HSBC HOLDINGS PLC
Form 13F-HR
November 12, 2010

13F-HR
FORM 13F HR

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 13F

FORM 13F COVER PAGE

REPORT FOR THE CALENDAR YEAR OR QUARTER ENDED: 30 SEPTEMBER 2010

CHECK HERE IF AMENDMENT ( ); AMENDMENT NUMBER: 0
THIS AMENDMENT (CHECK ONLY ONE.): ( ) IS A RESTATEMENT.
( ) ADDS NEW HOLDINGS ENTRIES

INSTITUTIONAL INVESTMENT MANAGER FILING THIS REPORT:

NAME: HSBC HOLDINGS PLC
ADDRESS: 8 CANADA SQUARE, LONDON E14 5HQ

THE INSTITUTIONAL INVESTMENT MANAGER FILING THIS REPORT AND THE PERSON BY WHOM IT IS SIGNED HEREBY REPRESENT THAT THE PERSON SIGNING THE REPORT IS AUTHORIZED TO SUBMIT IT, THAT ALL INFORMATION CONTAINED HEREIN IS MATERIALLY TRUE, CORRECT AND COMPLETE, AND THAT IT IS UNDERSTOOD THAT ALL REQUIRED ITEMS, STATEMENTS, SCHEDULES, LISTS, AND TABLES, ARE CONSIDERED INTEGRAL PARTS OF THIS FORM.

PERSON SIGNING THIS REPORT ON BEHALF OF REPORTING MANAGER:

NAME: H. V. Taylor
TITLE: Head of Regulatory Reporting
PHONE: + 44 (0)20 7992 1234

SIGNATURE, PLACE, AND DATE OF SIGNING:

/s/ H.V.Taylor LONDON UK 12 Nov 2010

REPORT TYPE (CHECK ONLY ONE):

(X) 13F HOLDINGS REPORT

( ) 13F NOTICE

( ) 13F COMBINATION REPORT

LIST OF OTHER MANAGERS REPORTING FOR THIS MANAGER:

1. HSBC BANK USA N.A.

2. HSBC INVESTMENTS (HONG KONG) LTD
3. HSBC BANK PLC
4. HSBC HONG KONG TRUSTEE OPERATIONS
5. HSBC INVESTMENTS (UK) LTD
6. HSBC BANK CANADA
7. HSBC ASSET MANAGEMENT SINGAPORE LTD
8. HSBC ASSET MANAGEMENT (TAIWAN) LTD
9. BANK OF BERMUDA

I AM SIGNING THIS REPORT AS REQUIRED BY THE SECURITIES EXCHANGE ACT OF 1934.

FORM 13F SUMMARY PAGE

REPORT SUMMARY:

NUMBER OF OTHER INCLUDED MANAGERS: 9

FORM 13F INFORMATION TABLE ENTRY TOTAL: 6,776

FORM 13F INFORMATION TABLE VALUE TOTAL: $14,857,816

LIST OF OTHER INCLUDED MANAGERS:

1. HSBC BANK USA N.A.
2. HSBC INVESTMENTS (HONG KONG) LTD
3. HSBC BANK PLC
4. HSBC HONG KONG TRUSTEE OPERATIONS
5. HSBC INVESTMENTS (UK) LTD
6. HSBC BANK CANADA
7. HSBC ASSET MANAGEMENT (SINGAPORE) LTD
8. HSBC ASSET MANAGEMENT (TAIWAN) LTD
9. BANK OF BERMUDA

HSBC HOLDINGS PLC
REGULATION 13F REPORTING
REPORT DATE: 30-September-2010

NAME OF ISSUER	TITLE OF CLASS	CUSIP	FAIR MARKET VALUE(x1000)	SHARES PRINCIPAL A
ABB LTD	SPONSORED ADR	000375204	8	
ABB LTD	SPONSORED ADR	000375204	142	
ABB LTD	SPONSORED ADR	000375204	3,485	
ABB LTD	SPONSORED ADR	000375204	840	
AFLAC INC	COM	001055102	3,925	

AFLAC INC	COM	001055102	85
AFLAC INC	COM	001055102	6,190
AFLAC INC	COM	001055102	6
AFLAC INC	COM	001055102	888
AFLAC INC	COM	001055102	4,502
AGCO CORP	COM	001084102	188
AGCO CORP	COM	001084102	41
AGCO CORP	COM	001084102	89
AGCO CORP	COM	001084102	18
AGCO CORP	COM	001084102	9,358
AGCO CORP	COM	001084102	286
AGCO CORP	COM	001084102	3,628
AES CORP	COM	00130H105	1,116
AES CORP	COM	00130H105	31
AES CORP	COM	00130H105	89
AES CORP	COM	00130H105	4,592
AK STL HLDG CORP	COM	001547108	2
AK STL HLDG CORP	COM	001547108	73
AK STL HLDG CORP	COM	001547108	10,624
AMB PROPERTY CORP	COM	00163T109	43
AMB PROPERTY CORP	COM	00163T109	7
AMB PROPERTY CORP	COM	00163T109	10
AMB PROPERTY CORP	COM	00163T109	1
AMB PROPERTY CORP	COM	00163T109	1,189
AOL INC	COM	00184X105	1
AOL INC	COM	00184X105	3
AOL INC	COM	00184X105	1
AOL INC	COM	00184X105	1
AOL INC	COM	00184X105	1
AOL INC	COM	00184X105	2
AOL INC	COM	00184X105	0
AOL INC	COM	00184X105	3,404
AOL INC	COM	00184X105	8
AOL INC	COM	00184X105	54
AOL INC	COM	00184X105	31
AT&T INC	COM	00206R102	2,654
AT&T INC	COM	00206R102	947
AT&T INC	COM	00206R102	483
AT&T INC	COM	00206R102	614
AT&T INC	COM	00206R102	558
AT&T INC	COM	00206R102	19,539
AT&T INC	COM	00206R102	380
AT&T INC	COM	00206R102	1,885
AT&T INC	COM	00206R102	26
AT&T INC	COM	00206R102	1,410
AT&T INC	COM	00206R102	9
AT&T INC	COM	00206R102	117,214
AT&T INC	COM	00206R102	12,654
AT&T INC	COM	00206R102	9,070
AT&T INC	COM	00206R102	146
AT&T INC	COM	00206R102	704
ATA INC	SPONS ADR	00211V106	8,165
AU OPTRONICS CORP	SPONSORED ADR	002255107	385
AU OPTRONICS CORP	SPONSORED ADR	002255107	12
AU OPTRONICS CORP	SPONSORED ADR	002255107	52
AU OPTRONICS CORP	SPONSORED ADR	002255107	517
AU OPTRONICS CORP	SPONSORED ADR	002255107	1,911
AVX CORP NEW	COM	002444107	323
AXT INC	COM	00246W103	132
AARONS INC	COM	002535201	3
AARONS INC	COM	002535201	43
AARONS INC	COM	002535201	1,212

ABBOTT LABS	COM	002824100	966
ABBOTT LABS	COM	002824100	157
ABBOTT LABS	COM	002824100	567
ABBOTT LABS	COM	002824100	9
ABBOTT LABS	COM	002824100	10,266
ABBOTT LABS	COM	002824100	258
ABBOTT LABS	COM	002824100	10,424
ABBOTT LABS	COM	002824100	263
ABBOTT LABS	COM	002824100	931
ABBOTT LABS	COM	002824100	54
ABBOTT LABS	COM	002824100	231
ABBOTT LABS	COM	002824100	26,420
ABBOTT LABS	COM	002824100	11,949
ABBOTT LABS	COM	002824100	3,423
ABBOTT LABS	COM	002824100	42
ABERCROMBIE & FITCH CO	CL A	002896207	4
ABERCROMBIE & FITCH CO	CL A	002896207	606
ABERCROMBIE & FITCH CO	CL A	002896207	37
ABERCROMBIE & FITCH CO	CL A	002896207	20
ABERCROMBIE & FITCH CO	CL A	002896207	103
ABERCROMBIE & FITCH CO	CL A	002896207	2
ABERDEEN EMERG MKTS TELECOMM	COM	00301T102	186
ABERDEEN LATIN AMER EQTY FD	COM	00306K106	428
ABRAXIS BIOSCIENCE INC NEW	COM	00383Y102	97
ABRAXIS BIOSCIENCE INC NEW	COM	00383Y102	325
ACERGY S A	SPONSORED ADR	00443E104	709
ACERGY S A	SPONSORED ADR	00443E104	369
ACTIVIDENTITY CORP	COM	00506P103	44
ACTIVISION BLIZZARD INC	COM	00507V109	97
ACTIVISION BLIZZARD INC	COM	00507V109	54
ACTIVISION BLIZZARD INC	COM	00507V109	22
ACTIVISION BLIZZARD INC	COM	00507V109	271
ACTIVISION BLIZZARD INC	COM	00507V109	233
ACTIVISION BLIZZARD INC	COM	00507V109	668
ACTUANT CORP	CL A NEW	00508X203	40
ACTUANT CORP	CL A NEW	00508X203	306
ACUITY BRANDS INC	COM	00508Y102	588
ADAMS EXPRESS CO	COM	006212104	6,530
ADOBE SYS INC	COM	00724F101	26
ADOBE SYS INC	COM	00724F101	1,201
ADOBE SYS INC	COM	00724F101	5
ADOBE SYS INC	COM	00724F101	212
ADOBE SYS INC	COM	00724F101	6,179
ADOBE SYS INC	COM	00724F101	200
ADOBE SYS INC	COM	00724F101	964
ADVANCE AUTO PARTS INC	COM	00751Y106	16
ADVANCE AUTO PARTS INC	COM	00751Y106	40
ADVANCE AUTO PARTS INC	COM	00751Y106	50
ADVANCE AUTO PARTS INC	COM	00751Y106	11
ADVANCE AUTO PARTS INC	COM	00751Y106	298
ADVANCE AUTO PARTS INC	COM	00751Y106	1
ADVANCED SEMICONDUCTOR ENGR	SPONSORED ADR	00756M404	384
ADVANCED SEMICONDUCTOR ENGR	SPONSORED ADR	00756M404	0
AECOM TECHNOLOGY CORP DELAWA	COM	00766T100	42
AECOM TECHNOLOGY CORP DELAWA	COM	00766T100	25
AECOM TECHNOLOGY CORP DELAWA	COM	00766T100	91
AECOM TECHNOLOGY CORP DELAWA	COM	00766T100	19
AECOM TECHNOLOGY CORP DELAWA	COM	00766T100	4,458
AECOM TECHNOLOGY CORP DELAWA	COM	00766T100	417
AECOM TECHNOLOGY CORP DELAWA	COM	00766T100	492
ADVANSOURCE BIOMATERIALS COR	COM	00767T109	3
AEROPOSTALE	COM	007865108	22

AEROPOSTALE	COM	007865108	0
AEROPOSTALE	COM	007865108	251
ADVANCED MICRO DEVICES INC	COM	007903107	71
ADVANCED MICRO DEVICES INC	COM	007903107	816
ADVANCED MICRO DEVICES INC	COM	007903107	24
ADVANCED MICRO DEVICES INC	COM	007903107	29
ADVANCED MICRO DEVICES INC	COM	007903107	14
ADVANCED MICRO DEVICES INC	COM	007903107	274
ADVANCED MICRO DEVICES INC	COM	007903107	1,939
AEGON N V	NY REGISTRY SH	007924103	116
AEGON N V	NY REGISTRY SH	007924103	44
AETNA INC NEW	COM	00817Y108	98
AETNA INC NEW	COM	00817Y108	1,318
AETNA INC NEW	COM	00817Y108	369
AETNA INC NEW	COM	00817Y108	697
AETNA INC NEW	COM	00817Y108	43
AFFYMETRIX INC	COM	00826T108	56
AFFYMETRIX INC	NOTE 3.500% 1/1	00826TAG3	3,278
AGILENT TECHNOLOGIES INC	COM	00846U101	40
AGILENT TECHNOLOGIES INC	COM	00846U101	17
AGILENT TECHNOLOGIES INC	COM	00846U101	738
AGILENT TECHNOLOGIES INC	COM	00846U101	83
AGILENT TECHNOLOGIES INC	COM	00846U101	3
AGILENT TECHNOLOGIES INC	COM	00846U101	461
AGILENT TECHNOLOGIES INC	COM	00846U101	1,488
AGNICO EAGLE MINES LTD	COM	008474108	1,545
AGNICO EAGLE MINES LTD	COM	008474108	1,817
AGNICO EAGLE MINES LTD	COM	008474108	0
AGNICO EAGLE MINES LTD	COM	008474108	28
AGRIUM INC	COM	008916108	225
AGRIUM INC	COM	008916108	69
AGRIUM INC	COM	008916108	5,475
AGRIUM INC	COM	008916108	210
AGRIUM INC	COM	008916108	5,978
AGRIUM INC	COM	008916108	3,750
AIR METHODS CORP	COM PAR $.06	009128307	249
AIR PRODS & CHEMS INC	COM	009158106	22
AIR PRODS & CHEMS INC	COM	009158106	1,475
AIR PRODS & CHEMS INC	COM	009158106	82
AIR PRODS & CHEMS INC	COM	009158106	17
AIR PRODS & CHEMS INC	COM	009158106	1,187
AIR PRODS & CHEMS INC	COM	009158106	2
AIR PRODS & CHEMS INC	COM	009158106	2,696
AIRGAS INC	COM	009363102	332
AIRGAS INC	COM	009363102	1
AKAMAI TECHNOLOGIES INC	COM	00971T101	763
AKAMAI TECHNOLOGIES INC	COM	00971T101	41
AKAMAI TECHNOLOGIES INC	COM	00971T101	568
AKAMAI TECHNOLOGIES INC	COM	00971T101	80
AKAMAI TECHNOLOGIES INC	COM	00971T101	1,015
AKAMAI TECHNOLOGIES INC	COM	00971T101	50
AKAMAI TECHNOLOGIES INC	COM	00971T101	403
AKAMAI TECHNOLOGIES INC	COM	00971T101	984
ALBANY INTL CORP	CL A	012348108	1,060
ALBEMARLE CORP	COM	012653101	56
ALBEMARLE CORP	COM	012653101	27
ALBEMARLE CORP	COM	012653101	399
ALBEMARLE CORP	COM	012653101	1,903
ALBERTO CULVER CO NEW	COM	013078100	1,236
ALCOA INC	COM	013817101	24
ALCOA INC	COM	013817101	795
ALCOA INC	COM	013817101	297

ALCOA INC	COM	013817101	621
ALCOA INC	COM	013817101	2
ALCOA INC	COM	013817101	9,905
ALCOA INC	COM	013817101	759
ALCATEL-LUCENT	SPONSORED ADR	013904305	46
ALCATEL-LUCENT	SPONSORED ADR	013904305	0
ALCATEL-LUCENT	SPONSORED ADR	013904305	125
ALCATEL-LUCENT	SPONSORED ADR	013904305	19
ALCATEL-LUCENT	SPONSORED ADR	013904305	34
ALCATEL-LUCENT	SPONSORED ADR	013904305	1
ALCATEL-LUCENT	SPONSORED ADR	013904305	0
ALERE INC	COM	01449J105	3
ALERE INC	COM	01449J105	251
ALERE INC	COM	01449J105	3
ALEXANDRIA REAL ESTATE EQ IN	COM	015271109	9
ALEXANDRIA REAL ESTATE EQ IN	COM	015271109	370
ALEXION PHARMACEUTICALS INC	COM	015351109	129
ALEXION PHARMACEUTICALS INC	COM	015351109	186
ALLEGHENY ENERGY INC	COM	017361106	261
ALLEGHENY ENERGY INC	COM	017361106	52
ALLEGHENY TECHNOLOGIES INC	COM	01741R102	967
ALLEGHENY TECHNOLOGIES INC	COM	01741R102	10
ALLEGHENY TECHNOLOGIES INC	COM	01741R102	3
ALLEGHENY TECHNOLOGIES INC	COM	01741R102	224
ALLEGHENY TECHNOLOGIES INC	COM	01741R102	627
ALLERGAN INC	COM	018490102	1,716
ALLERGAN INC	COM	018490102	752
ALLERGAN INC	COM	018490102	1,271
ALLERGAN INC	COM	018490102	506
ALLERGAN INC	COM	018490102	654
ALLERGAN INC	COM	018490102	1,694
ALLERGAN INC	COM	018490102	116
ALLERGAN INC	COM	018490102	42
ALLERGAN INC	COM	018490102	33
ALLERGAN INC	COM	018490102	5
ALLERGAN INC	COM	018490102	671
ALLERGAN INC	COM	018490102	1,768
ALLIANCE DATA SYSTEMS CORP	COM	018581108	30
ALLIANCE DATA SYSTEMS CORP	COM	018581108	1
ALLIANCE DATA SYSTEMS CORP	COM	018581108	1,492
ALLIANT ENERGY CORP	COM	018802108	43
ALLIANT ENERGY CORP	COM	018802108	503
ALLIANT ENERGY CORP	COM	018802108	97
ALLIANT TECHSYSTEMS INC	COM	018804104	5,418
ALLIED NEVADA GOLD CORP	COM	019344100	27
ALLIED NEVADA GOLD CORP	COM	019344100	203
ALLSCRIPTS HEALTHCARE SOLUTN	COM	01988P108	17
ALLSCRIPTS HEALTHCARE SOLUTN	COM	01988P108	119
ALLSCRIPTS HEALTHCARE SOLUTN	COM	01988P108	67
ALLSCRIPTS HEALTHCARE SOLUTN	COM	01988P108	74
ALLSTATE CORP	COM	020002101	14
ALLSTATE CORP	COM	020002101	2,015
ALLSTATE CORP	COM	020002101	29
ALLSTATE CORP	COM	020002101	28
ALLSTATE CORP	COM	020002101	4
ALLSTATE CORP	COM	020002101	2,705
ALPHA NATURAL RESOURCES INC	COM	02076X102	14
ALPHA NATURAL RESOURCES INC	COM	02076X102	48
ALPHA NATURAL RESOURCES INC	COM	02076X102	34
ALPHA NATURAL RESOURCES INC	COM	02076X102	62
ALPHA NATURAL RESOURCES INC	COM	02076X102	518
ALPHA NATURAL RESOURCES INC	COM	02076X102	424

