100%	7.2	0.8
10 ⁴ cfu/plate	15	100%	5.5	0.4
10 ⁶ cfu/plate	21	100%	4.7	0.1
IS-44	6	100%	4.7	0.0
IS-74	24	100%	5.0	0.3
IS-99	17	100%	4.6	0.1
<i>E. faecalis</i>				
29212	18	100%	5.0	0.4
51299	18	100%	5.0	0.2
IS-103	18	100%	5.2	0.5
IS-104	18	100%	5.8	0.9
IS-105	17	100%	6.5	0.7
IS-85	18	100%	4.8	0.2
<i>E. faecium</i>				
27270	15	100%	5.6	0.5
IS-23	18	100%	7.0	0.9
IS-24	24	100%	6.7	1.0

Table S3 (Contd.)

Species, strain	Total number of trials	Detection Accuracy	Average TTD (h)	Standard deviation
<i>E. faecium</i>				
IS-9	12	100%	7.3	0.9
IS-91	16	100%	6.5	0.4
IS-92	18	100%	6.8	0.7
<i>K. pneumoniae</i>				
33495				
10 ² cfu/plate	12	100%	7.7	0.5
10 ⁴ cfu/plate	12	100%	5.1	0.2
10 ⁶ cfu/plate	18	100%	4.7	0.1
700603				
10 ² cfu/plate	17	100%	7.4	1.7
10 ⁴ cfu/plate	17	100%	5.5	0.4
10 ⁶ cfu/plate	18	100%	4.7	0.2
BAA 1705	6	100%	4.8	0.2
BAA 1706	6	100%	5.7	0.4
IS-100	17	100%	4.7	0.3
IS-20	23	100%	4.7	0.2
IS-27	11	100%	4.8	0.2
IS-7				
10 ² cfu/plate	11	100%	8.1	1.1
10 ⁴ cfu/plate	11	100%	6.3	0.4
10 ⁶ cfu/plate	24	100%	5.0	0.4
<i>P. aeruginosa</i>				
27853				
10 ² cfu/plate	12	100%	10.5	1.4
10 ⁴ cfu/plate	12	100%	7.8	0.9
10 ⁶ cfu/plate	17	100%	5.2	0.3
IS-15				
10 ² cfu/plate	11	100%	10.5	2.2
10 ⁴ cfu/plate	11	100%	8.2	0.6
10 ⁶ cfu/plate	12	100%	5.0	0.3
IS-22			10.5	2.2
10 ² cfu/plate	12	100%	10.4	1.9
10 ⁴ cfu/plate	12	100%	7.9	0.9
10 ⁶ cfu/plate	18	100%	5.2	0.5
ST-21	18	100%	5.6	0.4
ST-22	18	100%	5.8	0.5
ST-23	18	100%	5.7	0.4
ST-24	18	100%	5.6	0.4
ST-26	17	100%	5.5	0.4

Table S3 (Contd.)

Species, strain	Total number of trials	Detection Accuracy	Average TTD (h)	Standard deviation
<i>P. mirabilis</i>				
12453	14	100%	4.6	0.1
43071	18	100%	5.5	1.2
IS-101	17	100%	5.1	0.3
IS-102	17	100%	4.8	0.2
IS-18	10	100%	4.6	0.2
IS-19	17	100%	4.7	0.1
<i>S. aureus</i>				
25923				
10 ² cfu/plate	27	100%	7.5	2.7
10 ⁴ cfu/plate	26	100%	6.6	1.3
10 ⁶ cfu/plate	21	100%	5.8	0.3
29213				
10 ² cfu/plate	12	100%	10.2	1.5
10 ⁴ cfu/plate	11	100%	7.3	0.3
10 ⁶ cfu/plate	18	100%	5.3	0.4
43300	6	100%	7.3	2.2
IS-13				
10 ² cfu/plate	12	100%	11.2	1.0
10 ⁴ cfu/plate	12	100%	7.4	0.5
10 ⁶ cfu/plate	18	100%	5.4	0.3
IS-43	6	100%	5.3	0.4
IS-69	6	100%	5.6	0.5
ST-01	6	100%	5.2	0.3
ST-02	6	100%	6.0	0.6
ST-03	6	100%	5.4	0.3
ST-04	6	100%	4.9	0.2
ST-05	6	100%	5.0	0.3
ST-06	6	100%	5.1	0.1
ST-07	5	100%	5.6	0.3
ST-08	6	100%	5.7	0.2
ST-09	6	100%	5.7	0.3
ST-11	6	100%	5.9	0.2
ST-12	6	100%	5.8	0.3
ST-13	6	100%	5.8	0.2
ST-14	12	100%	7.2	0.2
ST-15	12	100%	6.0	0.3
ST-16	12	100%	6.0	0.2
ST-17	12	100%	5.6	0.3
ST-18	12	100%	5.9	0.4

Table S3 (Contd.)

