

Supplementary Material

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Closing Gaps in the Human Genome with Fosmid Resources Generated from Multiple Individuals

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Supplementary Table S1: Fosmid libraries* and the numbers of fosmid clones determined to be useful for closing or extending in to the human genome euchromatic gaps

Gap Status	Gaps	NA03751	NA13838	NA14663	NA17031	NA17033	WIBR2	ABC7 NA18517	ABC8 NA18507	PCR	Total fosmids
Closed	26	0	0	3	1	1	25	4	1	1	36
Extensions	67	1	1	6	1	9	77	6	9	0	110

*: Eight fosmid libraries were constructed in-house from Corriell DNA samples and tested for one or more of the 28 euchromatic gaps. Five of these libraries yielded fosmid clones contributing sequences to this study. Three other libraries that were used but that did not yield any useful fosmid clones were from Corriell DNA samples, NA01814, NA11321 and NA17032

Supplementary Table S2: Haplotypic structural polymorphism in closed gaps based upon fosmid paired end-sequence and MCD fingerprint analysis.

Gap	Library	Concordant fosmids, #	Concordant avg. end- seq. span, bp	Concordant MCD avg. insert size estimate, bp	Avg. end- seq span Vs. MCD size concordant bp	Discordant fosmids, #	Discordant. Avg. end- seq. span, bp	Discordant MCD avg. insert size estimate, bp	Avg. end- seq span Vs. MCD size, discordant bp
g01_48	ABC12	4	39,790	39,207	583	3	44,470	40,153	4,317
g02_11	ABC09	4	37,463	37,000	463	1	87,029	37,249	49,780
g03_04	ABC11	3	41,557	41,802	-245	5	45,548	42,071	3,477
g04_03	ABC12	4	41,654	40,787	867	2	61,045	40,360	20,685

Fosmid paired end-sequences from ABC libraries were aligned with the closed gap sequences identified in the current study plus 50 kb of flanking sequences from either ends of these gaps. Clones concordant or discordant for size based upon their end-sequence spans were identified as described earlier⁷. Representative concordant and discordant fosmids for the 4 gaps from the same source library were subjected to MCD fingerprint analysis in four independent restriction enzyme domains, EcoRI, BglII, HindIII, and NsiI, as described earlier^{7,22}. The difference in average end-sequence span and MCD insert size estimates for concordant clones varied between -245 and 867 bp. Similarly, the MCD-based-insert-sizes estimates for concordant and discordant fosmids for any of the 4 gaps showed little variation (-427 and 946 bp). In contrast, the differences in average end-sequence span and MCD-insert-size estimates for discordant clones varied significantly (3,477 and 49,780 bp), thus indicating size polymorphism for these four gaps. MCD-based-insert-size estimates for both concordant and discordant fosmids analyzed here compared well with the mean-insert-size distribution (unpublished data) in the respective libraries; ABC9 ($39,512 \pm 2,260$ bp); ABC11 ($40,033 \pm 1,767$ bp); and ABC12 ($39,752 \pm 1395$ bp).

Supplementary Table S3: Summary list of euchromatic gaps, their flanking accessioned clones and the accession numbers of new sequences extending in to them.

Chr	Gap	Left Accession	Right Accession	Size, bp	Accession #
1	g01_03	AL732372.15	AC114498.2	9,196	AC174078
1	g01_11a	CR589905.6	BX640550.4	32,421	AC188787
1	g01_23	CR589921.2	BX649418.3	404	AC170163
1	g01_25	AL929472.21	BX296560.2	11,778	AC153806
1	g01_47	AL663102.4	AL732363.8	9,158	AC160852
2	g02_04	AC142122.2	AC144555.1	37,155	AC160845, AC174047
2	g02_05	AC142528.3	AC144555.1	282	AC156625
2	g02_06	AC142119.2	AC142283.3	28,202	AC174048
2	g02_07	AC112228.3	AC115619.3	9,756	AC153786, AC153787, AC205583, AC205584,
2	g02_08	AC110080.2	AC009958.3	38,712	AC170164
2	g02_12	AC139850.1	AC140485.3	5,465	AC153804
2	g02_14	AC092664.2	AC112229.4	34,224	AC187649
2	g02_19	AC141929.2	AC145517.3	68,128	AC157084, AC174149, AC205586
2	g02_20a	AC149644.1	AC142117.2	9,386	AC174050
2	g02_21	AC093802.3	AC142120.3	6,280	AC174149
3	g03_01	AC145425.5	AC092034.2	78,014	AC170801, AC170165, AC190385
3	g03_03	AC117469.3	AC125362.6	14,693	AC188788, AC174158
4	g04_01	AC145653.2	AC147067.4	16,683	AC174055, AC174150
4	g04_05	AC144557.2	AC116655.7	57,232	AC174051, AC174151
4	g04_07	AC142276.3	AC116630.4	9,785	AC174073, AC205585
4	g04_09	AC119752.3	AC119751.3	52,452	AC174053, AC174054
4	g04_14	AC142282.3	AC149643.1	14,111	AC174055
5	g05_08	AC134821.2	AC138522.2	16,185	AC174056
5	g05_09	AC142391.2	AC138517.2	2,715	AC188049
6	g06_02	AL356672.9	AL596065.3	32,340	AC174057
6	g06_04	AL035688.8	AL049551.1	34,221	AC174058, AC187646
6	g06_05	AL135906.19	AL731777.11	320,525	AC174440, AC174059, AC188620, AC188621, AC188628, AC188625, AC188627, AC187651, AC188043, AC187654, AC188619
6	g06_07	AL592444.18	CR631132.1	30,456	AC174060,
6	g06_08	AL049612.11	AL603783.14	117,713	AC174061, AC174052, AC174153
7	g07_01	AC145676.2	AC147651.4	223,365	AC187652, AC187653, AC188616, AC188626, AC188618, AC188617, AC188623,
7	g07_02	AC122132.5	AC073424.8	26,615	AC174152
7	g07_04	AC142456.2	AC122133.4	31,487	AC160848
7	g07_11	AC144438.2	AC142169.2	10,307	AC161036
8	g08_02	AC145124.2	AC144830.2	3,821	AC174063
8	g08_12	AC073385.14	AC145210.2	23,478	AC160859
9	g09_33n	AL591479.3	AL353608.20	16,524	AC174064
9	g09_35	BX284632.11	AL591479.3	16,706	AC174069
9	g09_35a	AL591479.3	AL353608.20	24,063	AC160846
9	g09_41	AL360004.22	AL354898.10	13,448	AC174065
9	g09_45	AL138781.13	BX649589.3	61,005	AC153812, AC174154
10	g10_18	AL772134.16	BX470155.5	29,738	AC153808, AC174075
10	g10_19	AL607044.24	BX294094.5	4,476	AC174066
11	g11_01	AADD01112371	AADC01095577	12,200	AC196286
11	g11_08	AADD01118406	AADD01118410	25,516	AC174067, AC188040
12	g12_01	AC140077.17	AC094008.10	838	AC154092
12	g12_03	AC154095.1	AC093718.3	29,833	AC154095, AC205580
12	g12_04	AC087893.15	AC011596.27	46,749	AC174068, AC190387
12	g12_06	AC156455.1	AC145421.5	37,793	AC156455, AC205581
12	g12_08	AC145426.6	AC148477.3	9,495	AC188041