ALTERA CORP	COM	021441100	232
ALTERA CORP	COM	021441100	1,078
ALTERA CORP	COM	021441100	91
ALTERA CORP	COM	021441100	12
ALTERA CORP	COM	021441100	2
ALTERA CORP	COM	021441100	1,858
ALTRIA GROUP INC	COM	02209S103	2,822
ALTRIA GROUP INC	COM	02209S103	86
ALTRIA GROUP INC	COM	02209S103	1,405
ALTRIA GROUP INC	COM	02209S103	1,025
ALTRIA GROUP INC	COM	02209S103	48
ALTRIA GROUP INC	COM	02209S103	6,841
ALTRIA GROUP INC	COM	02209S103	8
ALTRIA GROUP INC	COM	02209S103	1,733
ALTRIA GROUP INC	COM	02209S103	5,199
ALTRIA GROUP INC	COM	02209S103	77,852
ALTRIA GROUP INC	COM	02209S103	144
ALTRIA GROUP INC	COM	02209S103	503
ALTRIA GROUP INC	COM	02209S103	9,197
ALTRIA GROUP INC	COM	02209S103	3,670
ALTRIA GROUP INC	COM	02209S103	2,753
AMAZON COM INC	COM	023135106	4,194
AMAZON COM INC	COM	023135106	503
AMAZON COM INC	COM	023135106	188
AMAZON COM INC	COM	023135106	4,852
AMAZON COM INC	COM	023135106	187
AMAZON COM INC	COM	023135106	21
AMAZON COM INC	COM	023135106	985
AMAZON COM INC	COM	023135106	455
AMAZON COM INC	COM	023135106	19
AMAZON COM INC	COM	023135106	126
AMAZON COM INC	COM	023135106	2,370
AMAZON COM INC	COM	023135106	5,544
AMBAC FINL GROUP INC	COM	023139108	27
AMEREN CORP	COM	023608102	15
AMEREN CORP	COM	023608102	1,567
AMEREN CORP	COM	023608102	198
AMEREN CORP	COM	023608102	548
AMEREN CORP	COM	023608102	2,275
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	599
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	69
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	19
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	220
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	674
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	126
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	3,194
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	10
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	2,169
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	163
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	443
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	100
AMERICA MOVIL SAB DE CV	SPON ADR L SHS	02364W105	640
AMERICAN CAP LTD	COM	02503Y103	302
AMERICAN DAIRY INC	COM	025334103	293
AMERICAN ELEC PWR INC	COM	025537101	558
AMERICAN ELEC PWR INC	COM	025537101	2,034
AMERICAN ELEC PWR INC	COM	025537101	1,848
AMERICAN ELEC PWR INC	COM	025537101	1,335
AMERICAN ELEC PWR INC	COM	025537101	1,023
AMERICAN ELEC PWR INC	COM	025537101	7,448
AMERICAN EAGLE OUTFITTERS NE	COM	02553E106	35
AMERICAN EAGLE OUTFITTERS NE	COM	02553E106	10

AMERICAN EAGLE OUTFITTERS NE	COM	02553E106	1
AMERICAN EAGLE OUTFITTERS NE	COM	02553E106	435
AMERICAN EXPRESS CO	COM	025816109	1,072
AMERICAN EXPRESS CO	COM	025816109	436
AMERICAN EXPRESS CO	COM	025816109	5,623
AMERICAN EXPRESS CO	COM	025816109	16
AMERICAN EXPRESS CO	COM	025816109	6,265
AMERICAN EXPRESS CO	COM	025816109	118
AMERICAN EXPRESS CO	COM	025816109	126
AMERICAN EXPRESS CO	COM	025816109	12
AMERICAN EXPRESS CO	COM	025816109	5,424
AMERICAN EXPRESS CO	COM	025816109	1,455
AMERICAN EXPRESS CO	COM	025816109	11,423
AMERICAN EXPRESS CO	COM	025816109	14
AMERICAN INTL GROUP INC	COM NEW	026874784	118
AMERICAN INTL GROUP INC	COM NEW	026874784	345
AMERICAN INTL GROUP INC	COM NEW	026874784	2
AMERICAN INTL GROUP INC	COM NEW	026874784	313
AMERICAN INTL GROUP INC	COM NEW	026874784	0
AMERICAN INTL GROUP INC	COM NEW	026874784	16
AMERICAN INTL GROUP INC	COM NEW	026874784	133
AMERICAN INTL GROUP INC	COM NEW	026874784	1,632
AMERICAN INTL GROUP INC	COM NEW	026874784	12
AMERICAN INTL GROUP INC	COM NEW	026874784	185
AMERICAN TOWER CORP	CL A	029912201	1,128
AMERICAN TOWER CORP	CL A	029912201	46
AMERICAN TOWER CORP	CL A	029912201	318
AMERICAN TOWER CORP	CL A	029912201	31
AMERICAN TOWER CORP	CL A	029912201	1,789
AMERICAN TOWER CORP	CL A	029912201	83
AMERICAN TOWER CORP	CL A	029912201	38
AMERICAN TOWER CORP	CL A	029912201	256
AMERICAN TOWER CORP	CL A	029912201	326
AMERICAN TOWER CORP	CL A	029912201	236
AMERICAN TOWER CORP	CL A	029912201	12,636
AMERICAN SUPERCONDUCTOR CORP	COM	030111108	13
AMERICAN SUPERCONDUCTOR CORP	COM	030111108	1,400
AMERICAN WTR WKS CO INC NEW	COM	030420103	45
AMERICAN WTR WKS CO INC NEW	COM	030420103	26
AMERICAN WTR WKS CO INC NEW	COM	030420103	5,496
AMERICAN WTR WKS CO INC NEW	COM	030420103	419
AMERICREDIT CORP	COM	03060R101	10,161
AMERISOURCEBERGEN CORP	COM	03073E105	81
AMERISOURCEBERGEN CORP	COM	03073E105	1,724
AMERISOURCEBERGEN CORP	COM	03073E105	161
AMERISOURCEBERGEN CORP	COM	03073E105	193
AMERISOURCEBERGEN CORP	COM	03073E105	9,852
AMERISOURCEBERGEN CORP	COM	03073E105	6
AMERISOURCEBERGEN CORP	COM	03073E105	2,496
AMERIGROUP CORP	COM	03073T102	4
AMERIGROUP CORP	COM	03073T102	24,384
AMERIPRISE FINL INC	COM	03076C106	1,237
AMERIPRISE FINL INC	COM	03076C106	61
AMERIPRISE FINL INC	COM	03076C106	95
AMERIPRISE FINL INC	COM	03076C106	2,169
AMERIPRISE FINL INC	COM	03076C106	166
AMERIPRISE FINL INC	COM	03076C106	45
AMERIPRISE FINL INC	COM	03076C106	134
AMERIPRISE FINL INC	COM	03076C106	3
AMERIPRISE FINL INC	COM	03076C106	549
AMERIPRISE FINL INC	COM	03076C106	4,496
AMERIPRISE FINL INC	COM	03076C106	369

AMERIPRISE FINL INC	COM	03076C106	4,381
AMGEN INC	COM	031162100	474
AMGEN INC	COM	031162100	215
AMGEN INC	COM	031162100	820
AMGEN INC	COM	031162100	6,311
AMGEN INC	COM	031162100	85
AMGEN INC	COM	031162100	4,535
AMGEN INC	COM	031162100	556
AMGEN INC	COM	031162100	1,414
AMGEN INC	COM	031162100	3,263
AMGEN INC	COM	031162100	1,093
AMGEN INC	COM	031162100	9,117
AMGEN INC	COM	031162100	2,389
AMGEN INC	COM	031162100	1,724
AMPHENOL CORP NEW	CL A	032095101	529
AMPHENOL CORP NEW	CL A	032095101	112
AMPHENOL CORP NEW	CL A	032095101	16
AMPHENOL CORP NEW	CL A	032095101	196
AMPHENOL CORP NEW	CL A	032095101	10,830
AMPHENOL CORP NEW	CL A	032095101	653
AMPHENOL CORP NEW	CL A	032095101	3,474
ANADARKO PETE CORP	COM	032511107	119
ANADARKO PETE CORP	COM	032511107	2,457
ANADARKO PETE CORP	COM	032511107	84
ANADARKO PETE CORP	COM	032511107	103
ANADARKO PETE CORP	COM	032511107	220
ANADARKO PETE CORP	COM	032511107	665
ANADARKO PETE CORP	COM	032511107	544
ANADARKO PETE CORP	COM	032511107	71
ANALOG DEVICES INC	COM	032654105	86
ANALOG DEVICES INC	COM	032654105	1,069
ANALOG DEVICES INC	COM	032654105	2
ANALOG DEVICES INC	COM	032654105	11
ANHEUSER BUSCH INBEV SA/NV	SPONSORED ADR	03524A108	14
ANHEUSER BUSCH INBEV SA/NV	SPONSORED ADR	03524A108	21
ANHEUSER BUSCH INBEV SA/NV	SPONSORED ADR	03524A108	71
ANHEUSER BUSCH INBEV SA/NV	SPONSORED ADR	03524A108	392
ANIXTER INTL INC	COM	035290105	25,424
ANNALY CAP MGMT INC	COM	035710409	88
ANNALY CAP MGMT INC	COM	035710409	25
ANNALY CAP MGMT INC	COM	035710409	35
ANNALY CAP MGMT INC	COM	035710409	451
ANNALY CAP MGMT INC	COM	035710409	6
ANNALY CAP MGMT INC	COM	035710409	67
ANNALY CAP MGMT INC	COM	035710409	2
ANNALY CAP MGMT INC	COM	035710409	2,756
ANNALY CAP MGMT INC	COM	035710409	1,028
AON CORP	COM	037389103	45
AON CORP	COM	037389103	1,330
AON CORP	COM	037389103	89
AON CORP	COM	037389103	3
AON CORP	COM	037389103	43
AON CORP	COM	037389103	3,313
AON CORP	COM	037389103	1,445
APACHE CORP	COM	037411105	1,516
APACHE CORP	COM	037411105	162
APACHE CORP	COM	037411105	27
APACHE CORP	COM	037411105	19
APACHE CORP	COM	037411105	5,546
APACHE CORP	COM	037411105	168
APACHE CORP	COM	037411105	1,372
APACHE CORP	COM	037411105	2,053

APACHE CORP	COM	037411105	321
APACHE CORP	COM	037411105	110
APACHE CORP	COM	037411105	794
APACHE CORP	COM	037411105	16,423
APACHE CORP	COM	037411105	3,826
APACHE CORP	COM	037411105	9,690
APOLLO GROUP INC	CL A	037604105	409
APOLLO GROUP INC	CL A	037604105	7
APOLLO GROUP INC	CL A	037604105	168
APOLLO GROUP INC	CL A	037604105	12,814
APOLLO GROUP INC	CL A	037604105	1,458
APOLLO INVT CORP	COM	03761U106	25
APOLLO INVT CORP	COM	03761U106	336
APPLE INC	COM	037833100	568
APPLE INC	COM	037833100	8,527
APPLE INC	COM	037833100	2,780
APPLE INC	COM	037833100	4,028
APPLE INC	COM	037833100	287
APPLE INC	COM	037833100	199
APPLE INC	COM	037833100	9,499
APPLE INC	COM	037833100	1,134
APPLE INC	COM	037833100	29,888
APPLE INC	COM	037833100	633
APPLE INC	COM	037833100	1,917
APPLE INC	COM	037833100	1,218
APPLE INC	COM	037833100	27,414
APPLE INC	COM	037833100	3,328
APPLE INC	COM	037833100	72
APPLE INC	COM	037833100	74,331
APPLE INC	COM	037833100	519
APPLE INC	COM	037833100	25,129
APPLE INC	COM	037833100	25,830
APPLE INC	COM	037833100	5,167
APPLE INC	COM	037833100	11,436
APPLIED MATLS INC	COM	038222105	2,085
APPLIED MATLS INC	COM	038222105	162
APPLIED MATLS INC	COM	038222105	129
APPLIED MATLS INC	COM	038222105	1,212
APPLIED MATLS INC	COM	038222105	12
APPLIED MATLS INC	COM	038222105	130
APPLIED MATLS INC	COM	038222105	27
APPLIED MATLS INC	COM	038222105	1,133
APPLIED MATLS INC	COM	038222105	4,511
APPLIED MATLS INC	COM	038222105	0
APPLIED MATLS INC	COM	038222105	32,384
APPLIED MATLS INC	COM	038222105	222
APPLIED MATLS INC	COM	038222105	2,494
AQUA AMERICA INC	COM	03836W103	1,142
AQUA AMERICA INC	COM	03836W103	364
ARCH COAL INC	COM	039380100	42
ARCH COAL INC	COM	039380100	12,419
ARCELORMITTAL SA LUXEMBOURG	NY REGISTRY SH	03938L104	231
ARCELORMITTAL SA LUXEMBOURG	NY REGISTRY SH	03938L104	9
ARCELORMITTAL SA LUXEMBOURG	NY REGISTRY SH	03938L104	841
ARCELORMITTAL SA LUXEMBOURG	NY REGISTRY SH	03938L104	245
ARCHER DANIELS MIDLAND CO	COM	039483102	3,016
ARCHER DANIELS MIDLAND CO	COM	039483102	575
ARCHER DANIELS MIDLAND CO	COM	039483102	559
ARCHER DANIELS MIDLAND CO	COM	039483102	1,861
ARCHER DANIELS MIDLAND CO	COM	039483102	575
ARCHER DANIELS MIDLAND CO	COM	039483102	236
ARCHER DANIELS MIDLAND CO	COM	039483102	118