Species, strain	Total number of trials	Detection Accuracy	Average TTD (h)	Standard deviation
<i>S. aureus</i>				
ST-19	18	100%	5.8	0.3
<i>S. epidermidis</i>				
12228	24	100%	8.0	1.4
IS-60	12	100%	8.1	1.4
IS-61	12	100%	11.8	3.2
IS-63	18	100%	8.6	0.8
IS-70	18	100%	8.2	0.6
<i>S. lugdunensis</i>				
49576	30	100%	7.7	1.0
IS-34	24	100%	8.0	1.1
IS-56	24	100%	8.0	0.8
IS-77	12	100%	11.3	2.1
<i>S. maltophilia</i>				
51331	18	100%	5.9	0.6
IS-25	17	100%	9.0	1.7
IS-53	12	100%	10.2	1.7
<i>S. marcescens</i>				
13880	23	100%	4.9	0.2
IS-4	24	100%	4.7	0.2
IS-48	24	100%	4.8	0.2
IS-5	6	100%	4.6	0.1
<i>S. pneumoniae</i>				
49619	45	97.8%	6.1	0.9
IS-10	22	95.5%	6.6	2.2
IS-14	21	100%	6.0	1.0
<i>S. agalactiae</i>				
12386	33	100%	5.9	1.1
IS-11	24	100%	5.6	0.7
IS-83	24	100%	5.5	0.6
Total (Average)	1,894	(99.9%)	(6.1)	

Table S4 Sensitivity and specificity of species identification with the CSA in blood agar at the time of detection, along with the confusion matrix. Observed labels (row) and predicted labels (column) for bacterial discrimination after 10 repeats of 10 fold cross-validation.

	sensitivity	Specificity	Control	<i>A. baumannii</i>	<i>E. cloacae</i>	<i>E. coli</i>	<i>E. faecalis</i>	<i>E. faecium</i>	<i>K. pneumoniae</i>	<i>P. aeruginosa</i>	<i>P. mirabilis</i>	<i>S. aureus</i>	<i>S. epidermidis</i>	<i>S. lugdunensis</i>	<i>S. maltophilia</i>	<i>S. marcescens</i>	<i>S. pneumoniae</i>	<i>S. agalactiae</i>	Total
Control	92.8	99.8	529	2	0	1	0	6	0	3	0	16	11	0	2	0	0	0	570
<i>A. baumannii</i>	86.4	97.3	0	622	0	8	1	0	3	40	18	2	0	17	0	0	0	9	720
<i>E. cloacae</i>	37.0	99.2	0	168	333	257	2	0	103	0	33	0	0	0	0	4	0	0	900
<i>E. coli</i>	60.1	93.8	0	92	100	1370	3	23	428	27	37	126	5	0	0	67	0	2	2280
<i>E. faecalis</i>	77.9	98.8	0	4	0	21	833	71	49	0	15	0	20	0	0	0	35	22	1070
<i>E. faecium</i>	67.2	98.4	0	2	0	24	94	692	4	54	0	79	34	0	0	0	28	19	1030
<i>K. pneumoniae</i>	58.5	95.5	1	108	32	485	21	12	1188	35	99	25	2	1	0	18	0	3	2030
<i>P. aeruginosa</i>	84.3	97.6	0	11	0	30	0	14	54	1745	6	197	12	1	0	0	0	0	2070
<i>P. mirabilis</i>	77.6	98.9	0	76	1	36	0	0	95	0	722	0	0	0	0	0	0	0	930
<i>S. aureus</i>	86.4	96.0	2	11	0	61	9	42	5	208	0	2800	31	11	0	0	19	41	3240
<i>S. epidermidis</i>	76.4	99.1	8	0	0	22	6	11	1	13	0	103	642	21	0	0	10	3	840
<i>S. lugdunensis</i>	92.4	99.4	0	7	0	2	0	0	11	12	0	10	22	832	0	0	1	3	900
<i>S. maltophilia</i>	85.3	99.9	0	9	0	20	0	0	11	3	0	5	0	17	401	4	0	0	470
<i>S. marcescens</i>	77.5	99.5	0	15	8	103	0	0	15	0	0	7	0	15	10	597	0	0	770
<i>S. pneumoniae</i>	83.3	99.1	20	0	0	0	33	33	0	0	0	6	26	2	0	0	733	27	880
<i>S. agalactiae</i>	56.9	99.3	0	3	0	2	50	88	1	22	0	72	9	29	0	0	73	461	810
Total	74.3	98.3	560	1130	474	2442	1052	992	1968	2162	930	3448	814	946	413	690	899	590	19510