13	g13_01	BX072584.1	BX088568.4	13,536	AC174155
13	g13_02	AL359649.8	AL591932.8	11,344	AC154093, AC154094
13	G13_03	BX537316.2	BX072579.14	25,691	AC187647
13	G13_04	BX088578.4	BX537329.2	30,089	AC187648
15	g15_01	AC126335.16	AC134980.3	6,321	AC160014
15	g15_02	AC025884.28	AC116165.7	27,275	AC174070
15	g15_07	AC055876.16	AC127522.7	61,749	AC174071, AC174469
15	g15_09	AC136704.9	AC048382.7	7,738	AC170166
15	g15_10	AC144834.2	AC144835.2	1,273	AC174076
16	g16_05	AC136932.4	AC135776.3	27,816	AC190383
17	g17_11	AC145208.1	AC137723.5	26,844	AC174470
20	g20_03	AL512784.6	AL450465.12	9,184	AC188048, AC174072
20	g20_06	BX640513.2	AL450469.11	32,207	AC174062, AC188050
21	g21_02	AADD01172788	AADD01172789	3,561	AC188051
21	g21_04	AADD01209098	AADD01172902	5,533	AC160844
22	g22_10a	CR759740.1	BX545851.6	7,306	AC174074
X	gxx_02	AL672277.20	BX908402.3	18,554	AC188044
X	gxx_03	CR381640.8	CR856018.10	64,578	AC188622, AC188624
				2,125,728	

Supplementary Table S4: Identification and accession numbers for paired-end-sequences of 2,158 concordant fosmid clones from ABC7 - ABC12 fosmid libraries that span the 26 gaps closed in the current study.

Gap name	Library	Trace Archive ID (TI) numbers for clone end sequences*	Estimated insert size
g01_28	ABC12	1421137797, 1421137798	37989 bp
g01_28	ABC7	1074360060, 1074360061	49512 bp
g01_28	ABC9	1220219701, 1220882983	37516 bp
g01_28	ABC11	1445572814, 1445572815	36362 bp
g01_28	ABC9	1196356161, 1198425830	36227 bp
g01_28	ABC8	1054525165, 1054525166	30226 bp
g01_28	ABC12	1357955387, 1358574994	34762 bp
g01_28	ABC11	1445515642, 1445515643, 1445515644, 1445515645	34157 bp
g01_28	ABC7	970947864, 970947865	38138 bp
g01_28	ABC12	1417548784, 1417548785	32300 bp
g01_28	ABC8	1045156771, 1045576666	28896 bp
g01_28	ABC8	1039803093, 1040144374	32498 bp
g01_28	ABC11	1448201473, 1448846530	35241 bp
g01_28	ABC12	1406208661, 1406424270	34352 bp
g01_28	ABC10	1276297048, 1277006413	34001 bp
g01_28	ABC11	1448198155, 1448844219	34761 bp
g01_28	ABC8	1065897408, 1065902419	31988 bp
g01_28	ABC9	1192951640, 1192951641	33525 bp
g01_28	ABC10	1246404284, 1246404285	36338 bp
g01_28	ABC12	1319258308, 1319366824	32622 bp
g01_28	ABC8	1109021737, 1109021738	28160 bp
g01_28	ABC10	1240833285, 1240833286	36979 bp
g01_28	ABC9	1189566707, 1189566708	38180 bp
g01_28	ABC9	1177793367, 1177793368	38176 bp
g01_28	ABC9	1176064103, 1177737471	38153 bp
g01_28	ABC12	1419967717, 1420879628	33248 bp
g01_28	ABC8	1131321774, 1131321775	28292 bp
g01_28	ABC8	1043663239, 1044910516	29709 bp
g01_28	ABC12	1331663341, 1332345369	32660 bp
g01_28	ABC12	1420990432, 1420990433	36840 bp
g01_28	ABC9	1209874653, 1210456989	37622 bp
g01_28	ABC9	1227545287, 1227545288	37616 bp
g01_28	ABC9	1180815187, 1180815188	36086 bp
g01_28	ABC8	1065896054, 1071557056	30454 bp
g01_28	ABC10	1293276064, 1293276065	37907 bp
g01_28	ABC10	1284081786, 1286595160	41840 bp
g01_48	ABC7	1010848535, 1012460610	41332 bp
g01_48	ABC7	973537339, 973537340	43107 bp
g01_48	ABC10	1306092165, 1307491179	41850 bp
g01_48	ABC10	1243627691, 1243627692	41806 bp
g01_48	ABC10	1266531222, 1266531223	41779 bp
g01_48	ABC10	1243627215, 1243627216	42956 bp
g01_48	ABC10	1287872406, 1288196987	41615 bp