ARCHER DANIELS MIDLAND CO	COM	039483102	2,139
ARCHER DANIELS MIDLAND CO	COM	039483102	0
ARCHER DANIELS MIDLAND CO	COM	039483102	236
ARCHER DANIELS MIDLAND CO	COM	039483102	452
ARCHER DANIELS MIDLAND CO	COM	039483102	1,851
ARCHER DANIELS MIDLAND CO	COM	039483102	718
ARCHER DANIELS MIDLAND CO	COM	039483102	7,213
ARCHER DANIELS MIDLAND CO	COM	039483102	15
ARCHER DANIELS MIDLAND CO	COM	039483102	7,299
ARCHER DANIELS MIDLAND CO	COM	039483102	129
ARCHER DANIELS MIDLAND CO	UNIT 99/99/9999	039483201	343
ARCSIGHT INC	COM	039666102	541
ARES CAP CORP	COM	04010L103	5
ARES CAP CORP	COM	04010L103	55
ARES CAP CORP	COM	04010L103	716
ARES CAP CORP	COM	04010L103	128
ARM HLDGS PLC	SPONSORED ADR	042068106	79
ARM HLDGS PLC	SPONSORED ADR	042068106	43
ARM HLDGS PLC	SPONSORED ADR	042068106	304
ARMSTRONG WORLD INDS INC NEW	COM	04247X102	902
ARRIS GROUP INC	COM	04269Q100	3
ARRIS GROUP INC	COM	04269Q100	671
ASHLAND INC NEW	COM	044209104	561
ASHLAND INC NEW	COM	044209104	219
ASHLAND INC NEW	COM	044209104	1
ASIA TIGERS FD INC	COM	04516T105	252
ASIAINFO-LINKAGE INC	COM	04518A104	395
ASIAINFO-LINKAGE INC	COM	04518A104	724
ASIAINFO-LINKAGE INC	COM	04518A104	395
ASSURANT INC	COM	04621X108	1,284
ASSURANT INC	COM	04621X108	5,869
ASSURANT INC	COM	04621X108	177
ASSURANT INC	COM	04621X108	1
ASSURANT INC	COM	04621X108	61
ASTRAZENECA PLC	SPONSORED ADR	046353108	487
ASTRAZENECA PLC	SPONSORED ADR	046353108	41
ASTRAZENECA PLC	SPONSORED ADR	046353108	237
ASTRAZENECA PLC	SPONSORED ADR	046353108	51
ASTRAZENECA PLC	SPONSORED ADR	046353108	904
ASTRAZENECA PLC	SPONSORED ADR	046353108	3
ASTRAZENECA PLC	SPONSORED ADR	046353108	948
ASTRAZENECA PLC	SPONSORED ADR	046353108	35
ATHEROS COMMUNICATIONS INC	COM	04743P108	4,971
ATLANTIC PWR CORP	COM NEW	04878Q863	156
ATLAS ENERGY INC	COM	049298102	4,883
ATLAS ENERGY INC	COM	049298102	341
ATMEL CORP	COM	049513104	111
ATMEL CORP	COM	049513104	159
ATWOOD OCEANICS INC	COM	050095108	77
ATWOOD OCEANICS INC	COM	050095108	454
ATWOOD OCEANICS INC	COM	050095108	405
AUTODESK INC	COM	052769106	453
AUTODESK INC	COM	052769106	56
AUTODESK INC	COM	052769106	17
AUTODESK INC	COM	052769106	96
AUTODESK INC	COM	052769106	2
AUTODESK INC	COM	052769106	164
AUTODESK INC	COM	052769106	3,226
AUTOMATIC DATA PROCESSING IN	COM	053015103	505
AUTOMATIC DATA PROCESSING IN	COM	053015103	80
AUTOMATIC DATA PROCESSING IN	COM	053015103	2,168
AUTOMATIC DATA PROCESSING IN	COM	053015103	2,024

AUTOMATIC DATA PROCESSING IN	COM	053015103	276
AUTOMATIC DATA PROCESSING IN	COM	053015103	0
AUTOMATIC DATA PROCESSING IN	COM	053015103	10,136
AUTOMATIC DATA PROCESSING IN	COM	053015103	133
AUTOMATIC DATA PROCESSING IN	COM	053015103	11,558
AUTOMATIC DATA PROCESSING IN	COM	053015103	153
AUTOZONE INC	COM	053332102	1,154
AUTOZONE INC	COM	053332102	102
AUTOZONE INC	COM	053332102	2
AUTOZONE INC	COM	053332102	8
AUTOZONE INC	COM	053332102	2,981
AVALONBAY CMNTYS INC	COM	053484101	562
AVALONBAY CMNTYS INC	COM	053484101	8
AVALONBAY CMNTYS INC	COM	053484101	2
AVALONBAY CMNTYS INC	COM	053484101	2
AVALONBAY CMNTYS INC	COM	053484101	1,889
AVERY DENNISON CORP	COM	053611109	252
AVERY DENNISON CORP	COM	053611109	4
AVERY DENNISON CORP	COM	053611109	1,375
AVNET INC	COM	053807103	456
AVNET INC	COM	053807103	5
AVNET INC	COM	053807103	45
AVIVA PLC	ADR	05382A104	3
AVIVA PLC	ADR	05382A104	34
AVIVA PLC	ADR	05382A104	127
AVON PRODS INC	COM	054303102	42
AVON PRODS INC	COM	054303102	6
AVON PRODS INC	COM	054303102	40
AVON PRODS INC	COM	054303102	873
AVON PRODS INC	COM	054303102	100
AVON PRODS INC	COM	054303102	21
AVON PRODS INC	COM	054303102	322
AVON PRODS INC	COM	054303102	525
AVON PRODS INC	COM	054303102	535
AVON PRODS INC	COM	054303102	2,891
BB&T CORP	COM	054937107	467
BB&T CORP	COM	054937107	118
BB&T CORP	COM	054937107	45
BB&T CORP	COM	054937107	20
BB&T CORP	COM	054937107	1,400
BB&T CORP	COM	054937107	6
BB&T CORP	COM	054937107	338
BB&T CORP	COM	054937107	354
BB&T CORP	COM	054937107	4
BB&T CORP	COM	054937107	121
BCE INC	COM NEW	05534B760	10
BCE INC	COM NEW	05534B760	5,458
BCE INC	COM NEW	05534B760	101
BCE INC	COM NEW	05534B760	1,147
BCE INC	COM NEW	05534B760	9
BHP BILLITON PLC	SPONSORED ADR	05545E209	130
BHP BILLITON PLC	SPONSORED ADR	05545E209	147
BP PLC	SPONSORED ADR	055622104	166
BP PLC	SPONSORED ADR	055622104	1,300
BP PLC	SPONSORED ADR	055622104	268
BP PLC	SPONSORED ADR	055622104	53
BP PLC	SPONSORED ADR	055622104	704
BP PLC	SPONSORED ADR	055622104	282
BP PLC	SPONSORED ADR	055622104	2,946
BMC SOFTWARE INC	COM	055921100	1,491
BMC SOFTWARE INC	COM	055921100	232
BMC SOFTWARE INC	COM	055921100	2

BMC SOFTWARE INC	COM	055921100	67
BMC SOFTWARE INC	COM	055921100	3,651
BABCOCK & WILCOX CO NEW	COM	05615F102	6
BABCOCK & WILCOX CO NEW	COM	05615F102	106
BABCOCK & WILCOX CO NEW	COM	05615F102	269
BABCOCK & WILCOX CO NEW	COM	05615F102	1
BABCOCK & WILCOX CO NEW	COM	05615F102	59
BAIDU INC	SPON ADR REP A	056752108	567
BAIDU INC	SPON ADR REP A	056752108	410
BAIDU INC	SPON ADR REP A	056752108	302
BAIDU INC	SPON ADR REP A	056752108	534
BAIDU INC	SPON ADR REP A	056752108	232
BAIDU INC	SPON ADR REP A	056752108	2,802
BAKER HUGHES INC	COM	057224107	558
BAKER HUGHES INC	COM	057224107	1,483
BAKER HUGHES INC	COM	057224107	107
BAKER HUGHES INC	COM	057224107	203
BAKER HUGHES INC	COM	057224107	54
BALDOR ELEC CO	COM	057741100	429
BALL CORP	COM	058498106	1,302
BALL CORP	COM	058498106	52
BALL CORP	COM	058498106	108
BALL CORP	COM	058498106	1,005
BALL CORP	COM	058498106	970
BALLY TECHNOLOGIES INC	COM	05874B107	5
BALLY TECHNOLOGIES INC	COM	05874B107	15
BALLY TECHNOLOGIES INC	COM	05874B107	35
BALLY TECHNOLOGIES INC	COM	05874B107	7,128
BALLY TECHNOLOGIES INC	COM	05874B107	57
BANCO BRADESCO S A	SP ADR PFD NEW	059460303	25
BANCO BRADESCO S A	SP ADR PFD NEW	059460303	607
BANCO BRADESCO S A	SP ADR PFD NEW	059460303	14
BANCO BRADESCO S A	SP ADR PFD NEW	059460303	2,373
BANCO BRADESCO S A	SP ADR PFD NEW	059460303	1,500
BANCO BRADESCO S A	SP ADR PFD NEW	059460303	2,293
BANCO BRADESCO S A	SP ADR PFD NEW	059460303	105
BANCO SANTANDER SA	ADR	05964H105	79
BANCO SANTANDER SA	ADR	05964H105	12
BANCO SANTANDER SA	ADR	05964H105	3,690
BANCO SANTANDER SA	ADR	05964H105	262
BANK OF AMERICA CORPORATION	COM	060505104	1,152
BANK OF AMERICA CORPORATION	COM	060505104	296
BANK OF AMERICA CORPORATION	COM	060505104	76
BANK OF AMERICA CORPORATION	COM	060505104	2,512
BANK OF AMERICA CORPORATION	COM	060505104	2,481
BANK OF AMERICA CORPORATION	COM	060505104	14,213
BANK OF AMERICA CORPORATION	COM	060505104	325
BANK OF AMERICA CORPORATION	COM	060505104	1,343
BANK OF AMERICA CORPORATION	COM	060505104	5
BANK OF AMERICA CORPORATION	COM	060505104	1,580
BANK OF AMERICA CORPORATION	COM	060505104	1
BANK OF AMERICA CORPORATION	COM	060505104	243,911
BANK OF AMERICA CORPORATION	COM	060505104	143
BANK OF AMERICA CORPORATION	COM	060505104	8,837
BANK OF AMERICA CORPORATION	COM	060505104	20,470
BANK OF AMERICA CORPORATION	COM	060505104	251
BANK MONTREAL QUE	COM	063671101	4,221
BANK MONTREAL QUE	COM	063671101	183
BANK OF NEW YORK MELLON CORP	COM	064058100	65
BANK OF NEW YORK MELLON CORP	COM	064058100	39
BANK OF NEW YORK MELLON CORP	COM	064058100	2,788
BANK OF NEW YORK MELLON CORP	COM	064058100	270

BANK OF NEW YORK MELLON CORP	COM	064058100	498
BANK OF NEW YORK MELLON CORP	COM	064058100	1,392
BANK OF NEW YORK MELLON CORP	COM	064058100	2,557
BANK OF NEW YORK MELLON CORP	COM	064058100	5,017
BANK NOVA SCOTIA HALIFAX	COM	064149107	381
BANK NOVA SCOTIA HALIFAX	COM	064149107	17,337
BANK NOVA SCOTIA HALIFAX	COM	064149107	53
BARD C R INC	COM	067383109	8
BARD C R INC	COM	067383109	480
BARD C R INC	COM	067383109	205
BARD C R INC	COM	067383109	16
BARD C R INC	COM	067383109	2
BARD C R INC	COM	067383109	448
BARD C R INC	COM	067383109	67
BARCLAYS BK PLC	DJUBS CMDT ETN36	06738C778	76
BARCLAYS BK PLC	DJUBS CMDT ETN36	06738C778	140
BARCLAYS PLC	ADR	06738E204	30
BARCLAYS PLC	ADR	06738E204	118
BARCLAYS PLC	ADR	06738E204	20
BARCLAYS PLC	ADR	06738E204	1,070
BARCLAYS PLC	ADR	06738E204	371
BARCLAYS BK PLC	IPMS INDIA ETN	06739F291	6
BARCLAYS BK PLC	IPMS INDIA ETN	06739F291	3
BARCLAYS BK PLC	IPMS INDIA ETN	06739F291	178
BARCLAYS BK PLC	IPMS INDIA ETN	06739F291	365
BARCLAYS BK PLC	CALL	06739F901	1,894
BARCLAYS BANK PLC	ETN DJUBS AGRI37	06739H206	50
BARCLAYS BANK PLC	ETN DJUBS AGRI37	06739H206	145
BARCLAYS BANK PLC	ETN DJUBS AGRI37	06739H206	155
BARCLAYS BANK PLC	ADR PFD SR 5	06739H362	467
BARCLAYS BANK PLC	ADR PFD SR 5	06739H362	458
BARCLAYS BANK PLC	ADR PFD SR 5	06739H362	621
BARCLAYS BANK PLC	ETN DJUBS NAT37	06739H644	124
BARCLAYS BANK PLC	ETN DJUBS NAT37	06739H644	82
BARCLAYS BANK PLC	ETN DJUBS NAT37	06739H644	107
BARCLAYS BK PLC	IPATH S&P ST ETN	06740C527	80
BARCLAYS BK PLC	IPATH S&P ST ETN	06740C527	242
BARCLAYS BK PLC	IPATH S&P ST ETN	06740C527	2,362
BARNES GROUP INC	COM	067806109	686
BARRICK GOLD CORP	COM	067901108	1,360
BARRICK GOLD CORP	COM	067901108	1,523
BARRICK GOLD CORP	COM	067901108	296
BARRICK GOLD CORP	COM	067901108	575
BARRICK GOLD CORP	COM	067901108	2,859
BARRICK GOLD CORP	COM	067901108	19
BARRICK GOLD CORP	COM	067901108	8,080
BARRICK GOLD CORP	COM	067901108	898
BARRICK GOLD CORP	COM	067901108	135
BARRICK GOLD CORP	COM	067901108	3,883
BARRICK GOLD CORP	COM	067901108	7,979
BAXTER INTL INC	COM	071813109	386
BAXTER INTL INC	COM	071813109	48
BAXTER INTL INC	COM	071813109	3,529
BAXTER INTL INC	COM	071813109	1
BAXTER INTL INC	COM	071813109	60
BAXTER INTL INC	COM	071813109	2
BAXTER INTL INC	COM	071813109	215
BAXTER INTL INC	COM	071813109	218
BAXTER INTL INC	COM	071813109	3,952
BAXTER INTL INC	COM	071813109	198
BE AEROSPACE INC	COM	073302101	15
BE AEROSPACE INC	COM	073302101	592

BE AEROSPACE INC	COM	073302101	3,698
BEACON POWER CORP	COM	073677106	7
BECKMAN COULTER INC	COM	075811109	33
BECKMAN COULTER INC	COM	075811109	10
BECKMAN COULTER INC	COM	075811109	488
BECKMAN COULTER INC	COM	075811109	1
BECKMAN COULTER INC	COM	075811109	10
BECKMAN COULTER INC	COM	075811109	132
BECTON DICKINSON & CO	COM	075887109	13
BECTON DICKINSON & CO	COM	075887109	1,429
BECTON DICKINSON & CO	COM	075887109	90
BECTON DICKINSON & CO	COM	075887109	530
BECTON DICKINSON & CO	COM	075887109	2
BECTON DICKINSON & CO	COM	075887109	67
BECTON DICKINSON & CO	COM	075887109	4
BECTON DICKINSON & CO	COM	075887109	432
BECTON DICKINSON & CO	COM	075887109	74
BED BATH & BEYOND INC	COM	075896100	968
BED BATH & BEYOND INC	COM	075896100	48
BED BATH & BEYOND INC	COM	075896100	730
BED BATH & BEYOND INC	COM	075896100	410
BED BATH & BEYOND INC	COM	075896100	3
BED BATH & BEYOND INC	COM	075896100	255
BED BATH & BEYOND INC	COM	075896100	8,292
BEMIS INC	COM	081437105	869
BERKLEY W R CORP	COM	084423102	40
BERKLEY W R CORP	COM	084423102	186
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	498
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	872
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	18,053
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	125
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	125
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	2,002
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	8,093
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	7,014
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	8,218
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	9,960
BERKSHIRE HATHAWAY INC DEL	CL A	084670108	2,241
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	107
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	1,247
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	372
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	488
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	1,580
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	132
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	14,928
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	15
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	5,816
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	141
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	2,063
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	17,508
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	2,202
BERKSHIRE HATHAWAY INC DEL	CL B NEW	084670702	2,260
BEST BUY INC	COM	086516101	29
BEST BUY INC	COM	086516101	2,517
BEST BUY INC	COM	086516101	7
BEST BUY INC	COM	086516101	2,218
BEST BUY INC	COM	086516101	12
BEST BUY INC	COM	086516101	201
BEST BUY INC	COM	086516101	159
BEST BUY INC	COM	086516101	537
BEST BUY INC	COM	086516101	4,875
BHP BILLITON LTD	SPONSORED ADR	088606108	44