Table S5 Sensitivity and specificity of species identification with the CSA in blood agar 1 hour after detection, along with the confusion matrix. Observed labels (row) and predicted labels (column) for bacterial discrimination after 10 repeats of 10 fold cross-validation.

	Sensitivity	Specificity	Control	<i>A. baumannii</i>	<i>E. cloacae</i>	<i>E. coli</i>	<i>E. faecalis</i>	<i>E. faecium</i>	<i>K. pneumoniae</i>	<i>P. aeruginosa</i>	<i>P. mirabilis</i>	<i>S. aureus</i>	<i>S. epidermidis</i>	<i>S. lugdunensis</i>	<i>S. maltophilia</i>	<i>S. marcescens</i>	<i>S. pneumoniae</i>	<i>S. agalactiae</i>	Total
Control	91.9	99.9	524	0	0	0	0	7	0	1	0	11	21	0	5	0	0	1	570
<i>A. baumannii</i>	91.9	99.9	0	662	0	13	0	0	8	25	3	9	0	0	0	0	0	0	720
<i>E. cloacae</i>	65.9	98.6	0	0	593	198	0	0	83	0	24	0	0	0	0	2	0	0	900
<i>E. coli</i>	71.3	95.5	0	0	183	1625	5	15	272	0	37	108	4	2	0	23	0	6	2280
<i>E. faecalis</i>	93.6	99.8	0	0	0	16	1002	16	1	5	11	0	3	2	0	3	11	0	1070
<i>E. faecium</i>	82.3	98.9	0	1	0	10	17	848	7	29	0	51	36	0	0	0	0	31	1030
<i>K. pneumoniae</i>	74.1	97.2	0	0	57	349	2	2	1505	16	42	32	13	7	0	3	0	2	2030
<i>P. aeruginosa</i>	90.2	98.6	0	2	0	10	4	20	30	1867	0	126	9	0	0	0	0	2	2070
<i>P. mirabilis</i>	91.1	99.4	0	0	14	27	0	0	42	0	847	0	0	0	0	0	0	0	930
<i>S. aureus</i>	89.8	97.2	0	24	0	62	0	51	9	123	0	2909	36	5	0	0	9	12	3240
<i>S. epidermidis</i>	78.6	99.1	6	0	0	17	0	7	22	21	0	74	660	15	0	0	10	8	840
<i>S. lugdunensis</i>	94.4	99.7	0	0	0	10	0	0	1	10	0	4	22	850	3	0	0	0	900
<i>S. maltophilia</i>	90.0	99.9	0	0	0	11	8	1	5	0	0	0	1	10	423	10	0	1	470
<i>S. marcescens</i>	92.5	99.8	0	0	3	43	0	0	1	0	0	0	0	0	11	712	0	0	770
<i>S. pneumoniae</i>	93.0	99.6	20	0	0	0	6	3	0	0	0	0	7	0	0	0	818	26	880
<i>S. agalactiae</i>	70.5	99.5	0	0	0	9	1	81	7	10	0	46	16	19	1	0	49	571	810
Total	84.1	98.9	550	689	850	2400	1045	1051	1993	2107	964	3370	828	910	443	753	897	660	19510

Table S6 Sensitivity and specificity of species identification with the CSA in blood agar 2 hours after detection, along with the confusion matrix. Observed labels (row) and predicted labels (column) for bacterial discrimination after 10 repeats of 10 fold cross-validation.