g01_48	ABC11	1526490595, 1526833862	39332 bp
g01_48	ABC9	1222538290, 1222538291	43134 bp
g01_48	ABC9	1223708864, 1223708865	43142 bp
g01_48	ABC8	1052355465, 1052362234	39188 bp
g01_48	ABC11	1446310068, 1446310069	42228 bp
g01_48	ABC12	1330145358, 1332342148	39535 bp
g01_48	ABC12	1324350575, 1324350576	39469 bp
g01_48	ABC12	1432257789, 1432257790	38678 bp
g01_48	ABC8	1045028624, 1045544461	42433 bp
g01_48	ABC9	1178670167, 1180524345	42313 bp
g01_48	ABC10	1257518016, 1257518017	43780 bp
g01_48	ABC11	1534608694, 1534608695	39729 bp
g01_48	ABC11	1534668715, 1535490655	40013 bp
g01_48	ABC11	1524135588, 1524135589	40014 bp
g01_48	ABC11	1534111724, 1534111725	39672 bp
g01_48	ABC9	1159785531, 1159785532	41155 bp
g01_48	ABC9	1181039649, 1181998450	41166 bp
g01_48	ABC9	1176067921, 1176067922	41166 bp
g01_48	ABC10	1293829519, 1293829520	40886 bp
g01_48	ABC9	1196532122, 1196532123	41130 bp
g01_48	ABC10	1267283854, 1267283855	41696 bp
g01_48	ABC10	1240833563, 1240833564	41622 bp
g01_48	ABC8	1093265311, 1094030761	36922 bp
g01_48	ABC12	1369946526, 1372166883	39643 bp
g01_48	ABC9	1199950032, 1199950033	38679 bp
g01_48	ABC10	1246424294, 1246439942	39527 bp
g01_48	ABC9	1205357937, 1208019984	40121 bp
g01_48	ABC9	1208077485, 1208707886	40099 bp
g01_48	ABC11	1510049901, 1510049902	38407 bp
g01_48	ABC10	1278024078, 1278024079	42800 bp
g01_48	ABC10	1269001419, 1270445894	39004 bp
g01_48	ABC10	1246489756, 1246507900	39008 bp
g01_48	ABC9	1165231301, 1166829701	35996 bp
g01_48	ABC11	1446254742, 1446254743	40974 bp
g01_48	ABC12	1369808808, 1369808809	39827 bp
g01_48	ABC7	1004360813, 1004362807	33913 bp
g01_48	ABC7	971052086, 971054143	36162 bp
g01_48	ABC8	1021340432, 1021340433	34097 bp
g01_48	ABC9	1177831187, 1177831188	38441 bp
g01_48	ABC8	1067131042, 1067837516	34468 bp
g01_48	ABC7	1013817947, 1013817948	34194 bp
g01_48	ABC7	1003668408, 1003668409	33779 bp
g01_48	ABC8	1094128431, 1094801789	38770 bp
g01_48	ABC12	1324447181, 1325032537	38351 bp
g01_48	ABC8	1042088187, 1042088188	36933 bp
g01_48	ABC7	926212650, 926212651	42322 bp
g01_48	ABC10	1287500623, 1287550789	43198 bp
g01_48	ABC7	977321214, 978101908	37680 bp

g01_48	ABC9	1233626639, 1233626640	42038 bp
g01_48	ABC9	1177830935, 1177830936	41915 bp
g01_48	ABC8	1033156488, 1033156489	32314 bp
g01_48	ABC7	1003697860, 1002879753	35441 bp
g01_48	ABC9	1198862121, 1199754368	40173 bp
g01_48	ABC9	1172982143, 1172982144	39486 bp
g01_48	ABC8	1146849653, 1155580948	35993 bp
g01_48	ABC12	1400045424, 1400045425	40239 bp
g01_48	ABC10	1293329508, 1293329509	39773 bp
g01_48	ABC7	973414619, 973414620	42200 bp
g01_48	ABC8	1089253448, 1089253449	39319 bp
g01_48	ABC7	974399243, 974401437	32640 bp
g01_48	ABC8	1072413061, 1076134115	32101 bp
g01_48	ABC7	973592342, 973592343	43711 bp
g01_48	ABC7	1001420949, 1001420950	34281 bp
g01_48	ABC8	1132486338, 1132486339	36030 bp
g01_48	ABC9	1203010609, 1204851084	37376 bp
g01_48	ABC10	1278331250, 1278331251	42123 bp
g01_48	ABC9	1155899861, 1158325055	36674 bp
g01_48	ABC10	1271033000, 1272094154	46702 bp
g01_48	ABC11	1476630935, 1480980028	40777 bp
g01_48	ABC11	1486498935, 1487775561	41238 bp
g01_48	ABC11	1463769740, 1463769741	40484 bp
g01_48	ABC12	1399945310, 1399945311	39678 bp
g01_48	ABC9	1170861136, 1172634147	37659 bp
g01_48	ABC9	1188205654, 1189528331	37651 bp
g01_48	ABC10	1269020862, 1270451803	40426 bp
g01_48	ABC10	1278469348, 1278469349	43276 bp
g01_48	ABC10	1293104961, 1293104962	43274 bp
g01_48	ABC7	998477476, 999836215	36073 bp
g01_48	ABC9	1189565537, 1189565538	38585 bp
g01_48	ABC9	1170862349, 1172635168	38581 bp
g01_48	ABC9	1202686269, 1202686270	40621 bp
g01_48	ABC8	1094176123, 1094804937	35672 bp
g01_48	ABC9	1159785880, 1161010704	38596 bp
g01_48	ABC8	1057324289, 1057324290	36081 bp
g01_48	ABC8	1024926467, 1024926468	38527 bp
g01_48	ABC7	975379183, 976717844	36415 bp
g01_48	ABC10	1285482318, 1286601604	45632 bp
g01_48	ABC10	1300044736, 1300044737	45597 bp
g01_48	ABC11	1467964972, 1467964973	40616 bp
g01_48	ABC11	1507961965, 1507961966	40606 bp
g01_48	ABC11	1475238004, 1475238005	44121 bp
g01_48	ABC7	977774599, 978105228	33305 bp
g01_48	ABC11	1534711646, 1534711647	41068 bp
g01_48	ABC8	1120346116, 1120707253	35124 bp
g01_48	ABC8	1062061882, 1063875422	29469 bp
g01_48	ABC8	1041276059, 1043407626	34257 bp