BHP BILLITON LTD	SPONSORED ADR	088606108	153
BHP BILLITON LTD	SPONSORED ADR	088606108	126
BHP BILLITON LTD	SPONSORED ADR	088606108	188
BHP BILLITON LTD	SPONSORED ADR	088606108	8
BHP BILLITON LTD	SPONSORED ADR	088606108	594
BHP BILLITON LTD	SPONSORED ADR	088606108	4,790
BHP BILLITON LTD	SPONSORED ADR	088606108	1,973
BIG LOTS INC	COM	089302103	1,115
BIG LOTS INC	COM	089302103	11
BIG LOTS INC	COM	089302103	91
BIG LOTS INC	COM	089302103	1,101
BIO RAD LABS INC	CL A	090572207	58
BIO RAD LABS INC	CL A	090572207	158
BIO RAD LABS INC	CL A	090572207	136
BIO RAD LABS INC	CL A	090572207	360
BIO RAD LABS INC	CL A	090572207	158
BIOGEN IDEC INC	COM	09062X103	34
BIOGEN IDEC INC	COM	09062X103	1,946
BIOGEN IDEC INC	COM	09062X103	71
BIOGEN IDEC INC	COM	09062X103	17
BIOGEN IDEC INC	COM	09062X103	5,534
BIOGEN IDEC INC	COM	09062X103	31
BIOGEN IDEC INC	COM	09062X103	1,039
BIOTECH HOLDRS TR	DEPOSTRY RCPTS	09067D201	192
BIOTECH HOLDRS TR	DEPOSTRY RCPTS	09067D201	767
BLACKROCK INC	COM	09247X101	17
BLACKROCK INC	COM	09247X101	66
BLACKROCK INC	COM	09247X101	1
BLACKROCK INC	COM	09247X101	136
BLACKROCK INC	COM	09247X101	379
BLACKROCK INC	COM	09247X101	1,907
BLACKROCK STRAT DIVD ACHIEVE	COM	09249Y107	1,023
BLACKROCK S&P QLTY RK EQ MD	SHS BEN INT	09250D109	1,288
BLACKROCK KELSO CAPITAL CORP	COM	092533108	304
BLACKSTONE GROUP L P	COM UNIT LTD	09253U108	76
BLACKSTONE GROUP L P	COM UNIT LTD	09253U108	68
BLACKSTONE GROUP L P	COM UNIT LTD	09253U108	1,209
BLACKSTONE GROUP L P	COM UNIT LTD	09253U108	170
BLDRS INDEX FDS TR	EMER MK 50 ADR	09348R300	73
BLDRS INDEX FDS TR	EMER MK 50 ADR	09348R300	300
BLDRS INDEX FDS TR	EMER MK 50 ADR	09348R300	40
BLOCK H & R INC	COM	093671105	1,002
BLOCK H & R INC	COM	093671105	11
BLOCK H & R INC	COM	093671105	1
BLOCK H & R INC	COM	093671105	1,073
BLUE CHIP VALUE FD INC	COM	095333100	679
BLUELINX HLDGS INC	COM	09624H109	1,281
BMB MUNAI INC	COM	09656A105	8
BOEING CO	COM	097023105	1,423
BOEING CO	COM	097023105	80
BOEING CO	COM	097023105	17
BOEING CO	COM	097023105	3,764
BOEING CO	COM	097023105	8
BOEING CO	COM	097023105	5,197
BOEING CO	COM	097023105	11
BOEING CO	COM	097023105	10,488
BOEING CO	COM	097023105	363
BOEING CO	COM	097023105	1,690
BOEING CO	COM	097023105	4,727
BOEING CO	COM	097023105	2
BOEING CO	COM	097023105	20,452
BOEING CO	COM	097023105	304

BOEING CO	COM	097023105	14,513
BOEING CO	COM	097023105	5,620
BORGWARNER INC	COM	099724106	166
BORGWARNER INC	COM	099724106	55
BORGWARNER INC	COM	099724106	158
BORGWARNER INC	COM	099724106	27
BORGWARNER INC	COM	099724106	1
BORGWARNER INC	COM	099724106	810
BORGWARNER INC	COM	099724106	1,384
BOSTON PROPERTIES INC	COM	101121101	118
BOSTON PROPERTIES INC	COM	101121101	736
BOSTON PROPERTIES INC	COM	101121101	1,301
BOSTON PROPERTIES INC	COM	101121101	3
BOSTON PROPERTIES INC	COM	101121101	10
BOSTON PROPERTIES INC	COM	101121101	4,761
BOSTON SCIENTIFIC CORP	COM	101137107	35
BOSTON SCIENTIFIC CORP	COM	101137107	595
BOSTON SCIENTIFIC CORP	COM	101137107	11
BOSTON SCIENTIFIC CORP	COM	101137107	210
BOSTON SCIENTIFIC CORP	COM	101137107	8
BOSTON SCIENTIFIC CORP	COM	101137107	102
BOULDER GROWTH & INCOME FD I	COM	101507101	1,279
BOULDER TOTAL RETURN FD INC	COM	101541100	1,892
BRANDYWINE RLTY TR	SH BEN INT NEW	105368203	31
BRANDYWINE RLTY TR	SH BEN INT NEW	105368203	960
BRF-BRASIL FOODS S A	SPONSORED ADR	10552T107	5
BRF-BRASIL FOODS S A	SPONSORED ADR	10552T107	2
BRF-BRASIL FOODS S A	SPONSORED ADR	10552T107	75
BRF-BRASIL FOODS S A	SPONSORED ADR	10552T107	803
BRF-BRASIL FOODS S A	SPONSORED ADR	10552T107	958
BRINKER INTL INC	COM	109641100	7
BRINKER INTL INC	COM	109641100	202
BRINKER INTL INC	COM	109641100	95
BRINKER INTL INC	COM	109641100	5,472
BRISTOL MYERS SQUIBB CO	COM	110122108	352
BRISTOL MYERS SQUIBB CO	COM	110122108	770
BRISTOL MYERS SQUIBB CO	COM	110122108	53
BRISTOL MYERS SQUIBB CO	COM	110122108	6,222
BRISTOL MYERS SQUIBB CO	COM	110122108	15
BRISTOL MYERS SQUIBB CO	COM	110122108	192
BRISTOL MYERS SQUIBB CO	COM	110122108	2
BRISTOL MYERS SQUIBB CO	COM	110122108	10,424
BRISTOL MYERS SQUIBB CO	COM	110122108	1,897
BRISTOL MYERS SQUIBB CO	COM	110122108	17,062
BRISTOL MYERS SQUIBB CO	COM	110122108	3,752
BRISTOL MYERS SQUIBB CO	COM	110122108	58
BRITISH AMERN TOB PLC	SPONSORED ADR	110448107	28
BRITISH AMERN TOB PLC	SPONSORED ADR	110448107	567
BROADCOM CORP	CL A	111320107	793
BROADCOM CORP	CL A	111320107	60
BROADCOM CORP	CL A	111320107	302
BROADCOM CORP	CL A	111320107	1,312
BROADCOM CORP	CL A	111320107	200
BROADCOM CORP	CL A	111320107	233
BROADCOM CORP	CL A	111320107	619
BROADCOM CORP	CL A	111320107	578
BROADCOM CORP	CL A	111320107	383
BROADCOM CORP	CL A	111320107	1,195
BROADRIDGE FINL SOLUTIONS IN	COM	11133T103	4
BROADRIDGE FINL SOLUTIONS IN	COM	11133T103	233
BROADRIDGE FINL SOLUTIONS IN	COM	11133T103	186
BROADRIDGE FINL SOLUTIONS IN	COM	11133T103	15

BROCADE COMMUNICATIONS SYS I	COM NEW	111621306	64
BROCADE COMMUNICATIONS SYS I	COM NEW	111621306	790
BROCADE COMMUNICATIONS SYS I	COM NEW	111621306	2,516
BROOKDALE SR LIVING INC	COM	112463104	102
BROOKDALE SR LIVING INC	COM	112463104	639
BROOKFIELD ASSET MGMT INC	CL A LTD VT SH	112585104	1,136
BROOKFIELD ASSET MGMT INC	CL A LTD VT SH	112585104	564
BROOKFIELD HOMES CORP	COM	112723101	8,296
BROOKFIELD PPTYS CORP	COM	112900105	5,117
BROWN & BROWN INC	COM	115236101	849
BROWN FORMAN CORP	CL A	115637100	215
BROWN FORMAN CORP	CL B	115637209	384
BROWN FORMAN CORP	CL B	115637209	1
BROWN FORMAN CORP	CL B	115637209	6
BRUKER CORP	COM	116794108	34
BRUKER CORP	COM	116794108	217
BUCYRUS INTL INC NEW	COM	118759109	20
BUCYRUS INTL INC NEW	COM	118759109	59
BUCYRUS INTL INC NEW	COM	118759109	43
BUCYRUS INTL INC NEW	COM	118759109	18
BUCYRUS INTL INC NEW	COM	118759109	1,210
BURGER KING HLDGS INC	COM	121208201	13,827
CAE INC	COM	124765108	1,082
CBS CORP NEW	CL B	124857202	690
CBS CORP NEW	CL B	124857202	9
CBS CORP NEW	CL B	124857202	135
CBS CORP NEW	CL B	124857202	31
CBS CORP NEW	CL B	124857202	90
CBS CORP NEW	CL B	124857202	665
CBS CORP NEW	CL B	124857202	152
CBS CORP NEW	CL B	124857202	360
CBS CORP NEW	CL B	124857202	2
CBS CORP NEW	CL B	124857202	0
CBS CORP NEW	CL B	124857202	1,581
CB RICHARD ELLIS GROUP INC	CL A	12497T101	672
CB RICHARD ELLIS GROUP INC	CL A	12497T101	53
CB RICHARD ELLIS GROUP INC	CL A	12497T101	67
CB RICHARD ELLIS GROUP INC	CL A	12497T101	9
CB RICHARD ELLIS GROUP INC	CL A	12497T101	1,257
CF INDS HLDGS INC	COM	125269100	449
CF INDS HLDGS INC	COM	125269100	134
CF INDS HLDGS INC	COM	125269100	15
CF INDS HLDGS INC	COM	125269100	1,087
CF INDS HLDGS INC	COM	125269100	78
CF INDS HLDGS INC	COM	125269100	42
CF INDS HLDGS INC	COM	125269100	401
CF INDS HLDGS INC	COM	125269100	272
CF INDS HLDGS INC	COM	125269100	2
CF INDS HLDGS INC	COM	125269100	105
C H ROBINSON WORLDWIDE INC	COM NEW	12541W209	315
C H ROBINSON WORLDWIDE INC	COM NEW	12541W209	731
C H ROBINSON WORLDWIDE INC	COM NEW	12541W209	54
C H ROBINSON WORLDWIDE INC	COM NEW	12541W209	169
C H ROBINSON WORLDWIDE INC	COM NEW	12541W209	2,524
CIGNA CORP	COM	125509109	1,886
CIGNA CORP	COM	125509109	21
CIGNA CORP	COM	125509109	11,762
CIGNA CORP	COM	125509109	10
CIGNA CORP	COM	125509109	1,374
CIT GROUP INC	COM NEW	125581801	50
CIT GROUP INC	COM NEW	125581801	78
CIT GROUP INC	COM NEW	125581801	51

CIT GROUP INC	COM NEW	125581801	3,316
CIT GROUP INC	COM NEW	125581801	363
CME GROUP INC	COM	12572Q105	39
CME GROUP INC	COM	12572Q105	155
CME GROUP INC	COM	12572Q105	29
CME GROUP INC	COM	12572Q105	1,652
CME GROUP INC	COM	12572Q105	44
CME GROUP INC	COM	12572Q105	8
CME GROUP INC	COM	12572Q105	573
CME GROUP INC	COM	12572Q105	575
CME GROUP INC	COM	12572Q105	658
CME GROUP INC	COM	12572Q105	260
CMS ENERGY CORP	COM	125896100	436
CMS ENERGY CORP	COM	125896100	701
CMS ENERGY CORP	COM	125896100	47
CMS ENERGY CORP	COM	125896100	5
CNOOC LTD	SPONSORED ADR	126132109	117
CNOOC LTD	SPONSORED ADR	126132109	310
CNOOC LTD	SPONSORED ADR	126132109	6
CNOOC LTD	SPONSORED ADR	126132109	97
CNOOC LTD	SPONSORED ADR	126132109	16
CNOOC LTD	SPONSORED ADR	126132109	966
CNOOC LTD	SPONSORED ADR	126132109	563
CPFL ENERGIA S A	SPONSORED ADR	126153105	198
CPFL ENERGIA S A	SPONSORED ADR	126153105	394
CSX CORP	COM	126408103	277
CSX CORP	COM	126408103	28
CSX CORP	COM	126408103	80
CSX CORP	COM	126408103	2,036
CSX CORP	COM	126408103	122
CSX CORP	COM	126408103	26
CSX CORP	COM	126408103	845
CSX CORP	COM	126408103	2
CSX CORP	COM	126408103	9,285
CVS CAREMARK CORPORATION	COM	126650100	971
CVS CAREMARK CORPORATION	COM	126650100	22
CVS CAREMARK CORPORATION	COM	126650100	14
CVS CAREMARK CORPORATION	COM	126650100	208
CVS CAREMARK CORPORATION	COM	126650100	101
CVS CAREMARK CORPORATION	COM	126650100	4,463
CVS CAREMARK CORPORATION	COM	126650100	70
CVS CAREMARK CORPORATION	COM	126650100	4,894
CVS CAREMARK CORPORATION	COM	126650100	199
CVS CAREMARK CORPORATION	COM	126650100	227
CVS CAREMARK CORPORATION	COM	126650100	1,810
CVS CAREMARK CORPORATION	COM	126650100	12,383
CVS CAREMARK CORPORATION	COM	126650100	6,747
CVS CAREMARK CORPORATION	COM	126650100	10,200
CVS CAREMARK CORPORATION	COM	126650100	2,612
CVS CAREMARK CORPORATION	COM	126650100	3,487
CA INC	COM	12673P105	106
CA INC	COM	12673P105	91
CA INC	COM	12673P105	1,172
CA INC	COM	12673P105	2
CA INC	COM	12673P105	3,026
CABLEVISION SYS CORP	CL A NY CABLVS	12686C109	597
CABLEVISION SYS CORP	CL A NY CABLVS	12686C109	65
CABLEVISION SYS CORP	CL A NY CABLVS	12686C109	367
CABLEVISION SYS CORP	CL A NY CABLVS	12686C109	821
CABLEVISION SYS CORP	CL A NY CABLVS	12686C109	2
CABLEVISION SYS CORP	CL A NY CABLVS	12686C109	3,064
CABOT OIL & GAS CORP	COM	127097103	4

CABOT OIL & GAS CORP	COM	127097103	197
CABOT OIL & GAS CORP	COM	127097103	14
CABOT OIL & GAS CORP	COM	127097103	14
CABOT OIL & GAS CORP	COM	127097103	1,232
CABOT OIL & GAS CORP	COM	127097103	151
CADENCE DESIGN SYSTEM INC	COM	127387108	571
CALAMOS CONV & HIGH INCOME F	COM SHS	12811P108	475
CALAMOS CONV & HIGH INCOME F	COM SHS	12811P108	21
CALAMOS STRATEGIC TOTL RETN	COM SH BEN INT	128125101	1,948
CAMDEN PPTY TR	SH BEN INT	133131102	1,536
CAMECO CORP	COM	13321L108	87
CAMECO CORP	COM	13321L108	0
CAMECO CORP	COM	13321L108	1,955
CAMECO CORP	COM	13321L108	1,582
CAMECO CORP	COM	13321L108	2,173
CAMECO CORP	COM	13321L108	3,281
CAMECO CORP	COM	13321L108	3
CAMERON INTERNATIONAL CORP	COM	13342B105	1,131
CAMERON INTERNATIONAL CORP	COM	13342B105	155
CAMERON INTERNATIONAL CORP	COM	13342B105	314
CAMERON INTERNATIONAL CORP	COM	13342B105	15
CAMERON INTERNATIONAL CORP	COM	13342B105	1,022
CAMERON INTERNATIONAL CORP	COM	13342B105	143
CAMERON INTERNATIONAL CORP	COM	13342B105	27
CAMERON INTERNATIONAL CORP	COM	13342B105	1,504
CAMERON INTERNATIONAL CORP	COM	13342B105	603
CAMERON INTERNATIONAL CORP	COM	13342B105	183
CAMERON INTERNATIONAL CORP	COM	13342B105	6,001
CAMERON INTERNATIONAL CORP	COM	13342B105	3,773
CAMPBELL SOUP CO	COM	134429109	1,456
CAMPBELL SOUP CO	COM	134429109	74
CAMPBELL SOUP CO	COM	134429109	14
CAMPBELL SOUP CO	COM	134429109	23,802
CAMPBELL SOUP CO	COM	134429109	6
CDN IMPERIAL BK OF COMMERCE	COM	136069101	7,879
CDN IMPERIAL BK OF COMMERCE	COM	136069101	116
CANADIAN NATL RY CO	COM	136375102	4,802
CANADIAN NATL RY CO	COM	136375102	485
CANADIAN NAT RES LTD	COM	136385101	156
CANADIAN NAT RES LTD	COM	136385101	10,208
CANADIAN NAT RES LTD	COM	136385101	440
CANADIAN NAT RES LTD	COM	136385101	3,699
CANADIAN PAC RY LTD	COM	13645T100	97
CANADIAN PAC RY LTD	COM	13645T100	61
CANADIAN PAC RY LTD	COM	13645T100	95
CANADIAN PAC RY LTD	COM	13645T100	12
CANADIAN PAC RY LTD	COM	13645T100	6
CANON INC	ADR	138006309	264
CANON INC	ADR	138006309	127
CANON INC	ADR	138006309	321
CANON INC	ADR	138006309	127
CANON INC	ADR	138006309	456
CAPITAL GOLD CORP	COM NEW	14018Y205	16
CAPITAL GOLD CORP	COM NEW	14018Y205	63
CAPITAL ONE FINL CORP	COM	14040H105	538
CAPITAL ONE FINL CORP	COM	14040H105	115
CAPITAL ONE FINL CORP	COM	14040H105	4
CAPITAL ONE FINL CORP	COM	14040H105	1,914
CAPITAL ONE FINL CORP	COM	14040H105	49
CAPITAL ONE FINL CORP	COM	14040H105	11
CAPITAL ONE FINL CORP	COM	14040H105	403
CAPITAL ONE FINL CORP	COM	14040H105	111