	sensitivity	Specificity	Control	<i>A. baumannii</i>	<i>E. cloacae</i>	<i>E. coli</i>	<i>E. faecalis</i>	<i>E. faecium</i>	<i>K. pneumoniae</i>	<i>P. aeruginosa</i>	<i>P. mirabilis</i>	<i>S. aureus</i>	<i>S. epidermidis</i>	<i>S. lugdunensis</i>	<i>S. maltophilia</i>	<i>S. marcescens</i>	<i>S. pneumoniae</i>	<i>S. agalactiae</i>	Total
Control	93.0	99.9	530	0	0	0	0	7	0	1	0	4	17	0	9	0	0	2	570
<i>A. baumannii</i>	93.5	99.9	0	673	0	3	0	0	1	15	6	9	0	0	0	12	0	1	720
<i>E. cloacae</i>	67.8	98.8	0	0	610	155	0	0	102	0	22	0	0	0	0	11	0	0	900
<i>E. coli</i>	80.3	96.9	0	0	135	1831	1	1	197	8	30	61	1	0	0	15	0	0	2280
<i>E. faecalis</i>	94.7	99.9	0	0	0	7	1013	9	9	3	5	0	6	0	0	8	10	0	1070
<i>E. faecium</i>	86.5	99.4	0	0	0	0	7	891	0	1	0	35	29	1	0	0	0	66	1030
<i>K. pneumoniae</i>	79.7	97.7	0	0	69	229	0	0	1617	4	67	39	3	0	0	2	0	0	2030
<i>P. aeruginosa</i>	93.5	99.3	0	13	0	25	0	1	4	1936	0	76	8	0	0	0	1	6	2070
<i>P. mirabilis</i>	86.9	99.3	0	0	24	27	0	0	71	0	808	0	0	0	0	0	0	0	930
<i>S. aureus</i>	92.8	98.0	0	15	0	54	0	23	0	53	0	3007	53	15	0	0	1	19	3240
<i>S. epidermidis</i>	82.1	99.1	6	0	0	0	0	11	11	31	0	60	690	14	0	0	10	7	840
<i>S. lugdunensis</i>	93.6	99.8	0	0	0	8	0	0	0	0	0	11	33	842	4	2	0	0	900
<i>S. maltophilia</i>	91.5	99.9	1	0	0	2	11	0	4	0	0	3	0	4	430	14	1	0	470
<i>S. marcescens</i>	94.9	99.7	0	0	5	24	0	0	0	0	0	0	0	0	10	731	0	0	770
<i>S. pneumoniae</i>	93.4	99.8	21	0	0	0	2	1	0	0	0	0	11	0	0	0	822	23	880
<i>S. agalactiae</i>	83.5	99.3	0	0	0	8	0	67	0	0	0	22	7	12	0	0	18	676	810
Total	87.7	99.2	558	701	843	2373	1034	1011	2016	2052	938	3327	858	888	453	795	863	800	19510

Table S7 Sensitivity and specificity of species identification with the CSA in blood agar 3 hours after detection, along with the confusion matrix. Observed labels (row) and predicted labels (column) for bacterial discrimination after 10 repeats of 10 fold cross-validation.

	Sensitivity	Specificity	Control	<i>A. baumannii</i>	<i>E. cloacae</i>	<i>E. coli</i>	<i>E. faecalis</i>	<i>E. faecium</i>	<i>K. pneumoniae</i>	<i>P. aeruginosa</i>	<i>P. mirabilis</i>	<i>S. aureus</i>	<i>S. epidermidis</i>	<i>S. lugdunensis</i>	<i>S. maltophilia</i>	<i>S. marcescens</i>	<i>S. pneumoniae</i>	<i>S. agalactiae</i>	Total
Control	96.0	99.9	547	0	0	0	0	0	0	0	0	1	10	0	11	0	0	1	570
<i>A. baumannii</i>	95.3	99.9	0	686	0	8	0	0	2	14	0	0	0	0	0	10	0	0	720
<i>E. cloacae</i>	78.7	98.8	0	0	708	80	0	0	98	0	7	0	0	0	0	7	0	0	900
<i>E. coli</i>	89.1	98.1	0	0	81	2032	1	0	110	0	12	35	3	0	0	6	0	0	2280
<i>E. faecalis</i>	95.3	99.9	0	0	0	12	1020	10	14	2	0	0	1	0	0	10	1	0	1070
<i>E. faecium</i>	90.6	99.5	0	0	0	0	0	933	0	0	0	27	12	8	0	1	0	49	1030
<i>K. pneumoniae</i>	85.8	98.4	0	0	88	169	1	1	1741	1	20	4	4	0	0	0	0	1	2030
<i>P. aeruginosa</i>	95.5	99.6	0	8	0	9	4	0	2	1976	0	60	6	0	0	0	0	5	2070
<i>P. mirabilis</i>	91.0	99.8	0	0	39	4	0	0	36	0	846	0	0	0	0	5	0	0	930
<i>S. aureus</i>	95.1	98.8	0	8	0	22	0	12	5	25	0	3081	55	12	0	0	0	20	3240
<i>S. epidermidis</i>	83.6	99.3	1	0	0	0	5	9	11	33	0	37	702	22	0	0	8	12	840
<i>S. lugdunensis</i>	92.4	99.7	0	3	0	7	0	0	0	0	0	14	36	832	1	3	3	1	900
<i>S. maltophilia</i>	92.8	99.9	0	0	0	0	0	0	6	2	0	3	0	5	436	18	0	0	470
<i>S. marcescens</i>	95.8	99.7	0	0	8	12	1	0	0	0	1	0	0	0	10	738	0	0	770
<i>S. pneumoniae</i>	94.8	99.8	21	0	0	0	0	0	0	0	0	0	0	0	0	0	834	25	880
<i>S. agalactiae</i>	88.6	99.4	0	0	0	0	0	54	0	0	0	10	1	9	0	0	18	718	810
Total	91.4	99.4	569	705	924	2355	1032	1019	2025	2053	886	3272	830	888	458	798	864	832	19510