g01_48	ABC9	1239521659, 1239521660	41520 bp
g01_48	ABC7	1010789128, 1012458607	33908 bp
g01_48	ABC11	1476185616, 1476614838	40656 bp
g01_48	ABC10	1293724403, 1293724404	44920 bp
g01_48	ABC7	977294097, 977294098	48708 bp
g01_48	ABC11	1516955950, 1516955951	44088 bp
g01_48	ABC9	1237330389, 1237330390	40434 bp
g01_48	ABC7	977294229, 977294230	47012 bp
g01_48	ABC9	1193006455, 1194536111	45873 bp
g01_48	ABC10	1267972930, 1268847591	46855 bp
g01_48	ABC10	1292795797, 1292795798	46470 bp
g01_48	ABC8	1033148496, 1033148497	45557 bp
g01_48	ABC8	983245165, 983262137	42981 bp
g01_48	ABC8	1109022779, 1109022780	40612 bp
g01_48	ABC9	1221246794, 1222390126	44670 bp
g01_48	ABC9	1162606542, 1164452212	42946 bp
g01_48	ABC12	1317776022, 1317776023	45033 bp
g01_48	ABC11	1516967096, 1516967097	41303 bp
g01_48	ABC11	1526422262, 1526832657	41293 bp
g01_48	ABC12	1364931084, 1367107985	39303 bp
g01_48	ABC12	1400341167, 1400341168	38384 bp
g01_48	ABC10	1246516774, 1246524070	45169 bp
g01_48	ABC10	1284082183, 1285354322	43743 bp
g01_48	ABC8	1112344422, 1113755377	37285 bp
g01_48	ABC12	1364550484, 1364550485	39768 bp
g01_48	ABC7	972966908, 972966909	45010 bp
g01_48	ABC11	1450592530, 1450592531	41405 bp
g01_48	ABC12	1404573352, 1404573353	32981 bp
g01_48	ABC12	1367579744, 1367579745	38230 bp
g01_48	ABC11	1487844064, 1488716000	43289 bp
g01_48	ABC12	1400783519, 1400962625	39818 bp
g01_48	ABC8	1128592942, 1128592943	36969 bp
g01_48	ABC9	1226876165, 1226876166	46674 bp
g01_48	ABC9	1237329575, 1237329576	46667 bp
g01_48	ABC8	1061020841, 1061020842	40766 bp
g01_48	ABC8	1043557905, 1043557906	39339 bp
g01_48	ABC8	1119819597, 1119819598	30030 bp
g01_48	ABC7	975005052, 975005053	43672 bp
g01_48	ABC12	1388019849, 1389041094	40835 bp
g01_48	ABC9	1177830809, 1177830810	41077 bp
g01_48	ABC8	1134674966, 1134674967	41286 bp
g01_48	ABC8	1039803675, 1040150427	41996 bp
g01_48	ABC11	1510141510, 1510415689	39710 bp
g01_48	ABC10	1269016605, 1270448416	43834 bp
g01_48	ABC12	1319260841, 1319279865	40118 bp
g01_48	ABC12	1324837323, 1324837324	40077 bp
g01_48	ABC9	1219657855, 1219657856	39742 bp
g01_48	ABC10	1293911225, 1293911226	41900 bp

g01_48	ABC12	1412941878, 1412941879	40073 bp
g01_48	ABC9	1176225146, 1177771647	44760 bp
g01_48	ABC9	1196232434, 1198421673	44753 bp
g01_48	ABC10	1240930119, 1240930120	41637 bp
g01_48	ABC12	1426993109, 1428092734	40310 bp
g01_48	ABC7	1016380450, 1017060977	34394 bp
g01_48	ABC7	1016475024, 1017053792	34371 bp
g01_48	ABC7	930975666, 932579403	35319 bp
g01_48	ABC11	1472925297, 1473378980	41472 bp
g01_48	ABC8	1146947420, 1146947421	36793 bp
g01_48	ABC8	1045064942, 1045066911	39102 bp
g01_48	ABC11	1524132770, 1524132771	40847 bp
g01_48	ABC11	1524132678, 1524132679	40831 bp
g01_48	ABC12	1323377120, 1324247906	39373 bp
g01_48	ABC10	1255080798, 1255080799	42176 bp
g01_48	ABC7	977080768, 977085558	39559 bp
g01_48	ABC7	977179725, 977179726	39565 bp
g01_48	ABC8	1043689639, 1044987080	43783 bp
g01_48	ABC10	1266503060, 1266503061	41601 bp
g01_48	ABC12	1336366136, 1336689691	43250 bp
g01_48	ABC9	1212378290, 1212378291	44503 bp
g01_48	ABC9	1208076474, 1208707365	44488 bp
g01_48	ABC12	1406160942, 1406423350	40350 bp
g01_48	ABC11	1510139394, 1510415109	38459 bp
g01_48	ABC11	1525729583, 1526401746	40112 bp
g01_48	ABC9	1232725031, 1232725032	39313 bp
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g01_48	ABC11	1475250612, 1480974813	42786 bp
g01_48	ABC12	1406058538, 1406058539	40457 bp
g01_48	ABC11	1496686349, 1497114077	46611 bp
g01_48	ABC11	1467963298, 1467963299	46614 bp
g01_48	ABC10	1269019160, 1270450371	40324 bp
g01_48	ABC10	1267208976, 1267208977	40317 bp
g01_48	ABC8	1110999608, 1112347861	38197 bp
g01_48	ABC8	1043409066, 1043409067	36400 bp
g01_48	ABC10	1293900503, 1293900504	47109 bp
g01_48	ABC10	1287796416, 1288222958	47062 bp
g01_48	ABC8	1105945384, 1105945385	34494 bp
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g01_48	ABC9	1181043015, 1181043016	38970 bp
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g01_48	ABC8	1134972544, 1136936684	41219 bp
g01_48	ABC12	1397738586, 1397738587	41417 bp
g01_48	ABC8	1043637610, 1043637611	31947 bp
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g01_48	ABC12	1430963563, 1431681639	38167 bp
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g01_48	ABC8	1120321563, 1120325258	40689 bp
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g01_48	ABC11	1442245469, 1442245470	40231 bp
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g01_48	ABC12	1397433778, 1397739161	41387 bp
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g02_01	ABC9	1220902209, 1220902210	38862 bp
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g02_11	ABC7	973036574, 973036575	31694 bp
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g02_11	ABC8	1119075609, 1119075610	34704 bp
g02_11	ABC7	973993200, 973999596	40872 bp
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g02_20	ABC12	1379362109, 1379362110	40127 bp
g02_20	ABC11	1437073232, 1437681231	40266 bp
g02_20	ABC11	1443928275, 1443928276	40249 bp
g02_20	ABC12	1392451703, 1392451704	40269 bp
g02_20	ABC9	1231719018, 1231719019	38440 bp
g02_20	ABC9	1208712425, 1208712426	38444 bp
g02_20	ABC9	1231719014, 1231719015	38443 bp
g02_20	ABC11	1490051326, 1495804833	49579 bp
g02_20	ABC10	1272341263, 1274096197	47683 bp
g02_20	ABC7	970951719, 970951720	46167 bp
g02_20	ABC9	1232887045, 1233914646	47464 bp
g02_20	ABC10	1278357909, 1278357910	48902 bp
g02_20	ABC11	1475107607, 1475229026	47107 bp
g02_20	ABC10	1190756539, 1190756540	54565 bp
g02_20	ABC7	1012521837, 1012521838	47208 bp
g02_20	ABC8	1140383436, 1140383437	47096 bp
g02_20	ABC7	1013813423, 1013813424	47196 bp
g02_20	ABC9	1209621235, 1209621236	54402 bp
g02_20	ABC12	1329708383, 1329708384	47412 bp