CAPITAL ONE FINL CORP	COM	14040H105	187
CAPITAL ONE FINL CORP	COM	14040H105	3,085
CAPITALSOURCE INC	COM	14055X102	731
CAPSTONE TURBINE CORP	COM	14067D102	12
CARDINAL HEALTH INC	COM	14149Y108	87
CARDINAL HEALTH INC	COM	14149Y108	1,455
CARDINAL HEALTH INC	COM	14149Y108	97
CARDINAL HEALTH INC	COM	14149Y108	3
CARDINAL HEALTH INC	COM	14149Y108	189
CARDINAL HEALTH INC	COM	14149Y108	360
CAREFUSION CORP	COM	14170T101	441
CAREFUSION CORP	COM	14170T101	10,186
CAREFUSION CORP	COM	14170T101	40
CAREFUSION CORP	COM	14170T101	154
CARLISLE COS INC	COM	142339100	446
CARLISLE COS INC	COM	142339100	536
CARMAX INC	COM	143130102	392
CARMAX INC	COM	143130102	1
CARMAX INC	COM	143130102	100
CARNIVAL CORP	PAIRED CTF	143658300	56
CARNIVAL CORP	PAIRED CTF	143658300	7
CARNIVAL CORP	PAIRED CTF	143658300	180
CARNIVAL CORP	PAIRED CTF	143658300	236
CARNIVAL CORP	PAIRED CTF	143658300	394
CARNIVAL CORP	PAIRED CTF	143658300	117
CARNIVAL CORP	PAIRED CTF	143658300	102
CARNIVAL CORP	PAIRED CTF	143658300	7,766
CARNIVAL CORP	PAIRED CTF	143658300	1,288
CATERPILLAR INC DEL	COM	149123101	629
CATERPILLAR INC DEL	COM	149123101	928
CATERPILLAR INC DEL	COM	149123101	1,076
CATERPILLAR INC DEL	COM	149123101	579
CATERPILLAR INC DEL	COM	149123101	39
CATERPILLAR INC DEL	COM	149123101	4,388
CATERPILLAR INC DEL	COM	149123101	66
CATERPILLAR INC DEL	COM	149123101	676

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Revenue

$

475,000

$

409,000

$

238,000

$

347,000

Operating expenses:

Research and development

3,992,000

5,805,000

4,876,000

2,777,000

General and administrative

6,710,000

8,714,000

6,876,000

4,857,000

Total operating expenses

10,702,000

14,519,000

11,752,000

7,634,000

Loss from operations

(10,227,000

)

(14,110,000

)

(11,514,000

)

(7,287,000

)

Other income (expense):

Change in fair value of derivative liabilities

9,940,000

37,219,000

2,403,000

9,304,000

Other expense

(302,000

)

(227,000

)

(302,000

)

Total other income (expense)

9,638,000

37,219,000

2,176,000

9,002,000

Net income (loss) before income taxes

(589,000

)

23,109,000

(9,338,000

)

1,715,000

Income tax benefit

73,000

Net income (loss)

(516,000

)

23,109,000

(9,338,000

)

1,715,000

Excess of fair value of consideration transferred on conversion of Series B Preferred S

(3,580,000

)

Accretion of Series B redeemable convertible preferred stock

(10,278,000

)

(1,285,000

)

(1,858,000

)

(9,329,000

)

Net income (loss) attributable to common stockholders

$

(10,794,000

)

$

21,824,000

$

(14,776,000

)

$

(7,614,000

)

Per share information:

Net income (loss) per share of common stock basic

$
(1.99
)

$
4.21

$
(1.72
)

$
(1.45
)

Weighted average number of shares of common stock outstanding basic

5,411,204

3,746,639

8,590,772

5,247,508

Net loss per share of common stock diluted

$ (1.99)

$ (2.33)

$ (1.77)

$ (1.45)

Weighted average number of shares of common stock outstanding diluted	
	5,411,204
	5,886,730
	8,648,914
	5,247,508

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	As of September 30, 2016
Consolidated Balance Sheet Data:	
Cash and cash equivalents	$3,967,000
Working capital	1,407,000
Total assets	26,036,000
Total liabilities	7,808,000
Accumulated deficit	(371,860,000)
Total stockholders equity	18,228,000

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RISK FACTORS

Investing in our securities involves a high degree of risk. You should consider carefully the risks described below, together with all of the other information included or incorporated by reference in this prospectus, including the risks and uncertainties discussed under Risk Factors in our Quarterly Report on Form 10-Q for the quarter ended September 30, 2016, before deciding whether to purchase shares of our common stock and warrants in this offering. All of these risk factors are incorporated herein in their entirety. The risks described below and incorporated by reference are material risks currently known, expected or reasonably foreseeable by us. If any of these risks actually materialize, our business, prospects, financial condition, and results of operations could be seriously harmed. This could cause the trading price of our common stock and the value of the warrants to decline, resulting in a loss of all or part of your investment.

Risks Related to this Offering

You will experience immediate and substantial dilution if you purchase securities in this offering.

As of September 30, 2016, our net tangible book deficit was approximately $(2.1) million, or $(0.19) per share. Since the price per share of our common stock being offered in this offering is substantially higher than the net tangible book deficit per share of our common stock, you will suffer substantial dilution with respect to the net tangible book value of the common stock you purchase in this offering. Based on the assumed combined public offering price of $1.00 per share of common stock and accompanying warrant being sold in this offering, and our net tangible book deficit per share as of September 30, 2016, if you purchase shares of common stock in this offering, you will suffer immediate and substantial dilution of $(0.87) per share with respect to the net tangible book value of the common stock. See the section entitled Dilution for a more detailed discussion of the dilution you will incur if you purchase common stock in this offering.

We may be required to issue a significant number of additional shares of common stock for no additional consideration to certain of our stockholders in connection with the closing of this offering; we may not be able to satisfy our potential contractual obligation to issue these shares.

In April 2016, we entered into a Common Stock Issuance Agreement, or CSIA, with certain former holders, or the Holders, of our Series B Preferred Stock. The terms of the CSIA require us to issue shares of common stock for no additional consideration to the Holders in connection with the closing of this offering if the public offering price per share of common stock is less than $2.35 per share. Based on the assumed public offering price per share of common stock in this offering of $0.99 (which is based on the last reported sale price of our common stock on the NYSE MKT on November 8, 2016), we may be obligated under the CSIA to issue the Holders an aggregate of 2,455,228 shares of common stock within 15 business days following the closing of this offering. However, under the rules of the NYSE MKT, the maximum number of shares we can issue to the Holders as a result of this offering is 286,846 shares unless we obtain stockholder approval to issue shares in excess of this amount. Our inability to comply in full with our potential obligation under the CSIA to issue shares to the Holders in connection with the closing of this offering could have adverse consequences, including, without limitation:

the Holders may bring an action against us for breach of contract, or threaten to bring an action against us, either of which could require us to expend significant time and resources to resolve the matter, and we may not be successful;
we may need to call a special meeting of our stockholders to seek their approval of the issuance by us to the Holders of the number of shares to be issued to the Holders in connection with the closing of this offering, less the 286,846 shares we are currently permitted to issue, which would require us to expend time and resources, and our stockholders may not ultimately approve such issuance; and
we may need to provide other consideration to the Holders to settle potential claims arising from our inability to satisfy our potential contractual obligations under the CSIA, which could involve:
cash make-whole payments, which in turn would impact our expected use of the net proceeds from this offering and deplete our cash resources faster than we would otherwise anticipate; and
other unfavorable terms that could make it difficult for us to raise financing in the future, which would raise further doubts about our ability to continue as a going concern.

We may be required to issue a significant number of additional shares ofcommon stock for no additional consideration

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The occurrence of any of the foregoing, or even the potential for them to occur, could result in a material decline in our stock price.

The actual number of shares that we may be required to issue to the Holders pursuant to the provisions of the CSIA in connection with the closing of this offering will depend on the actual public offering price per share of common stock in this offering. A $0.25 decrease from the assumed public offering price of $0.99 per share of common stock would increase the number of shares we may need to issue to the Holders in connection with the closing of this offering by 1,433,274 shares, or 3,888,502 shares in the aggregate.

There is no public market for the warrants being offered in this offering.

There is no established public trading market for the warrants being offered in this offering, and we do not expect a market to develop. In addition, we do not intend to apply to list the warrants on any securities exchange or nationally recognized trading system, including the NYSE MKT. Without an active market, the liquidity of the warrants will be limited.

We will have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

Our management will have broad discretion in the application of the net proceeds from this offering, including for any of the purposes described in the section entitled Use of Proceeds, and you will not have the opportunity as part of your investment decision to assess whether the net proceeds are being used appropriately. Because of the number and variability of factors that will determine our use of the net proceeds from this offering, their ultimate use may vary substantially from their currently intended use. Our management may not apply the net proceeds from this offering in ways that ultimately increase the value of your investment. The failure by our management to apply these funds effectively could harm our business. Pending their use, we may invest the net proceeds from this offering in short-term, investment-grade, interest-bearing securities. These investments may not yield a favorable return to our stockholders. If we do not invest or apply the net proceeds from this offering in ways that enhance stockholder value, we may fail to achieve expected financial results, which could cause our stock price to decline.

There may be future sales of our securities or other dilution of our equity, which may adversely affect the market price of our common stock.

We are generally not restricted from issuing additional common stock, including any securities that are convertible into or exchangeable for, or that represent the right to receive, common stock. The market price of our common stock could decline as a result of sales of common stock or securities that are convertible into or exchangeable for, or that represent the right to receive, common stock after this offering or the perception that such sales could occur.

Holders of warrants purchased in this offering will have no rights as common stockholders until such holders exercise their warrants and acquire our common stock.

Until holders of warrants acquire shares of our common stock upon exercise of the warrants, holders of warrants will have no rights with respect to the shares of our common stock underlying such warrants. Upon exercise of the warrants, the holders will be entitled to exercise the rights of a common stockholder only as to matters for which the record date occurs after the exercise date.

Even if this offering is successful, we will need to raise additional capital in the future to continue operations, which may not be available on acceptable terms, or at all. Failure to obtain this necessary capital when needed may force us to delay, limit or terminate our product development efforts or other operations.

We have had recurring losses from operations, negative operating cash flow and an accumulated deficit. We do not generate any cash from operations and must raise additional funds in order to continue operating our business. We expect to continue to fund our operations primarily through equity and debt financings in the future. If additional capital is not available to us when needed or on acceptable terms, we may not be able to continue to operate our business pursuant to our business plan or we may have to discontinue our operations

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entirely. As of September 30, 2016, we had cash and cash equivalents of $4.0 million. We estimate that we will receive net proceeds of approximately $4.6 million from the sale of the securities offered by us in this offering, based on the assumed combined public offering price of $1.00 per share and accompanying warrant (the last reported sale price of our common stock on the NYSE MKT on November 8, 2016), and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering. We currently anticipate that our existing resources, together with the expected net proceeds from this offering, will be sufficient to fund our planned operations until the end of the first quarter of 2017. In the event of a decrease in the net proceeds to us from this offering as a result of a decrease in the assumed public offering price or the number of shares offered by us, based on the assumptions discussed in Use of Proceeds , we would expect that our existing resources, together with such reduced expected net proceeds from this offering, would be sufficient to fund our planned operations until approximately mid-way through the first quarter of 2017.

Developing drugs and conducting clinical trials is expensive. Our future funding requirements will depend on many factors, including:

the costs and timing of our research and development activities;
the progress and cost of our clinical trials and other research and development activities;
the cost and timing of securing manufacturing capabilities for our clinical product candidates and commercial products, if any;
the terms and timing of any collaborative, licensing, acquisition or other arrangements that we may establish;
the costs and timing of seeking regulatory approvals;
the costs of filing, prosecuting, defending and enforcing any patent applications, claims, patents and other intellectual property rights; and
the costs of lawsuits involving us or our product candidates.

We may seek funds through arrangements with collaborators or others that may require us to relinquish rights to the products candidates that we might otherwise seek to develop or commercialize independently. We cannot be certain that we will be able to enter into any such arrangements on reasonable terms, if at all.

We may seek to raise capital through a variety of sources, including:

the public equity market;
private equity financings;
collaborative arrangements;
licensing arrangements; and/or
public or private debt.

Any additional fundraising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to develop and commercialize our product candidates. Our ability to raise additional funds will depend, in part, the success of our preclinical studies and clinical trials and other product development activities, regulatory events, our ability to identify and enter into in-licensing or other strategic arrangements, and other events or conditions that may affect our value or prospects, as well as factors related to financial, economic and market conditions, many of which are beyond our control. We cannot be certain that sufficient funds will be available to us when required or on acceptable terms, if at all. Raising additional capital through the sale of securities could cause significant dilution to our stockholders. If we are unable to secure additional funds on a timely basis or on acceptable terms, we may be required to defer, reduce or eliminate significant planned expenditures, restructure, curtail or eliminate some or all of our development programs or other operations, dispose of technology or assets, pursue an acquisition of our company by a third party at a price that may result in a loss on investment for our stockholders, enter into arrangements that may require us to relinquish rights to certain of our product candidates, technologies or

Even if this offering is successful, we will need to raise additional capital in the future to continue operations, which

potential markets, file for

Even if this offering is successful, we will need to raise additional capital in the future to continue operations, which

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bankruptcy or cease operations altogether. Any of these events could have a material adverse effect on our business, financial condition and results of operations. Moreover, if we are unable to obtain additional funds on a timely basis, there will be substantial doubt about our ability to continue as a going concern and increased risk of insolvency and loss of investment by our stockholders.

Any additional fundraising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to develop and commercialize our product candidates. Our ability to raise additional funds will depend, in part, the success of our preclinical studies and clinical trials and other product development activities, regulatory events, our ability to identify and enter into in-licensing or other strategic arrangements, and other events or conditions that may affect our value or prospects, as well as factors related to financial, economic and market conditions, many of which are beyond our control. We cannot be certain that sufficient funds will be available to us when required or on acceptable terms, if at all. Raising additional capital through the sale of securities could cause significant dilution to our stockholders. If we are unable to secure additional funds on a timely basis or on acceptable terms, we may be required to defer, reduce or eliminate significant planned expenditures, restructure, curtail or eliminate some or all of our development programs or other operations, dispose of technology or assets, pursue an acquisition of our company by a third party at a price that may result in a loss on investment for our stockholders, enter into arrangements that may require us to relinquish rights to certain of our product candidates, technologies or potential markets, file for bankruptcy or cease operations altogether. Any of these events could have a material adverse effect on our business, financial condition and results of operations. Moreover, if we are unable to obtain additional funds on a timely basis, there will be substantial doubt about our ability to continue as a going concern and increased risk of insolvency and loss of investment by our stockholders.