TABLE S8 Sensitivity of CSA for species identification as a function of time following bacterial detection. For *E. coli*, *K. pneumoniae*, *P. aeruginosa*, and *S. aureus*, plates were inoculated at 10^2 , 10^4 , and 10^6 CFU per plate, while all other species were inoculated at 10^6 CFU only.

Species	n	Detection	Sensitivity of CSA for Species Identification after Culture Detection								
			+1 hr	+2 hr	+3 hr	+4 hr	+5 hr	+6 hr	+7 hr	+8 hr	+9 hr
<i>S.marcescens</i>	77	77.5%	92.5%	94.9%	95.8%	96.2%	95.7%	95.8%	95.6%	95.6%	95.6%
<i>P.aeruginosa</i>	207	84.3%	90.2%	93.5%	95.5%	95.3%	97.3%	98.5%	98.7%	98.7%	98.9%
<i>E.faecalis</i>	107	77.9%	93.6%	94.7%	95.3%	95.5%	95.6%	95.4%	95.4%	95.9%	96.3%
<i>A.baumannii</i>	72	86.4%	91.9%	93.5%	95.3%	96.5%	97.9%	98.3%	98.3%	98.5%	98.6%
<i>S.aureus</i>	324	86.4%	89.8%	92.8%	95.1%	95.7%	97.1%	97.4%	97.8%	97.4%	97.5%
<i>S.pneumoniae</i>	88	83.3%	93.0%	93.4%	94.8%	94.3%	94.4%	94.1%	94.7%	94.4%	94.0%
<i>S.maltophilia</i>	47	85.3%	90.0%	91.5%	92.8%	93.2%	91.5%	91.1%	92.1%	91.7%	93.2%
<i>S.lugdunensis</i>	90	92.4%	94.4%	93.6%	92.4%	90.2%	91.8%	91.3%	91.7%	90.7%	91.8%
<i>P.mirabilis</i>	93	77.6%	91.1%	86.9%	91.0%	94.6%	95.5%	95.1%	95.3%	94.3%	94.5%
<i>E.faecium</i>	103	67.2%	82.3%	86.5%	90.6%	92.3%	94.4%	94.5%	94.2%	95.0%	95.2%
<i>E.coli</i>	228	60.1%	71.3%	80.3%	89.1%	93.8%	96.6%	96.5%	97.0%	97.1%	97.5%
<i>S. agalactiae</i>	81	56.9%	70.5%	83.5%	88.6%	89.3%	90.5%	90.6%	92.1%	94.1%	95.7%
<i>K.pneumoniae</i>	203	58.5%	74.1%	79.7%	85.8%	88.8%	91.2%	92.1%	92.8%	93.0%	93.7%
<i>E.cloacae</i>	90	37.0%	65.9%	67.8%	78.7%	83.8%	87.1%	88.6%	88.8%	87.4%	89.3%
<i>S.epidermidis</i>	84	76.4%	78.6%	82.1%	83.6%	83.1%	85.8%	87.1%	86.4%	87.1%	86.9%
Total:	1,894	73.8%	84.6%	87.6%	91.0%	92.2%	93.5%	93.8%	94.1%	94.1%	94.6%

Table S9 List of inoculum preparation dates for each strain tested.