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g02_20	ABC8	1059564508, 1059573619	38030 bp
g02_20	ABC8	1074067320, 1076126389	35311 bp
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g02_20	ABC10	1268997742, 1268997743	38271 bp
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g02_20	ABC11	1534704174, 1534704175	38643 bp
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g02_20	ABC9	1230072896, 1230072897	40653 bp
g02_20	ABC9	1238102835, 1239324687	40644 bp
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g02_20	ABC8	1108973602, 1108973603	33588 bp
g02_20	ABC12	1331813705, 1332350180	40063 bp
g02_20	ABC10	1266535442, 1266535443	41116 bp
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g02_20	ABC7	1005844322, 1005844323	36035 bp
g02_20	ABC7	1015365561, 1015365571	36003 bp
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g04_03	ABC9	1162615171, 1164455321	43807 bp
g04_03	ABC11	1508044851, 1508044852	40890 bp
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g04_03	ABC9	1213257592, 1213257593	44229 bp
g04_03	ABC9	1196361099, 1198560762	38510 bp
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g04_03	ABC11	1517792113, 1519867179	39358 bp

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g04_03	ABC8	1145218942, 1146698742	35910 bp
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g04_03	ABC12	1411880224, 1411880225	41621 bp
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g04_03	ABC7	1009732944, 1010788208	36921 bp
g04_03	ABC7	1005838670, 1005838671	36669 bp
g04_03	ABC7	1005836477, 1008314427	36654 bp
g04_03	ABC7	977071498, 977071499	38242 bp
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g04_03	ABC8	1129312968, 1129312969	35017 bp
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g10_01	ABC7	1004594252, 1005832012	35899 bp
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g10_01	ABC11	1472877509, 1472877510	41495 bp
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g10_01	ABC11	1443636838, 1443919069	40751 bp
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g10_01	ABC9	1223708230, 1223708231	38753 bp
g10_01	ABC7	932599960, 932599961	38112 bp
g10_01	ABC11	1458689764, 1458689765	40151 bp
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g10_01	ABC8	993872010, 993872011	38426 bp
g10_01	ABC7	1002965140, 1002965141	43290 bp
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g12_07	ABC8	1057345893, 1058691695	36918 bp
g12_07	ABC11	1485703968, 1485703969, 1486092223	40544 bp
g12_07	ABC9	1217909915, 1219454286	36927 bp
g12_07	ABC12	1429405321, 1431740211, 1431740212, 1431740213	40399 bp
g17_08	ABC10	1274586320, 1274586321	43444 bp
g17_08	ABC8	1093317253, 1094034990	41198 bp
g17_08	ABC10	1287560871, 1287560872	43415 bp
g17_08	ABC9	1161878591, 1162418861	37356 bp
g17_08	ABC9	1186273867, 1186273868	37357 bp
g17_08	ABC9	1183959218, 1185738422	36081 bp
g17_08	ABC9	1198864541, 1198864542	42618 bp
g17_08	ABC9	1198641184, 1198858204	42594 bp
g17_08	ABC8	1087364303, 1089249702	36953 bp
g17_08	ABC8	987424756, 989371579	32277 bp
g17_08	ABC8	1108133688, 1108133689	34940 bp
g17_08	ABC8	1108975972, 1108975973	34924 bp
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g17_08	ABC10	1272337944, 1274094030	41813 bp
g17_08	ABC8	990325472, 991135862	39395 bp
g17_08	ABC9	1223404714, 1223404715	40611 bp
g17_08	ABC9	1186398340, 1186398341	38318 bp
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g17_08	ABC10	1292940813, 1292940814	41514 bp

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g17_08	ABC11	1510144997, 1510417640	39908 bp
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g22_10	ABC12	1426936098, 1428087951	39754 bp
g22_10	ABC12	1435111815, 1435111816	39747 bp
g22_10	ABC8	1106479420, 1106479421	37753 bp
g22_10	ABC8	1052360762, 1054872117	44303 bp
g22_10	ABC10	1292745845, 1292745846	41005 bp
g22_10	ABC11	1468778272, 1470020996	39846 bp
g22_10	ABC11	1467128346, 1467964501	39833 bp
g22_10	ABC12	1417036271, 1417715814	35667 bp
g22_10	ABC12	1416210977, 1416210978	35670 bp
g22_10	ABC7	1001552775, 1002395524	42719 bp
g22_10	ABC9	1220060760, 1220060761	40303 bp
g22_10	ABC9	1238055602, 1238055603	40291 bp
g22_10	ABC8	1092899818, 1092899819	31449 bp
g22_10	ABC11	1484887816, 1485691972	40037 bp
g22_10	ABC8	1098962815, 1105221897	37456 bp
g22_10	ABC9	1213257602, 1213257603	48020 bp
g22_10	ABC9	1208803750, 1209504893	47515 bp
g22_10	ABC9	1230065711, 1231502730	47502 bp
g22_10	ABC7	970840934, 970840935	36317 bp
g22_10	ABC12	1405885587, 1405885588	45379 bp
g22_10	ABC11	1516881334, 1516881335	44078 bp
g22_10	ABC8	1121967111, 1121967112	32477 bp
g22_10	ABC9	1227528750, 1227807058	41156 bp
gXX_02b	ABC8	1075627084, 1076204908	34275 bp
gXX_02b	ABC8	1092843707, 1092843708	31308 bp
gXX_02b	ABC11	1278473152, 1278490432	39559 bp