Even if this offering is successful, we will need to raise additional capital in the future to continue operations, which

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference herein contain forward-looking statements. The forward-looking statements are contained principally in the sections entitled Prospectus Summary, Risk Factors, Management s Discussion and Analysis of Financial Condition and Results of Operations and Business in this prospectus or the documents incorporated herein by reference. These statements relate to future events or to our future financial performance and involve known and unknown risks, uncertainties and other factors which may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Forward-looking statements include, but are not limited to, statements about:

our estimates regarding anticipated operating losses, capital requirements and needs for additional funds;

our ability to raise additional capital when needed and to continue as a going concern;

our ability to manufacture, or otherwise secure the manufacture of, sufficient amounts of our product candidates for our preclinical studies and clinical trials;

our clinical development and other research and development plans and expectations, including our expectation to report final data for two Phase 1 clinical trials by the end of 2016 and our plans to initiate additional clinical trials;

our ability to select combinations of phages to formulate our product candidates;

the safety and efficacy of our product candidates;

the anticipated regulatory pathways for our product candidates;

our ability to successfully complete preclinical and clinical development of, and obtain regulatory approval of our product candidates and commercialize any approved products on our expected timeframes or at all;

the content and timing of submissions to and decisions made by the U.S. Food and Drug Administration, or FDA, and other regulatory agencies;

our ability to leverage the experience of our management team;

our ability to attract and keep management and other key personnel;

the capacities and performance of our suppliers, manufacturers, contract research organizations and other third parties over whom we have limited control;

the actions of our competitors and success of competing drugs that are or may become available;

our expectations with respect to future growth and investments in our infrastructure, and our ability to effectively manage any such growth;

the size and potential growth of the markets for any of our product candidates, and our ability to capture share in or impact the size of those markets;

the benefits of our product candidates;

market and industry trends;

the number of shares we may ultimately issue to the Holders pursuant to the CSIA in connection with the closing of this offering, and the consequences of our potential inability to comply with our potential contractual obligations under the CSIA;

the outcome of any litigation in which we or any of our officers or directors are involved;

the effects of government regulation and regulatory developments, and our ability and the ability of the third parties with whom we engage to comply with applicable regulatory requirements;

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the accuracy of our estimates regarding future expenses, revenues, capital requirements and need for additional financing;

our expectations regarding future planned expenditures;

our ability to achieve and maintain effective internal control over financial reporting in accordance with Section 404 of the Sarbanes-Oxley Act;

our expectations regarding the period during which we qualify as an emerging growth company under the JOBS Act;

our ability to obtain, maintain and successfully enforce adequate patent and other intellectual property protection of any of our products and product candidates;

our expected use of the net proceeds from this offering; and

our ability to operate our business without infringing the intellectual property rights of others.

In some cases, you can identify these statements by terms such as anticipate, believe, could, estimate, expect, may, plan, potential, predict, project, should, will, would or the negative of those terms, and similar ex convey uncertainty of future events or outcomes. These forward-looking statements reflect our management s beliefs and views with respect to future events and are based on estimates and assumptions as of the date of this prospectus and are subject to risks and uncertainties. We discuss many of these risks in greater detail in the documents incorporated by reference herein, usually under the heading Risk Factors. Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. Given these uncertainties, you should not place undue reliance on these forward-looking statements.

You should carefully read this prospectus, the documents that we incorporate by reference into this prospectus and the documents we reference in this prospectus and have filed as exhibits to the registration statement, of which this prospectus is a part, completely and with the understanding that our actual future results may be materially different from what we expect. We qualify all of the forward-looking statements in this prospectus by these cautionary statements.

Except as required by law, we assume no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in any forward-looking statements, whether as a result of new information, future events or otherwise.

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USE OF PROCEEDS

We estimate that we will receive net proceeds of approximately $4.6 million from the sale of the securities offered by us in this offering, based on the assumed combined public offering price of $1.00 per share and accompanying warrant (the last reported sale price of our common stock on the NYSE MKT on November 8, 2016), and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering.

A $0.25 increase (decrease) in the assumed combined public offering price of $1.00 per share and accompanying warrant would increase (decrease) the net proceeds to us from this offering by approximately $1.2 million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering.

Similarly, a one million share increase (decrease) in the number of shares offered by us, as set forth on the cover page of this prospectus, would increase (decrease) the net proceeds to us by approximately $0.9 million, assuming the assumed combined public offering price of $1.00 per share and accompanying warrant remains the same, and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering.

We currently intend to use the net proceeds from this offering for general corporate purposes, including manufacturing expenses, clinical trial expenses, research and development expenses and general and administrative expense. See Risk Factors for a discussion of certain risks that may affect our intended use of the net proceeds from this offering.

We may also use a portion of the net proceeds from this offering to in-license, acquire, or invest in complementary businesses, technologies, products or assets. However, we have no current plans, commitments or obligations to do so.

Our expected use of net proceeds from this offering represents our current intentions based upon our present plans and business condition. As of the date of this prospectus, we cannot currently allocate specific percentages of the net proceeds that we may use for the purposes specified above, and we cannot predict with certainty all of the particular uses for the net proceeds to be received upon the completion of this offering, or the amounts that we will actually spend on the uses set forth above. The amounts and timing of our actual use of the net proceeds will vary depending on numerous factors, including our ability to obtain additional financing, the progress, cost and results of our preclinical and clinical development programs, and whether we are able to enter into future licensing or collaboration arrangements. We may find it necessary or advisable to use the net proceeds for other purposes, and our management will have broad discretion in the application of the net proceeds, and investors will be relying on our judgment regarding the application of the net proceeds from this offering.

Pending the use of the net proceeds from this offering, we intend to invest the net proceeds in investment-grade, interest-bearing instruments.

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PRICE RANGE OF OUR COMMON STOCK

Our common stock has been listed on the NYSE MKT since August 18, 2015 under the symbol APHB. Prior to that date, our common stock was quoted on the OTCQB market under the symbol APHB.

On November 8, 2016, the closing price for our common stock as reported on the NYSE MKT was $1.00 per share. The following table sets forth the ranges of high and low sales prices per share of our common stock as quoted on the OTCQB or, if applicable, as reported on the NYSE MKT for the periods indicated. OTCQB quotations represent inter-dealer prices without retail markup, markdown or commission and may not necessarily represent actual transactions.

	High	Low
Year Ended December 31, 2014		
First Quarter	$ 37.00	$ 22.50
Second Quarter	$ 29.50	$ 17.50
Third Quarter	$ 22.50	$ 10.00
Fourth Quarter	$ 13.50	$ 3.50

	High	Low
Year Ended December 31, 2015		
First Quarter	$ 17.00	$ 8.00
Second Quarter	$ 15.00	$ 8.00
Third Quarter	$ 11.70	$ 3.79
Fourth Quarter	$ 9.00	$ 2.75

	High	Low
Year Ending December 31, 2016		
First Quarter	$ 5.49	$ 1.92
Second Quarter	$ 4.84	$ 1.45
Third Quarter	$ 2.17	$ 1.15
Fourth Quarter (through November 11, 2016)	$ 1.69	$ 0.98

As of September 30, 2016, there were 156 holders of record of our common stock. The number of stockholders of record of our common stock excludes stockholders whose shares were held in nominee or street name by brokers. The actual number of common stockholders is greater than the number of record holders, and includes stockholders who are beneficial owners, but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

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DIVIDEND POLICY

We have never declared or paid any cash dividends on our common stock. We currently intend to retain all available funds and any future earnings to support our operations and finance the growth and development of our business. Any future determination related to our dividend policy will be made at the discretion of our board of directors and will depend upon, among other factors, our results of operations, financial condition, capital requirements, contractual restrictions, business prospects and other factors our board of directors may deem relevant.

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DILUTION

Our historical net tangible book deficit as of September 30, 2016 was approximately $(2.1) million, or $(0.19) per share of common stock. Our historical net tangible book deficit is the amount of our total tangible assets less our liabilities. Historical net tangible book deficit per common share is our historical net tangible book deficit divided by the number of shares of common stock outstanding as of September 30, 2016.

After giving effect to (1) the sale of 5,300,000 shares of our common stock and warrants to purchase up to 5,300,000 shares of our common stock in this offering at the assumed combined public offering price of $1.00 per share of common stock and accompanying warrant (the last reported sale price of our common stock as reported on the NYSE MKT on November 8, 2016), and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering, and (2) the issuance by us to the Holders under the CSIA of an aggregate of 2,455,228 shares of common stock for no additional consideration in connection with the closing of this offering (based on an assumed public offering price per share of common stock in this offering of $0.99, and without regard to any limitations on our ability to issue such shares under the rules of the NYSE MKT), our as adjusted net tangible book value as of September 30, 2016 would have been approximately $2.5 million, or $0.13 per share of common stock. This represents an immediate increase in pro forma net tangible book value of $0.32 per share to our existing stockholders, and an immediate dilution of $(0.87) per share to new investors purchasing securities in this offering at the assumed combined public offering price.

The following table illustrates this dilution on a per share basis:

Assumed combined public offering price per share and accompanying warrant		$ 1.00
Historical net tangible book deficit per share as of September 30, 2016	$ (0.19)	
Pro forma increase in net tangible book value per share attributable to investors in this offering	0.34	
Pro forma decrease in net tangible book value per share attributable to issuance of common stock pursuant to the CSIA	(0.02)	
As adjusted net tangible book value per share after this offering		0.13
Dilution per share to investors participating in this offering		$ (0.87)

A $0.25 increase in the assumed combined public offering price of $1.00 per share and accompanying warrant would increase our as adjusted net tangible book value after this offering by $1.2 million, or $0.08 per share, and the dilution per share to investors purchasing securities in this offering would be approximately ($1.04) per share, assuming the issuance by us of an aggregate of 1,599,887 shares of common stock pursuant to the CSIA in connection with the closing of this offering and that the number of shares of common stock and accompanying warrants offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering. Similarly, a $0.25 decrease in the assumed combined public offering price of $1.00 per share and accompanying warrant would decrease our as adjusted net tangible book value after this offering by $1.2 million, or $(0.07) per share, and the dilution per share to investors purchasing securities in this offering would be $(0.69) per share, assuming the issuance by us of an aggregate of 3,888,502 shares of common stock pursuant to the CSIA in connection with the closing of this offering and that the number of shares of common stock and accompanying warrants offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable

by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering.

We may also increase or decrease the number of shares of common stock and accompanying warrants we are offering from the assumed number of shares of common stock and accompanying warrants set forth above. An increase of 1,000,000 shares of common stock and accompanying warrants in the number of shares of common stock and accompanying warrants offered by us from the assumed number of shares of common stock and accompanying warrants set forth on the cover page of this prospectus would increase our as

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adjusted net tangible book value after this offering by $0.9 million, or $0.04 per share, and the dilution per share to investors purchasing securities in this offering would be approximately $(0.83) per share, assuming the issuance by us of an aggregate of 2,455,228 shares of common stock pursuant to the CSIA in connection with the closing of this offering and that the combined public offering price remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering. Similarly, a decrease of 1,000,000 shares of common stock and accompanying warrants in the number of shares of common stock and accompanying warrants offered by us from the assumed number of shares of common stock and accompanying warrants set forth on the cover page of this prospectus would decrease our as adjusted net tangible book value after this offering by $0.9 million, or $0.04 per share, and the dilution per share to investors purchasing securities in this offering would be approximately $(0.91), assuming the issuance by us of an aggregate of 2,455,228 shares of common stock pursuant to the CSIA in connection with the closing of this offering and that the combined public offering price remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering. The information discussed above is illustrative only and will adjust based on the actual public offering price, the actual number of shares and warrants that we offer in this offering, the actual number of shares or other consideration provided to the Holders under the CSIA in connection with the closing of this offering, and other terms of this offering determined at pricing.

The foregoing discussion and table does not take into account further dilution to investors in this offering that could occur upon the exercise of outstanding options and warrants, including the warrants offered in this offering, having a per share exercise price less than the public offering price per share in this offering.

The foregoing discussion and table are based on 11,120,394 shares of common stock outstanding as of September 30, 2016, and excludes as of that date:

736,938 shares of common stock issuable upon the exercise of outstanding stock options, at a weighted-average exercise price of $6.78 per share;

1,652,162 shares of common stock reserved for future issuance under the 2016 plan;

120,000 shares of common stock reserved for future issuance under the ESPP; and

2,443,479 shares of common stock issuable upon the exercise of outstanding warrants, at a weighted-average exercise price of $5.87 per share.

To the extent that options or warrants outstanding as of September 30, 2016 have been or may be exercised or other shares issued, investors purchasing securities in this offering may experience further dilution. In addition, we may seek to raise additional capital in the future through the sale of equity or convertible debt securities. To the extent that additional capital is raised through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

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BUSINESS

Company Overview

We are a biotechnology company focused on the discovery, development and commercialization of novel phage therapeutics. Phage therapeutics use bacteriophages, a family of viruses, to kill pathogenic bacteria. Phages have powerful and highly selective mechanisms of action that permit them to target and kill specific bacteria. We believe that phages represent a promising means to treat bacterial infections, especially those that have developed resistance to current therapies, including the so-called multi-drug-resistant or superbug strains of bacteria.

Our goal is to be the leading developer of phage therapeutics. We are combining our expertise in the manufacture of drug-quality bacteriophages and our proprietary approach and expertise in identifying, characterizing and developing naturally occurring bacteriophages with that of our collaboration partners in bacteriophage biology, synthetic biology and manufacturing, to develop second-generation bacteriophage products.

The extensive use of antibiotics since their discovery in the 1940s has resulted in drug resistance among many disease-causing bacteria. According to the U.S. Centers for Disease Control and Prevention, or CDC, resistance to antibiotics threatens to reverse many of the key medical advances of the last half-century. Examples of clinically important microbes that are rapidly developing resistance to available antimicrobials include bacteria that cause skin, bone, lung and bloodstream infections (e.g., *S. aureus* and methicillin-resistant *S. aureus*, or MRSA), pneumonia and lung infections in both community and hospital settings and cystic fibrosis patients (e.g., *A. baumanii, P. aeruginosa,* and *K. pneumoniae*), meningitis (e.g., *S. pneumonia*), urinary tract and gastrointestinal infections (e.g., *E. coli* and *C. difficile*). As phages kill bacteria in ways entirely unlike the mechanisms used by traditional antibiotics, we believe that multi-drug resistant bacteria will be susceptible to phage therapy. Furthermore, should resistant bacteria emerge or evolve, we believe it will remain possible to identify phages that can effectively kill these resistant bacteria.

Our lead product candidate is AB-SA01, for the treatment of *S. aureus* infections, including MRSA. We also have another product candidate in earlier stage development, AB-PA01 for the treatment of *P. aeruginosa* infections, and an additional discovery program, AB-CD01 for the treatment of *C. difficile* infections.

We are developing our phage product candidates using a proprietary discovery and development platform, which is designed for rapid identification, characterization and manufacturing of multiple phage therapeutics. Each product candidate combines several carefully chosen phages, which target a specific disease-causing bacteria such as *S. aureus, P. aeruginosa*, and *C. difficile*. We believe that the combination of our platform, our manufacturing capability, our understanding of the regulatory and development requirements of bacteriophage therapeutics, and the clinical and scientific expertise of our collaboration partners may enable the rapid advancement of phage therapeutics through the clinic and the regulatory approval process.

In June 2013, we entered into a cooperative research and development agreement, or Research and Development Agreement, with the United States Army Medical Research and Materiel Command focusing on developing bacteriophage therapeutics to treat *S. aureus*, *E. coli* and *P. aeruginosa* infections. Under this Research and Development Agreement, we completed enrollment of a Phase 1 safety study of AB-SA01 for the treatment of wounds infected with *S. aureus* in July 2016. In September 2016, we reported topline safety and tolerability results which demonstrated that AB-SA01 was well-tolerated with no drug-related serious adverse events. The complete study report is expected by the end of 2016.

In September 2013, we entered into a license agreement, or the Leicester License Agreement, with the University of Leicester to develop a phage therapy to kill certain types of *C. difficile*. Pursuant to the Leicester License Agreement, we may be obligated to pay the University of Leicester a single digit royalty and an aggregate of up to £575,000 in milestone payments.

In November 2015, our Australian subsidiary, AmpliPhi Australia Pty Ltd, entered into a clinical trial research agreement with the University of Adelaide and the Queen Elizabeth Hospital, both of Adelaide, SA, Australia, to conduct a Phase 1 clinical trial titled A Phase 1 Investigator Initiated Study to Evaluate the Safety, Tolerability and Preliminary Effectiveness of AB-SA01 in Patients with Chronic Rhinosinusitis Associated with *S. aureus* infection . The University of Adelaide is sponsoring the clinical trial while we supply

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AB-SA01 and control the trial protocol. This clinical trial will primarily measure the safety and tolerability of AB-SA01 and will secondarily examine the presence of *S. aureus* and symptoms assessed by the patient as well as by the physician using standard questionnaires used by physicians to assess treatment efficacy. We enrolled nine patients in the trial, divided into three cohorts. The first cohort received a twice daily dose of AB-SA01 for seven days. The second cohort received the same dose twice daily for 14 days. The third cohort received a higher dose of AB-SA01 twice daily for 14 days. Patients will be monitored an additional 30 days following their last day of treatment. In October 2016, we reported topline safety and tolerability results which demonstrated that AB-SA01 was well-tolerated with no drug-related serious adverse events. We are planning a Phase 2 trial in chronic rhinosinusitis patients, to commence in the second half of 2017.