Species, strain		Test Dates				Total number of trials
Negative controls	3/1/2011 7/27/2011	6/24/2011 7/29/2011	7/15/2011 8/10/2011	7/18/2011		57
<i>A. baumannii</i>						72
19608	4/14/2011	8/18, 2011	8/24/2011	8/29/2011		24
IS-47	4/14/2011	8/18, 2011	8/24/2011	8/29/2011		24
IS-86	7/15/2011	8/18/2011	8/24/2011	8/29/2011		24
<i>E. cloacae</i>						
13047	4/19/2011	5/4/2011	5/17/2011	6/2/2011		12
IS-26	4/22/2011	5/10/2011	5/19/2011	6/12/2011		12
IS-37	4/22/2011	5/12/2011	5/26/2011	6/10/2011		12
IS-41	7/28/2011	8/2/2011	8/11/2011			18
IS-42	7/28/2011	8/2/2011	8/11/2011			18
IS-98	7/28/2011	8/2/2011	8/11/2011			18
<i>E. coli</i>						
25922	3/1/2011 5/17/2011	3/8/2011 6/2/2011	4/20/2011	5/4/2011		62
35218	4/1/2011 5/20/2011	4/22/2011 6/3/2011	5/3/2011	5/10/2011		44
700728	4/1/2011					6
IS-2	4/1/2011	7/28/2011	8/2/2011	8/10/2011		22
IS-39	4/5/2011 5/25/2011	4/22/2011 6/7/2011	5/3/2011	5/12/2011		47
IS-44	4/5/2011					6
IS-74	4/5/2011	7/28/2011	8/2/2011	8/10/2011		24
IS-99	7/28/2011	8/2/2011	8/10/2011			17
<i>E. faecalis</i>						
29212	3/24/2011 6/1/2011	4/19/2011	5/2/2011	5/18/2011		18
51299	3/24/2011 6/12/2011	4/25/2011	5/9/2011	5/24/2011		18
IS-103	7/26/2011	8/8/2011	8/15/2011			18
IS-104	7/26/2011	8/8/2011	8/15/2011			18
IS-105	7/26/2011	8/8/2011	8/15/2011			17
IS-85	3/24/2011 6/10/2011	4/25/2011	5/10/2011	5/27/2011		18
<i>E. faecium</i>						
27270	4/19/2011 6/1/2011	5/2/2011	5/5/2011	5/18/2011		15
IS-23	3/24/2011 6/6/2011	4/25/2011	5/12/2011	5/31/2011		18
IS-24	3/24/2011	7/26/2011	8/8/2011	8/11/2011		24
IS-9	4/25/2011	5/9/2011	5/24/2011	6/9/2011		12
IS-91	7/26/2011	8/8/2011	8/11/2011			16
IS-92	7/26/2011	8/8/2011	8/11/2011			18

Table S9 (Contd.)

Species, strain		Test Dates			Total number of trials
<i>K. pneumoniae</i>					
33495	3/31/2011 6/2/2011	4/20/2011	5/4/2011	5/17/2011	42
700603	3/3/2011 6/7/2011	4/26/2011	5/5/2011	5/20/2011	52
BAA 1705	3/31/2011				6
BAA 1706	3/31/2011				6
IS-100	8/1/2011	8/9/2011	8/16/2011		17
IS-20	3/31/2011	8/1/2011	8/9/2011	8/16/2011	23
IS-27	8/9/2011	8/16/2011			11
IS-7	3/31/2011 6/8/2011	4/28/2011 8/1/2011	5/13/2011	5/25/2011	46
<i>P. aeruginosa</i>					
27853	3/17/2011 6/8/2011	4/20/2011	5/4/2011	5/17/2011	41
IS-15	4/26/2011	5/11/2011	5/20/2011	6/3/2011	35
IS-22	1/20/2011 6/9/2011	4/28/2011	5/13/2011	5/26/2011	42
ST-21	7/8/2011	7/13/2011	7/15/2011		18
ST-22	7/8/2011	7/13/2011	7/18/2011		18
ST-23	7/8/2011	7/13/2011	7/18/2011		18
ST-24	7/8/2011	7/13/2011	7/18/2011		18
ST-26	7/8/2011	7/14/2011	7/18/2011		17
<i>P. mirabilis</i>					
12453	4/19/2011 6/7/2011	5/3/2011	5/6/2011	5/19/2011	14
43071	1/11/2011 6/3/2011	4/26/2011	5/10/2011	5/20/2011	18
IS-101	8/1/2011	8/9/2011	8/16/2011		17
IS-102	8/1/2011	8/9/2011	8/16/2011		17
IS-18	4/28/2011	5/13/2011	5/26/2011	6/10/2011	10
IS-19	8/1/2011	8/9/2011	8/16/2011		17
<i>S. aureus</i>					
25923	3/2/2011 5/16/2011	3/8/2011 5/27/2011	4/20/2011 6/1/2011	5/5/2011	74
29213	4/7/2011 6/6/2011	4/27/2011	5/9/2011	5/25/2011	41
43300	3/17/2011				6
IS-13	4/7/2011 6/12/2011	4/28/2011	5/12/2011	5/27/2011	42
IS-43	4/8/2011				6
IS-69	4/8/2011				6
ST-01	7/11/2011				6
ST-02	7/11/2011				6
ST-03	7/11/2011				6