gXX_02b	ABC7	926177572, 926177573	35138 bp
gXX_02b	ABC8	1112342659, 1113753401	34346 bp
gXX_02b	ABC8	1092903996, 1092903997	29721 bp
gXX_02b	ABC11	1508654960, 1508654961	36500 bp
gXX_02b	ABC9	1220066828, 1220066829	36963 bp
gXX_02b	ABC8	1115649799, 1115649800	30621 bp
gXX_02b	ABC11	1443928941, 1444089063	38894 bp
gXX_02b	ABC8	1110079271, 1110079272	34906 bp
gXX_02b	ABC8	1123066555, 1123066556	34878 bp
gXX_02b	ABC8	1045160009, 1045160010	29407 bp
gXX_02b	ABC7	973973912, 973973913	35711 bp
gXX_02b	ABC12	1364417510, 1364417511	30475 bp
gXX_02b	ABC10	1257305489, 1257305490	39939 bp
gXX_02b	ABC10	1267462007, 1267806039	40674 bp
gXX_02b	ABC7	1002406032, 1002406033	28829 bp
gXX_02b	ABC8	1054758960, 1056167505	33150 bp
gXX_02b	ABC8	1045580890, 1045580891	33150 bp
gXX_02b	ABC10	1246455572, 1246466804	37751 bp
gXX_02b	ABC10	1260349683, 1265982175	37741 bp
gXX_02b	ABC10	1295622285, 1295794628	40581 bp
gXX_02b	ABC7	970828841, 970832485	37724 bp
gXX_02b	ABC9	1201138405, 1202684049	32968 bp
gXX_02b	ABC10	1266446988, 1266446989	39518 bp
gXX_02b	ABC10	1274586014, 1274586015	42279 bp
gXX_02b	ABC11	1470843968, 1472497042	40106 bp
gXX_02b	ABC8	1062106525, 1063876672	36808 bp
gXX_02b	ABC8	1062410993, 1063890110	41263 bp
gXX_02b	ABC7	977771146, 977771147	33645 bp
gXX_02b	ABC7	975351579, 975351580	30097 bp
gXX_02b	ABC8	1057535634, 1059599663	36124 bp
gXX_02b	ABC7	1004579752, 1004579753	39455 bp
gXX_02b	ABC11	1508039777, 1508652346	40014 bp
gXX_02b	ABC8	1052449700, 1052453221	37964 bp
gXX_02b	ABC11	1523540962, 1524125821	38758 bp
gXX_02b	ABC7	1003697338, 1002963567	36687 bp
gXX_02b	ABC9	1235532796, 1235532797	41254 bp
gXX_02b	ABC7	973500630, 973502126	37054 bp
gXX_02b	ABC9	1208713477, 1208713478	42370 bp
gXX_02b	ABC9	1212374248, 1213238010, 1213238011, 1213238012	42366 bp
gXX_02b	ABC11	1444112217, 1445361867	40244 bp
gXX_02b	ABC7	1001416010, 1001416011	41078 bp
gXX_02b	ABC8	1068205194, 1068205195	41069 bp
gXX_02b	ABC7	971120961, 971124174	38463 bp
gXX_02b	ABC9	1217900281, 1219453131	39669 bp
gXX_02b	ABC9	1186269635, 1186269636	43598 bp
gXX_02b	ABC8	1139190710, 1139190711	39570 bp
gXX_02b	ABC9	1162414218, 1162414219	39386 bp
gXX_02b	ABC11	1509093922, 1510051490	41100 bp

gXX_02b	ABC9	1200544058, 1200544059	35553 bp
gXX_02b	ABC7	1016475404, 1016475405	36639 bp
gXX_02b	ABC9	1229827385, 1229827386	35568 bp
gXX_02b	ABC8	1050448677, 1050448678	40821 bp
gXX_02b	ABC7	1012526326, 1013711600	44650 bp
gXX_02b	ABC8	1093323983, 1094104506	31717 bp
gXX_02b	ABC8	1073972362, 1075432880	31703 bp
gXX_02b	ABC7	1015444754, 1016373086	36622 bp
gXX_02b	ABC7	1016380173, 1017053303	43984 bp
gXX_19	ABC9	1217900865, 1217900866	40095 bp
gXX_19	ABC10	1246456828, 1246468636	42133 bp
gXX_19	ABC11	1499094342, 1507000510	41761 bp
gXX_19	ABC12	1324842122, 1324842123	38860 bp
gXX_19	ABC12	1324842038, 1324842039	38815 bp
gXX_19	ABC10	1293730189, 1293730190	42623 bp
gXX_19	ABC10	1280031591, 1280031592	42612 bp
gXX_19	ABC12	1358627399, 1358627400	38532 bp
gXX_19	ABC8	1131414712, 1131414713	35254 bp
gXX_19	ABC12	1404758273, 1404758274	52865 bp
gXX_19	ABC7	1001551389, 1002394522	40360 bp
gXX_19	ABC7	970795257, 970795258	33638 bp
gXX_19	ABC8	1092976392, 1092976393	30763 bp
gXX_19	ABC10	1278433319, 1278433320	51577 bp
gXX_19	ABC11	1515044563, 1519864107	51920 bp
gXX_19	ABC10	1310867351, 1310867352	53084 bp
gXX_19	ABC10	1277153214, 1277934331	51236 bp
gXX_19	ABC9	1226985713, 1227468759	50153 bp
gXX_19	ABC12	1416921975, 1416921976	50482 bp
gXX_19	ABC10	1280164756, 1280164757	50783 bp
gXX_19	ABC10	1293904159, 1293904160	50788 bp
gXX_19	ABC7	1074353573, 1074353574	34142 bp
gXX_19	ABC8	1028172050, 1028172051	38529 bp
gXX_19	ABC9	1165104956, 1166363651	36422 bp
gXX_19	ABC12	1419965432, 1420877439	39824 bp
gXX_19	ABC12	1421413300, 1422122637	39829 bp
gXX_19	ABC11	1464332707, 1464332708	40533 bp
gXX_19	ABC11	1464333757, 1464333758	40537 bp
gXX_19	ABC11	1524131896, 1524131897	40153 bp
gXX_19	ABC11	1524132176, 1524132177	40154 bp
gXX_21	ABC7	929419220, 929787350	44138 bp
gXX_21	ABC9	1235539009, 1235539010	40633 bp
gXX_21	ABC12	1397239646, 1397239647	39727 bp
gXX_21	ABC11	1458633318, 1458633319	40703 bp
gXX_21	ABC10	1278329559, 1278474462	41142 bp
gXX_21	ABC10	1287494115, 1287494116	41123 bp
gXX_21	ABC12	1406055629, 1406055630	40870 bp
gXX_21	ABC9	1227501669, 1227501670	40723 bp
gXX_21	ABC12	1364424862, 1364424863	40872 bp