In January 2016, we entered into an Asset Purchase Agreement with Novolytics Ltd., which we refer to as the Novolytics Purchase Agreement, to purchase certain tangible and intangible assets. Pursuant to the Novolytics Purchase Agreement, we acquired all rights, title and interest to two families of patents. The first patent family is titled Anti-bacterial compositions and has been granted in Australia and China with prosecution pending in the United States and other countries. The second patent family is titled Novel bacteriophages and the prosecution is pending in the United States and other countries. We also received clinical isolates for *S. aureus* which will bolster our libraries of clinically relevant strains. Additionally, we received know-how relating to certain formulation processes. We also have access to all previous dialogue between Novolytics and various regulatory organizations including the United Kingdom Medicines and Healthcare Products Regulatory Agency, or MHRA.

The Need for New Anti-Infective Therapies

The rapid and continuous emergence of antibiotic-resistant bacteria has become a global crisis. Despite this crisis, the number of novel anti-infective therapies currently in development is at historically-low levels. The CDC estimates that more than two million people in the United States acquire an antibiotic-resistant infection each year and more than 23,000 of these prove fatal. It is estimated that 50% of hospital-acquired infections are resistant to first-line anti-infective therapies. The cumulative annual cost for treating resistant bacterial infections in the United States alone is estimated to be $20 billion, while the global antibiotics market opportunity was estimated to be $40.3 billion in 2015.

The CDC s latest report on the matter, *Antibiotic Resistance Threats in the United States, 2013*, notes that there are potentially catastrophic consequences of inaction and ranks *C. difficile* as belonging to the highest tier of threat, or Urgent Threats. Despite the potential market opportunity, only two New Drug Applications, or NDAs, for antibacterial drugs were approved by the FDA between 2010 and 2012 compared to 18 in the period between 1980 and 1984. One of the primary recommendations of the CDC is the development of new antimicrobials to diversify treatment options.

Product Candidates

AB-SA01: Infections Caused by S. aureus

By screening our proprietary library of phage samples, we have selected a phage product candidate mix that has demonstrated, in *in vitro* studies, greater than 92% activity against a global diversity panel that includes some of the most virulent isolates of *S. aureus*, including MRSA isolates. The three phage constituents of AB-SA01 were subsequently tested for their ability to infect clinically relevant bacterial isolates collected from around the world and were shown to have similar activity with maximal complementation. Complementation, defined as the percentage of

S. aureus isolates susceptible to more than one phage, is emphasized in product selection to reduce risk of the emergence of bacterial resistance.

In connection with our Research and Development Agreement with the U.S. Army Medical Research and Materiel Command, we are developing AB-SA01 to treat acute and chronic infections caused by *S. aureus*, including infections caused by MRSA strains of the same bacterium. MRSA infections are one of the most common causes of hospital-acquired (nosocomial) infections. The CDC estimates that more than 850,000 patients were treated for *S. aureus* infections of the skin or soft tissue in 2013 and, due to failure of first line treatment, more than 50% of these patients required a second-line treatment and approximately 35% of them required a third-line treatment. Global Data estimates the market for MRSA infection treatments alone was more than $2.7 billion in 2007. This market is forecasted to grow to more than $3.5 billion by 2019.

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Also in connection with our Research and Development Agreement with the U.S. Army, we submitted a pre-IND briefing package to the FDA to obtain their feedback on our Chemistry, Manufacturing and Controls, or CMC, program and plans for our first human clinical trial of AB-SA01 for the treatment of *S. aureus* infections of wound and skin. The FDA concurred with our plan for progressing this bacteriophage product candidate into clinical trials, specifically agreeing with the proposed manufacturing process and product specifications and not requiring non-clinical toxicology data to initiate our first Phase 1 clinical trial. We initiated the Phase 1 clinical trial in May 2016 and completed enrollment in July 2016. In September 2016, we announced topline safety and tolerability results, and we expect the complete study report to be available by the end of 2016.

In December 2015, we opened a clinical trial at the University of Adelaide Queen Elizabeth Hospital to evaluate the safety and preliminary efficacy of AB-SA01 in chronic rhinosinusitis patients infected with *S. aureus*. In October 2016, we reported topline safety and tolerability results and we expect the complete study report to be available by the end of 2016. We expect to initiate a Phase 2 trial of AB-SA01 in the second half of 2017 and to complete that trial within approximately 12 months thereafter.

AB-PA01: Lung Infections in Cystic Fibrosis (CF) Patients Caused by P. aeruginosa

We are initially developing AB-PA01 for the treatment of *P. aeruginosa*, the most prevalent bacterial infection in cystic fibrosis, or CF, patients and the one that leads to the highest mortality and is the primary cause of lung infection in approximately 80% of CF patients ages 25 to 34, causing an estimated 450 deaths per year in the United States. To develop our product candidates, we have created a global diversity panel of relevant clinical isolates (bacteria isolated from patients) from clinics around the globe. These diversity panels have been screened against our phage libraries, which are isolated and characterized according to our set of proprietary discovery protocols. We have demonstrated, in *in vitro* and *in vivo* studies, that our proprietary phage mix is able to effectively kill targeted bacteria. Furthermore, our phage mixes are selected to exhibit a high degree of overlap, defined as the number of bacteria targeted by more than one phage in the product. We believe that high overlap is an important factor in preventing bacteria from developing resistance to our phage product candidates.

Similar to work described above for *S. aureus*, we have tested over 400 clinical *P. aeruginosa* clinical isolates. As an example, initial host range testing was performed with a reference panel of 67 CF isolates. AB-PA01 showed an activity of 95.5% (64/67) with 87.5% (56/64) of the positives isolates hit by more than one phage in the mix.

In collaboration with Institut Pasteur (Paris, France) and also with the Brompton Hospital, Imperial College (London, United Kingdom), we have demonstrated in the preclinical studies that phages can effectively treat infections in animal models of acute *P. aeruginosa* lung infections. In one such study, we inoculated eight mice and treated them with either PBS (control group), our phage mix, or with an antibiotic.

Bacterial counts and the number of bacteriophage infection units detected by assay, or phage titers, were measured in these animals after 24 hours, and the results demonstrated that our phage mix effectively lowered the bacterial counts, or CFU, in the mouse lung to levels comparable to antibiotic treatment (PBS vs. antibiotic, p=0.0003; PBS vs. bacteriophage, p=0.0003). A p-value is a statistical measure of the probability that the difference in two values could have occurred by chance. The smaller the p-value, the lower the likelihood is that the difference occurred by chance, or the greater our confidence is that the results are statistically significant. Furthermore, it was evident that phage replicated to high levels in the infected lung.

An additional preclinical study conducted at the Institut Pasteur in mice (12 mice in each of the treatment and control groups) demonstrated the ability of our phage mix to reach the lung within two hours of being delivered by oral administration. The phage levels increased between two and six hours post-treatment, and the results were statistically significant (p-value <0.001). These results demonstrate that when orally administered in mice, phages not only reached the lungs, but were also able to infect and multiply in target bacteria.

In a separate *in vivo* study of acute *P. aeruginosa* infection of the mouse lung conducted at the Brompton Clinic, results demonstrated that our phage mix reduced CFU levels upon simultaneous intranasal

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administration (six mice in each of the treatment and control groups) and also when administered 24 hours post-bacterial infection (seven mice in the treatment group and eight mice in the control group) using a standard strain of *P. aeruginosa*, Pa01.

We were granted an advisory meeting with the MHRA in the first quarter of 2014 to discuss our plans and intend to move the AB-PA01 compound into additional preclinical testing in preparation for a Phase 1/2 clinical trial in CF patients. We also sought advice on the acceptability of CMC plans. The MHRA concurred with our approach and plans as presented, including a first-in-man dose ranging clinical trial in CF patients. We have completed product candidate selection and are currently conducting manufacturing process development and scale-up with the goal of initiating inhalation toxicology studies in the first quarter of 2017 and completing such studies within approximately six months thereafter. We plan to initiate a Phase 1 single-ascending dose study in CF patients during the second half of 2017 and currently expect to complete that study within approximately 12 months thereafter.

We are also currently evaluating our *P. aeruginosa* phages in preclinical animal models of chronic rhinosinusitis in collaboration with the University of Adelaide. Pending the outcome of this study, we also expect to move AB-PA01 into a chronic rhinosinusitis study in Australia in the second half of 2017. We expect the study to be similar in design to our current Phase 1 study of AB-SA01 in chronic rhinosinusitis, except the AB-PA01 study will target *P. aeruginosa* in chronic rhinosinusitis patients.

If we achieve successful proof of concept studies, we may consider developing this compound for the treatment of other acute and chronic lung infections, such as ventilator associated bacterial pneumonia, or VABP, and chronic obstructive pulmonary disease, or COPD. *P. aeruginosa* is the predominant pathogen in these indications.

AB-CD01: Gastrointestinal (GI) Infection Caused by C. difficile, or CDI

From 2000 through 2007, deaths in the United States from CDI increased over 400%. Over 90% of such deaths occur in hospitalized or confined patients over the age of 65. Global Data estimates that the major European Union and United States markets for CDI therapies grew to more than $314 million in 2011 and they are expected to grow to more than $500 million by 2019.

According to the CDC almost 250,000 people each year require hospitalization for CDI and at least 14,000 people die each year in the United States from CDI. The CDC also estimates that 20 40% of CDI recurs with standard antibiotic treatment. We are actively working with researchers at the University of Leicester to develop a phage therapeutic that targets and kills *C. difficile*. We believe that orally delivered phages are well suited to treat CDI. Within this collaboration, researchers at the University of Leicester have discovered phages that have been shown to be effective *in vitro* and *in vivo* against clinically-relevant strains of *C. difficile* isolated from around the world. These same researchers have also shown phage cocktails to be effective in preventing *C. difficile* biofilm formation *in vitro*. While current pathogenic strains of *C. difficile* are not yet antibiotic-resistant, the CDC has categorized *C. difficile* as an urgent threat and has stated that CDI requires urgent and aggressive action. We believe that there is a significant market opportunity for our product in treating this infection.

Preclinical studies are underway to select and optimize our phage cocktail and manufacturing strains as well as evaluate their efficacy in animal models.

Prior Clinical Development

In 2010, our wholly owned subsidiary, Biocontrol Ltd, reported a double-blind placebo-controlled, randomized Phase 1/2 clinical trial targeting chronic ear infections (otitis) caused by *P. aeruginosa*. To our knowledge, this was the first randomized placebo-controlled efficacy trial of bacteriophage therapy. Results were published demonstrating decreasing levels of *P. aeruginosa* in the ear and improvement of clinical condition with a single input dose of 2.4 nanograms of bacteriophage preparation. While this was a small trial (n=24), changes from baseline at the end of the trial in the test group (n=12) were statistically significant for both clinical condition (p=0.001) and bacterial load (p=0.016). No significant changes were seen in the control group (n=12) compared to baseline at the end of the trial. Difference between test and control groups was statistically significant by analysis by covariance on day 21 for bacterial count (p=0.0365). These results will need to be validated in larger well-controlled trials.

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Anti-Infective Therapeutics Market

The market opportunity for antibiotics is large, with the market estimated to reach $40.3 billion in annual sales globally in 2015. Almost one in every five deaths worldwide occurs as a result of infection and, according to the World Health Organization, or WHO, many bacterial infections will become difficult or impossible to cure as the efficacy of current antibiotic drugs wanes. Despite the advances in antimicrobial and vaccine development, infectious diseases still remain as the third-leading cause of death in the United States and the second-leading cause of death worldwide.

The number of new antibiotics approved by the FDA and other global regulatory authorities has declined consistently over the last two decades. According to the PEW Charitable Trusts report, as of March 2016 there are an estimated 37 new antibiotics in clinical development for the U.S. market. Historically, the success rate from Phase 1 to marketing approval is only 1 in 5 for infectious disease products. We therefore believe there is a need for new approaches to treat serious bacterial infections. Hospital-acquired (nosocomial) infections are a major healthcare problem throughout the world, affecting developed countries as well as resource-poor countries. The WHO reports that hospital-acquired infections are among the major causes of death and increased morbidity among hospitalized patients and estimates that more than 1.4 million people per year worldwide suffer from infectious complications from a hospital stay.

A recent CDC report also cites that in the United States, between 5 and 10% of all patients admitted to a hospital will be affected by a hospital-acquired infection during their stay, typically requiring extended stays and additional care. There is also a significant risk of death from such infections. In the United States, the CDC estimates that approximately 99,000 people die from hospital-acquired infections each year. The Cystic Fibrosis Foundation estimates that *P. aeruginosa* accounts for 10% of all hospital-acquired infections.

Compounding the above situations is the alarming and continuing rise in the prevalence of antibiotic-resistant bacterial infections. This, coupled with the lack of new antibiotics in current discovery and development pipelines, has generated a significant clinical management problem worldwide, leading to increases in morbidity and mortality due to these antibiotic-resistant bacteria as well as increases in healthcare costs.

The first of these antibiotic-resistant infections to reach epidemic proportions was caused by the Gram-positive bacterium *S. aureus*. *S. aureus* resistance to a broad range of antibiotics has necessitated the use of expensive and potentially toxic drugs of last resort , most notably vancomycin. Antibiotic-resistant forms of *S. aureus*, usually termed MRSA, VISA (vancomycin-intermediate *S. aureus*), or VRSA (vancomycin-resistant *S. aureus*), can be extremely challenging to treat. Although several antibiotics targeting *S. aureus* have been developed, rapidly developing bacterial resistance has been noted for all of these including linezolid, daptomycin and tigecycline. On the basis of historical evidence, resistance to these existing products is likely to increase over time, and this picture is further complicated by the reduced efficacy of conventional antibiotics against *Staphylococcus* biofilms.

Typically, *S. aureus* infection causes a variety of suppurative (pus-forming) infections and toxinoses (lesions) in humans. It causes superficial skin lesions such as boils, styes and furuncles; more serious infections such as pneumonia, mastitis, phlebitis, meningitis and urinary tract infections; and deep-seated infections, such as osteomyelitis and endocarditis. *S. aureus* is the leading cause of wound infections, in particular, hospital-acquired (nosocomial) infection of surgical wounds and infections associated with indwelling medical devices. *S. aureus* is the leading pathogen in healthcare-associated infections in the United States as a whole, accounting for 30.4% of surgical site infections, or SSI, and 15.6% of such infections overall.

Infections also occur in connection with CF, which is a genetic disease affecting primarily Caucasians of northern European descent. According to the Cystic Fibrosis Foundation, there are approximately 50,000 cases of CF in North America and Europe. *P. aeruginosa* opportunistically infects the mucous membranes, primarily the lungs, of CF patients and quickly grows out of control, resulting in pneumonia. *P. aeruginosa* infections are notoriously resistant to known antibiotics, and treatment may be further complicated by the formation of biofilms. Biofilms are organized structures of microorganisms growing on solid surfaces (such as lung tissue) and often limit access of antibiotics to the covered tissues. Since phages attack bacteria in a manner independent of chemical antibiotic resistance mechanisms and can infect bacteria growing in biofilms, we believe that *P. aeruginosa* infection among CF patients represents a compelling indication to pursue. The

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availability of *Pseudomonas*-specific phages along with validated animal models of *P. aeruginosa* lung infections has contributed to the development of our bacteriophage program in CF.

Anti-Infective Treatments with Bacteriophages

Background

The dramatic rise in antibiotic resistance, the appearance of an increasing number of new superbugs and the lack of new antibiotics in the pipeline has prompted calls to action from many of the world s major health bodies such as the CDC and the WHO, who warn of an antibiotic cliff and a post-antibiotic era. In 2009, the European Antimicrobial Resistance Surveillance System, or EARSS, concluded that the loss of effective antimicrobial therapy increasingly threatens the delivery of crucial health services in hospitals and in the community. This conclusion was reinforced by The Antimicrobial Availability Task Force, or AATF, of the Infectious Diseases Society of America, or IDSA, and the European Centre for Disease Prevention and Control, or ECDC, in conjunction with the European Medicine Agency, or EMA. Clearly, there is a pressing need to find alternative antibacterial therapies.

Bacteriophage therapy has the potential to be an alternative method of treating bacterial infection. Phages are ubiquitous environmental viruses that grow only within bacteria. The name bacteriophage translates as eaters of bacteria and reflects the fact that as they grow, phages kill the bacterial host by multiplying inside and then bursting through the cell membrane in order to release the next generation of phages. Phages can differ substantially in morphology and each phage is active against a specific range of a given bacterial species. Phages were first discovered in 1915 at the Institut Pasteur and were shown to kill bacteria taken from patients suffering from dysentery. Furthermore, it was noted that phage numbers rose as patients recovered from infection, suggesting a direct association.