Table S9 (Contd.)

Species, strain		Test Dates			Total number of trials
<i>S. aureus</i>					
ST-04	7/11/2011				6
ST-05	7/11/2011				6
ST-06	7/11/2011				6
ST-07	7/12/2011				5
ST-08	7/12/2011				6
ST-09	7/12/2011				6
ST-11	7/12/2011				6
ST-12	7/12/2011				6
ST-13	7/12/2011				6
ST-14	7/7/2011	7/14/2011			12
ST-15	7/7/2011	7/14/2011			12
ST-16	7/7/2011	7/14/2011			12
ST-17	7/7/2011	7/15/2011			12
ST-18	7/7/2011	7/15/2011			12
ST-19	7/7/2011	7/13/2011	7/15/2011		18
<i>S. epidermidis</i>					
12228	3/3/2011	3/23/2011	4/21/2011	5/5/2011	24
	5/18/2011	6/6/2011			
IS-60	4/27/2011	5/9/2011	5/25/2011	6/12/2011	12
IS-61	4/29/2011	5/16/2011	5/31/2011	6/10/2011	12
IS-63	7/27/2011	8/10/2011	8/15/2011		18
IS-70	7/27/2011	8/10/2011	8/15/2011		18
<i>S. lugdunensis</i>					
49576	3/2/2011	3/31/2011	8/17/2011	8/25/2011	30
	8/30/2011				
IS-34	4/12/2011	8/17/2011	8/25/2011	8/30/2011	24
IS-56	4/12/2011	8/17/2011	8/25/2011	8/30/2011	24
IS-77	4/12/2011	8/18/2011			12
<i>S. maltophilia</i>					
51331	8/18/2011	8/24/2011	8/29/2011		18
IS-25	8/18/2011	8/24/2011	8/29/2011		17
IS-53	8/24/2011	8/29/2011			12
<i>S. marcescens</i>					
13880	3/4/2011	8/17/2011	8/25/2011	8/30/2011	23
IS-4	4/6/2011	8/17/2011	8/25/2011	8/30/2011	24
IS-48	4/6/2011	8/17/2011	8/25/2011	8/30/2011	24
IS-5	4/6/2011				6
<i>S. pneumoniae</i>					
49619	3/15/2011	5/3/2011	5/6/2011	5/18/2011	45
	6/9/2011	8/5/2011	8/26/2011	3/9/2012	
	3/15/2012	3/28/2012	3/29/2012		

Table S9 (Contd.)

Species, strain					Test Dates	Total number of trials
S. pneumoniae						
IS-10	3/22/2011	4/26/2011	5/11/2011	5/26/2011	22	
	6/2/2011	8/5/2011				
IS-14	3/22/2011	4/29/2011	5/13/2011	5/27/2011	21	
	6/3/2011	8/5/2011				
S. agalactiae					81	
12386	3/16/2011	4/21/2011	5/2/2011	5/6/2011	33	
	5/19/2011	6/6/2011	8/3/2011	8/26/2011		
IS-11	3/16/2011	4/27/2011	5/11/2011	5/24/2011	24	
	6/8/2011	8/3/2011				
IS-83	3/16/2011	4/29/2011	5/16/2011	5/31/2011	24	
	6/8/2011	8/3/2011				
Test Date Range: 1/11/2011 to 3/29/2012				Grand Total:	1,951	