gXX_21	ABC11	1470119209, 1473329042	40575 bp
gXX_21	ABC12	1369939969, 1370573892	41071 bp
gXX_21	ABC12	1325038969, 1325981960	41037 bp
gXX_21	ABC12	1319045787, 1319045788	40130 bp
gXX_21	ABC9	1234233902, 1234233903	38102 bp
gXX_21	ABC11	1513036317, 1513036318	40762 bp
gXX_21	ABC12	1314333957, 1314732033	38948 bp
gXX_21	ABC11	1446256762, 1446256763	40099 bp
gXX_21	ABC11	1506331632, 1506331633	40115 bp
gXX_21	ABC12	1356700858, 1356700859	40297 bp
gXX_21	ABC12	1370142232, 1370142233	38559 bp
gXX_21	ABC10	1287878031, 1288226320	42570 bp
gXX_21	ABC10	1278091981, 1278177455	42523 bp
gXX_21	ABC12	1411915716, 1412833702	40891 bp
gXX_21	ABC10	1266353371, 1266353372	39903 bp
gXX_21	ABC10	1279989246, 1279989247	42135 bp
gXX_21	ABC10	1276274282, 1276274283	42130 bp
gXX_21	ABC10	1274275893, 1274275894	42093 bp
gXX_21	ABC11	1526409062, 1526409063	37950 bp
gXX_21	ABC9	1198917136, 1199760862	37815 bp
gXX_21	ABC9	1171179116, 1171179117	36209 bp
gXX_21	ABC12	1329867541, 1329867542	39865 bp
gXX_21	ABC12	1329867445, 1329867446	39861 bp
gXX_21	ABC8	1049640810, 1049640811	38517 bp
gXX_21	ABC10	1250700740, 1250883755	41238 bp
gXX_21	ABC12	1395871801, 1396008746	40429 bp
gXX_21	ABC8	1146059405, 1146700544	34687 bp
gXX_21	ABC10	1189524594, 1190753662	40867 bp
gXX_21	ABC9	1166368124, 1166368125	37540 bp
gXX_21	ABC8	1137283005, 1139138860	36393 bp
gXX_21	ABC9	1235535288, 1235535289	37640 bp
gXX_21	ABC9	1235428490, 1235428491	36105 bp
gXX_21	ABC11	1470112726, 1470112727	39102 bp
gXX_21	ABC9	1193010154, 1194542594	42139 bp
gXX_21	ABC12	1373759750, 1373759751	37803 bp
gXX_21	ABC12	1392434294, 1392986961	39420 bp
gXX_21	ABC8	1043660026, 1043660027	35397 bp
gXX_21	ABC11	1534706784, 1534706785	37445 bp
gXX_21	ABC10	1292797871, 1292797872	41854 bp
gXX_21	ABC11	1470960349, 1470960350	41507 bp
gXX_21	ABC12	1400785820, 1400963198	38346 bp
gXX_21	ABC9	1226869003, 1226869004	41595 bp
gXX_21	ABC10	1243625500, 1246383565	41406 bp
gXX_21	ABC7	977741313, 977741314	36127 bp
gXX_21	ABC11	1534708492, 1534708493	39969 bp
gXX_21	ABC11	1534665898, 1534665899	42849 bp
gXX_21	ABC8	1132341552, 1132341553	34389 bp
gXX_21	ABC11	1499085163, 1506225435	39817 bp

gXX_21	ABC10	1269098433, 1270556032	42108 bp
gXX_21	ABC10	1269015164, 1269015165	42109 bp
gXX_21	ABC8	1134973261, 1137192386	36555 bp
gXX_21	ABC8	1137289309, 1139141787	36531 bp
gXX_21	ABC12	1416922891, 1416922892	39943 bp
gXX_21	ABC12	1319038415, 1319038416	40376 bp
gXX_21	ABC9	1217903890, 1219453219	37593 bp
gXX_21	ABC12	1389660296, 1392425746	39440 bp
gXX_21	ABC12	1417698972, 1419667653	39553 bp
gXX_21	ABC12	1426995181, 1431676137	39541 bp
gXX_21	ABC10	1240656546, 1240656547	42987 bp
gXX_21	ABC12	1392994174, 1392994175	40190 bp
gXX_21	ABC12	1405981490, 1405981491	40170 bp
gXX_21	ABC9	1223707949, 1224943542	39607 bp
gXX_21	ABC9	1205491512, 1206411198	39587 bp
gXX_21	ABC11	1435852786, 1437031154	39304 bp
gXX_21	ABC11	1524133624, 1524133625	40820 bp
gXX_21	ABC8	1105289944, 1105917949	37233 bp
gXX_21	ABC9	1210457280, 1211876029	42285 bp
gXX_21	ABC12	1417038635, 1417719138	39399 bp
gXX_21	ABC12	1419790218, 1419790219	39384 bp
gXX_21	ABC7	1001546224, 1001546225	43825 bp
gXX_21	ABC8	1110036009, 1110036010	37683 bp
gXX_21	ABC8	1076217392, 1076217393	31286 bp
gXX_21	ABC10	1278486264, 1279920572	39962 bp
gXX_21	ABC10	1284005738, 1284005739	39937 bp
gXX_21	ABC8	981341571, 981341572	40250 bp
gXX_21	ABC9	1170856276, 1175809541	41215 bp
gXX_21	ABC8	1054386297, 1054386298	40529 bp
gXX_21	ABC10	1284077870, 1285292336	40416 bp
gXX_21	ABC8	1075680295, 1075680296	34560 bp
gXX_21	ABC9	1159683907, 1159683908	37936 bp
gXX_21	ABC12	1401252620, 1402600471	41027 bp
gXX_21	ABC12	1389089769, 1389320644	41027 bp
gXX_21	ABC10	1301416966, 1301928383	41460 bp
gXX_21	ABC12	1397761895, 1397761896	39500 bp
gXX_21	ABC12	1417898977, 1417898978	39836 bp
gXX_21	ABC12	1404582176, 1404582177	39817 bp
gXX_21	ABC12	1369192598, 1369192599	40412 bp
gXX_21	ABC10	1272279783, 1274090624	41364 bp
gXX_21	ABC9	1183965427, 1185742135	40050 bp
gXX_21	ABC8	981353201, 983222741	43842 bp
gXX_21	ABC12	1378253911, 1378622766	40613 bp
gXX_21	ABC12	1404578926, 1404578927	40644 bp
gXX_21	ABC11	1465915303, 1466581443	41001 bp
gXX_21	ABC7	978168416, 978168417	37250 bp
gXX_21	ABC7	978168320, 978168321	37249 bp
gXX_21	ABC12	1343976627, 1343976628	39863 bp

gXX_21	ABC11	1513040243, 1513040244	41445 bp
gXX_21	ABC11	1510141308, 1510415487	41440 bp
gXX_21	ABC11	1513075179, 1513420982	41438 bp

*: The trace archive end-sequence data for fosmid clones can be retrieved at the URL provided (<http://www.ncbi.nlm.nih.gov/Traces/trace.cgi?>) and entering the end-sequence accessions in the search window.

Supplementary Table S5: Summary of segmental duplication analysis in gap closing and extending sequences.

Chr	Gap	Status	Sequence Size	Segmentally duplicated region	Type
1	g01_48	Closed	16,503	0-16,000	Complex
2	g02_11	Closed	13,729	0-13,000	Complex
3	g03_04	Closed	26,497	0-21,527 21,627-21,753 21,754-26,497	Complex Complex Complex
1	g01_11a left end	Extension	32,421	0-32,000	Complex
2	g02_04 left end	Extension	37,150	8,000-20,000	Simple
2	g02_08 right end	Extension	38,712	7,000-38,000	Complex
4	g04_09 Left end	Extension	22,058	0 -22,000	Complex
4	g04_09 Right end	Extension	30,394	0-13,000	Complex
6	g06_02_Right end	Extension	32,340	3,000-12,751 12,919-32,000	Complex Complex
7	g07_01 Right end	Extension	223,365	16,000-26,000	Simple
7	g07_04 Left end	Extension	31,487	0-31,000	Complex
9	g09_35 Left end	Extension	16,706	0-16,000	Complex
9	g09_35a Right end	Extension	24,063	0-15,000	Complex
15	g15_02 Left end	Extension	27,275	0-27,071	Complex

Segmental duplication analysis of the 87 gap closing and extension sequences were carried out by the whole-genome-shotgun-sequence-detection strategy described earlier^{4, 24}. Only sequences identified to be part of segmentally duplicated regions are listed here.

Supplementary Table S6: Identification of spliced ESTs in sequences spanning or extending in to gaps.

Gap	Gap closed	Left Accession	Right Accession	Gap Sequence Accession	# similarity match regions	Spliced EST Accession	Gene	Blast X output
g02_08	No,	AC110080.2	AC009958.3	AC170164	2	CD686008.1	Human nasopharynx Homo sapiens cDNA, mRNA sequence	sp P04431 KV1W_HUMAN Ig kappa chain V-I region Walker precursor
g02_19	No,	AC141929.2	AC145517.3	AC157084	2	CF137999.1	Homo sapiens cDNA clone IMAGE:3095106 5', mRNA sequence	No hit
g02_20	Yes	AC144525.3	AC149644.1	AC174049	2	U70057.1	Soares infant brain 1NIB Homo sapiens cDNA clone 154359, mRNA sequence	Q8WVJ9 TWST2_HUMAN Twist-related protein 2 (Dermis expressed protein 1 (Dermo-1))
g03_01	No,	AC145425.5	AC092034.2	AC170165	2	BI822084.1	Homo sapiens cDNA clone IMAGE:5180870 5', mRNA sequence	No hit
g03_04	Yes	AC091633.22	AC069513.28	AC160857	2	DA427689.1	Homo sapiens cDNA clone COLON2003217 5', mRNA sequence	No hit
g06_08	No,	AL049612.11	AL603783.14	AC174061	3	BG389429.1	Homo sapiens cDNA clone IMAGE:4522564 5', mRNA sequence	No hit
g12_04	No,	AC087893.15	AC011596.27	AC174068	2	DA721647.1	Homo sapiens cDNA clone NT2RI3002158 5', mRNA sequence	No hit

Supplementary Table S7: Annotated human genes, mRNA, or spliced ESTs associated with gaps, wholly or partly closed in this study.

Gap	Closed	Left end Accession	Right end Accession	Chr #	Annotation	Accession
g01_28	Yes	AL604028.14	BX664740.3	1	Actin binding protein IPP	AK023880
g01_47	No	AL663102.4	AL732363.8	1	Homo sapiens NBPF1 mRNA	AY894575
g01_48	Yes	AL356957.27	AL109948.9	1	Isolated from testis library	DB069858
g02_01	Yes	AC144527.3	AC140476.2	2	Syntrophin 5	AJ003029
g02_12	No	AC139850.1	AC140485.3	2	FLJ00204 protein	AK074131
g02_14	No	AC092664.2	AC112229.4	2	MAL-like protein	AW172642
g02_18	No	AC105402.5	AC144611.2	2	Kinesin family member, 5C	BC002721
g02_19	No	AC141929.2	AC145517.3	2	SH2 containing Inositol 5-phosphatase (hSHIP)	U57650
g03_01	No	AC145425.5	AC092034.2	3	Putative mitochondrial carrier protein	AK092496
g03_04	Yes	AC091633.22	AC069513.28	3	Transmembrane mucin MUC20S	AB098731
g04_09	No	AC119752.3	AC119751.3	4	WS helix-loop-helix leucine zipper protein	AF056184
g08_02	No	AC145124.2	AC144830.2	8	Isolated from tongue, tumor tissues	AK091259
g09_44	Yes	AL683798.22	AL669970.10	9	Retinoid X receptor, alpha	BC063827
g10_01	Yes	BX276080.7	AL365356.13	10	Isolated from adenocarcinoma cell line	BG035368
g10_18	No	AL772134.16	BX470155.5	10	DOCK180 protein	D50857
g11_01	Yes	AADD01112371	AADC01095577	11	MUC5AC (mucin)	AF015521
g11_08	No	AADD01118406	AADD01118410	11	Expressed in testis	BX095394
g12_01	No	AC140077.17	AC094008.10	12	Human complement C1r mRNA	M14058
g12_04	No	AC087893.15	AC011596.27	12	SV2 related protein homolg	BC094722
g12_06	No	AC156455.1	AC145421.5	12	MondoA	AF312918
g12_07	Yes	AC073578.17	AC140063.13	12	Isolated from testis	AI200739
g15_01	No	AC126335.16	AC134980.3	15	Olfactory receptor 4D2	CD244436
g15_07	No	AC055876.16	AC127522.7	15	Isolated from Testis library	DB093754
g15_09	No	AC136704.9	AC048382.7	15	Hansenula MRAKII killer toxin-resistant protein 1 precursor	BX647899
g15_10	No	AC144834.2	AC144835.2	15	Isolated from brain	DA145170
g17_08	Yes	AC060780.18	AC109326.11	17	NBR1	AF227189
g17_11	No	AC145208.1	AC137723.5	17	Homo sapiens FKSG68 (FKSG68) mRNA	AF338196
g20_03	No	AL512784.6	AL450465.12	20	Disks large-associated protein 4 (membrane associated guanylate kinase)	AB023181
gxx_21	Yes	BX936347	BX936365	X	GDP dissociation inhibitor	AL833629