Life Cycle of a Bacteriophage

Until the discovery of effective antibiotics, phages were used as an effective means of combating bacterial infection. When broad-spectrum antibiotics came into common use in the early 1940s, phages were considered unnecessary, with antibiotics being seen for many years as the answer to bacterial disease. This attitude persisted until the development of the wide-ranging, and in some cases total, resistance to antibiotics seen within the last 10 years.

Phages have the potential to provide both an alternative to, and a synergistic approach with, antibiotic therapy. Since they use different mechanisms of action, phages are unaffected by resistance to conventional antibiotics. Phages containing certain enzymes also have the ability to disrupt bacterial biofilms, thus potentiating the effect of chemical antibiotics when used in combination with them.

Our Strategy

Our strategy is to use techniques of modern biotechnology and current state-of-the-art practices for drug development in concert with existing regulatory guidance to develop a pipeline of bacteriophage products that will destroy bacteria such as MRSA, which are resistant to antibiotics. Our business strategy will apply state-of-the-art techniques in molecular biology and in clinical trial design to build upon the long successful history of using phages therapeutically to treat and cure infections.

We supplement our internal resources with world-class scientific and medical collaborations throughout the world. For example, through a collaboration with The University of Adelaide in Australia and the University

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Hospital Ghent in Belgium, we conducted preclinical studies showing the ability of *S. aureus* phage preparations to kill over 140 clinical isolates from chronic rhinosinusitis patients demonstrating activity of greater than 90%. Furthermore, a *S. aureus* mixture was shown to be safe and efficacious in a preclinical sheep model of chronic rhinosinusitis. A Phase 1 clinical trial for this program is being conducted at the University of Adelaide s Queen Elizabeth Hospital for the treatment of patients suffering from chronic rhinosinusitis associated with S. *aureus* infection. Enrollment has been completed and we announced topline safety and tolerability results in October 2016. A complete study report is expected by the end of 2016. In August 2016, we tested AB-SA01 against 90 *S. aureus* clinical isolates from chronic rhinosinusitis patients located in Belgium and showed similar activity to isolates obtained from Australian patients, highlighting the diverse geographic activity of our phage cocktail.

In collaboration with the U.S. Army, we are conducting a Phase 1 safety study under an IND that we believe will support the further development of a treatment for *S. aureus* infections for wound and skin infections. We reported topline safety and tolerability results in September 2016 and expect a complete study report by the end of 2016.

We collaborate with the Royal Brompton Hospital in London where we have demonstrated that a candidate phage product can survive nebulization, was effective in killing over 83% of recent clinical *P. aeruginosa* isolates, and in preclinical mouse models demonstrated that a phage mixture dose-dependently clears *P. aeruginosa* infection from the lung and reduced inflammation.

We have completed selection of the phages for drug product selection for AB-PA01, and in conjunction with the Brompton Hospital, we would expect to conduct a Phase 1/2 study using AB-PA01 to treat CF patients with *P. aeruginosa* lung infections.

Acquisitions

In January 2011, we completed the acquisition of Biocontrol Ltd, with the goal of developing their phage therapy programs using funding from the sale of our legacy gene therapy assets. Under the terms of our acquisition of Biocontrol Ltd, we issued 456,344 shares of our common stock to the stockholders of Biocontrol Ltd with a total fair value of approximately $8.6 million as of January 6, 2011, resulting in Biocontrol s former stockholders owning approximately 50% of our outstanding equity securities at the time. As a condition to closing the acquisition, Biocontrol Ltd raised approximately £200,000 (US$310,000) in working capital for use by us.

In November 2012, we completed the acquisition of Special Phage Holdings Pty Ltd, a company based in Australia, which we refer to as SPH, with the goal of combining SPH s research on addressing the rapidly escalating problem of antibiotic resistance through the development of a series of bacteriophage-based treatments into our own development programs. We acquired SPH in exchange for shares of our common stock pursuant to the terms of a Stockholder Sale Agreement and a Managers Warranty Deed.

In connection with our acquisition of SPH, we entered into certain other arrangements, including the repayment under a Loan Repayment Deed (as amended) of a $770,000 loan originally made by Cellabs Pty Ltd, or Cellabs, an Australian company, to SPH, a consulting agreement with Dr. Anthony Smithyman and the payment of $3,017 per month to Cellabs for our laboratory space in Australia through December 31, 2015. Under the terms of the Loan Repayment Deed, the loan from Cellabs to SPH was to be repaid and fully satisfied partly in cash and partly by issuing 40,000 shares of our common stock to Cellabs. As of December 31, 2015, $350,000 has been paid by us to Cellabs and all 40,000 shares have been issued. We paid the remaining balance of $200,000 under the terms of the Loan Repayment Deed in December 2013. The SPH acquisition also included several phage therapy projects which had reached the pre-clinical or animal study stage, including the Brompton Hospital CF study, the Adelaide University

MRSA chronic rhinosinusitis study and the University of Leicester *C. difficile* project. We believe that acquisition of SPH brought substantial phage scientific expertise and know-how to us.

In January 2016, we entered the Novolytics Purchase Agreement, pursuant to which we acquired all rights, title and interest to two families of patents. The first patent family is titled Anti-bacterial compositions and has been granted in Australia and China, with prosecution pending in the United States and other countries. The second patent family is titled Novel bacteriophages and the prosecution is pending in the United States

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and other countries. We also received clinical isolates for *S. aureus* which will bolster our libraries of clinically relevant strains. Additionally, we received know-how relating to certain formulation processes. We also have access to all previous dialogue between Novolytics and various regulatory organizations including the MHRA.

In connection with the Novolytics Purchase Agreement, we paid cash to Novolytics to cover expenses incurred in connection with winding up its phage-related business, as well as warrants to the stockholders of Novolytics to purchase up to an aggregate of 170,000 shares of our common stock, each with an exercise price of $12.00 per share. Pursuant to the terms of the Novolytics Purchase Agreement, we granted certain registration rights covering the resale of the shares of common stock underlying such warrants.

Strategic Alliances and Research and License Agreements

As discussed below, we have established collaborations with the U.S. Army and the University of Leicester, which provide us with access to the considerable scientific, developmental, and regulatory capabilities of our collaborators. We believe that our collaborations contribute to our ability to rapidly advance our product candidates, build our product platform and concurrently progress a wide range of discovery and development programs.

Global R&D Agreement with U.S. Army

In June 2013, we entered into a Research and Development Agreement with the U.S. Army Medical Research and Materiel Command. The Research and Development Agreement focuses on developing bacteriophage therapeutics to treat at least three types of infections: *S. aureus*, *E. coli* and *P. aeruginosa*. The initial indication will be wounds and skin infections from *S. aureus*, which is the leading pathogen in healthcare-associated infections in the United States as a whole, accounting for 30.4% of surgical site infections.

We retain global regulatory ownership and commercial rights to all products developed by us under the Research and Development Agreement. The U.S. Army Medical Research and Materiel Command will have the right to retain a non-exclusive license to use any products developed by or on behalf of the U.S. Government for non-commercial uses. We also have the rights to exclusively license any intellectual property developed by the U.S. Army Medical Research and Materiel Command under the collaboration on terms to be agreed upon.

The Research and Development Agreement expires in June 2018 and can be terminated by either the U.S. Army Medical Research and Materiel Command or us upon 60 days written notice to the other party at any time.

University of Leicester Development Agreements

In April and September 2013, we entered into a collaboration agreement and a license agreement, respectively, with the University of Leicester to develop a phage therapy that targets and kills *C. difficile*.

Under these agreements, which we refer to collectively as the Leicester Development Agreements, we are funding the University of Leicester to carry out *in vitro* studies and animal model development work to identify bacteriophage to resolve *C. difficile* infections. We have licensed related patents, materials and know-how from the University of Leicester. Under the Leicester Development Agreements, the University of Leicester will provide the bacteriophage and act as overall project coordinator for preclinical studies. All rights, title and interest to any intellectual property developed under the Leicester Development Agreements belong to us. Under the Leicester License Agreement, we have exclusive rights to certain patents and materials owned by the University of Leicester, as well as non-exclusive licenses to related know-how.

The collaboration agreement expires in November 2018 and is terminable by either party upon (a) material breach by the other party, subject to a 90-day cure period, (b) the inability of the principal investigator to continue the collaboration or (c) our bankruptcy or winding up of our operations or, commencing on November 13, 2016, with 180 days notice.

Pursuant to the Leicester License Agreement, we paid an up-front fee and will pay the University of Leicester royalties based on product sales and make certain milestone payments based on product development. We are

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also required to pay minimum annual fees, which reduce future milestone payments. In the event that we sublicense a product created under the Leicester Development Agreements, we have agreed to pay the University of Leicester certain milestone payments or a certain percentage of any sublicense revenue received by us for the attainment of such milestone, as well as a certain percentage of all royalty payments we receive from any sublicensees.

The license agreement expires on the later of the expiration of the licensed patents or September 2028, and is terminable by us at any time upon 60 days notice, by the University of Leicester (a) if we legally challenge the validity or ownership of any of the licensed patents, (b) if we fail to pay the fees, milestones or royalties due under the license agreement or (c) if we fail to make substantial commercial process and agree with Leicester that we will be unable to do so. The license agreement is also terminable by either party upon the material breach by the other party (subject to a 30-day cure period) or upon the other party s bankruptcy or insolvency.

License Agreement with United Kingdom Secretary of State for the Department of Health

In January 2011, upon completion of our acquisition of Biocontrol Ltd., we assumed a license agreement entered into in March 2007 between Biocontrol Ltd. and the Health Protection Agency, Centre for Emergency Preparedness and Response, to use certain intellectual property rights to develop treatments for bacterial biofilm infections. The agreement was subsequently assigned to the United Kingdom Secretary of State for the Department of Health, or DoH.

Under the license agreement, we have obtained exclusive rights to a patent portfolio related to the use of bacteriophages combined with biofilm-disrupting agents in treating biofilm infections. In consideration for the exclusive license, we may be required to pay to the DoH certain milestone payments in the aggregate of up to £10,000 per product, as well as single digit percentage royalty on net sales of products incorporating licensed intellectual property.

The license agreement shall remain in full force and effect until the expiration of the last patent exclusively licensed under the license agreement. If we default on any milestone or royalty payments, or upon breach by us of certain other terms of the license agreement, the DoH may either terminate the license agreement immediately upon written notice or modify the license to be non-exclusive upon 30 days written notice.

Intellectual Property

General

Our goal is to obtain, maintain and enforce patent protection for our product candidates, formulations, processes, methods and any other proprietary technologies, preserve our trade secrets and operate without infringing on the proprietary rights of other parties, both in the United States and in other countries. Our policy is to actively seek to obtain, where appropriate, the broadest intellectual property protection possible for our current product candidates and any future product candidates, proprietary information and proprietary technology through a combination of contractual arrangements and patents, both in the United States and abroad. However, patent protection may not afford us with complete protection against competitors who seek to circumvent our patents.

We also depend upon the skills, knowledge, experience and know-how of our management and research and development personnel, as well as that of our advisors, consultants and other contractors. To help protect our

proprietary know-how, which is not patentable, and for inventions for which patents may be difficult to enforce, we currently and will in the future rely on trade secret protection and confidentiality agreements to protect our interests. To this end, we require all of our employees, consultants, advisors and other contractors to enter into confidentiality agreements that prohibit the disclosure of confidential information and, where applicable, require disclosure and assignment to us of the ideas, developments, discoveries and inventions important to our business.

As of November 9, 2016, we owned or had exclusive license rights to a total of 65 patents and applications: five U.S. patents, seven U.S. patent applications, 39 foreign patents, and 14 foreign patent applications, expiring on various dates between 2024 and 2036. These patents and applications cover our lead phage-therapeutic programs and use thereof, the sequential use of bacteriophages in combination with

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conventional antibiotics, genetic sequence variations, biofilm disrupting agents, methods to reduce antibiotic resistance, methods to design therapeutic combination panels of bacteriophage, disinfection methods using bacteriophages, and bacteriophage mutants having increased bacterial host spectra.

US 7758856 and national patents within the EU deriving from PCT WO2004062677; Bacteriophage for the treatment of bacterial biofilms

Under an existing license from the United Kingdom Secretary of State for the Department of Health (DoH), we have exclusive rights to a patent portfolio related to the use of bacteriophages combined with biofilm-disrupting agents in treating biofilm infections. This portfolio includes one issued patent in the United States and a patent granted in Europe (EP1587520 is validated in France, Germany, Netherlands, Switzerland, Liechtenstein and the United Kingdom). Claims issued in these patents include those directed to compositions and methods related to agents that are able to facilitate the penetration of biofilms, and their combination with therapeutic bacteriophage preparations. The U.S. patent is expected to expire in December 2026 (absent any extensions). The foreign patents are expected to expire in January 2024 (absent any extensions).

US 7807149, US 8105579, US 8388946, continuation application and national filings deriving from PCT WO2005009451; Bacteriophage containing therapeutic agents

Through our wholly owned subsidiary, Biocontrol Ltd, we own three granted U.S. patents and one pending U.S. continuation patent application (US 13/757655) with claims directed generally to bacteriophage compositions, therapeutic methods of using bacteriophages, and methods of treating bacterial infections by sequentially administering bacteriophages in combination with conventional antibiotics. The pending U.S. continuation application relates generally to panels of bacteriophages with different strain specificities for bacterial infections. Corresponding patents have been granted in Australia (AU2004258731), Europe (EP1663265 and EP2570130 both patents are validated in the United Kingdom, Switzerland, Liechtenstein, Germany, Spain, France, Italy and the Netherlands), Japan (JP5731727 and JP5856556) and Canada (CA2533352). Claims issued in these patents include those directed to therapeutic and non-therapeutic applications of bacteriophage and the sequential use of antibiotics to treat bacterial infections. U.S. patents are expected to expire from July 2024 to March 2027 (absent any extensions). The foreign patents are expected to expire in July 2024 to March 2027 (absent any extensions).

US 8475787, continuation application and national filings deriving from PCT WO2008110840; Beneficial effects of bacteriophage treatment

Through our wholly owned subsidiary, Biocontrol Ltd, we own one granted U.S. patent (8475787), and one pending continuation application (14/625049). This patent family broadly relates to bacteriophage-induced induction of antibiotic sensitivity in a bacterial target, such as *P. aeruginosa*. The granted U.S. patent is expected to expire in July 2029 (absent any extensions). Corresponding patents have been granted in Australia (AU2008224651), Europe (EP2136826 validated in the United Kingdom, Switzerland/Liechtenstein, Germany, Spain, France, Italy and the Netherlands), and Japan (JP5988417 and JP6004543). A related Canadian application (CA2680108) is currently pending. Foreign patents in this family are expected to expire in March 2028 (absent any extensions).

PCT WO2013/164640 (United Kingdom earliest priority filing 1207910.9); Therapeutic bacteriophage compositions

Through our wholly owned subsidiary, Biocontrol Ltd, we own a Patent Cooperation Treaty, or PCT, application relating to the design of effective bacteriophage combinations and elimination of antagonistic effects between said bacteriophage. The PCT application published on November 7, 2013, and following International Preliminary Examination a positive patentability opinion issued. National/regional phase applications are currently pending in the U.S. (US14/398384), Canada (CA2871986), Europe (EP2874635), Japan (JP2015/523850), and Australia (AU2013255583). Patents issuing from this PCT, if any, are expected to expire in May 2032 (absent any extensions).

PCT WO2009/044163 (United Kingdom earliest priority filing 0719438.4); Anti-bacterial compositions

Pursuant to the terms of the Asset Purchase Agreement with Novolytics Ltd., we acquired and currently own one U.S. continuation application (14/686315), relating to methods for killing/treating *Staphylococcus aureus*

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and MRSA, among other bacteria, using a combined bacteriophage K and bacteriophage P68 composition. A corresponding patent has been granted in Australia (AU2008306626) and China (CN101835384) and related applications are pending in Australia (AU2015264918), Japan (JP2015/007087), Canada (CA2700646) and Europe (EP2197284). The granted foreign patents are expected to expire October 2028 (absent any extensions).

PCT WO2013/068743 (United Kingdom priority filing 1119167.3); Novel bacteriophages

Pursuant to the terms of the Asset Purchase Agreement with Novolytics Ltd., we acquired and currently own a U.S. patent application (14/356869) relating to *Staphylococcus aureus* and MRSA therapeutics, and in particular Phage K mutants capable of targeting an increased number of *Staphylococcus aureus* strains when compared to wild-type Phage K, as well as uses of said mutant. Related applications are also pending in Australia (AU2012335397), Canada (CA2890450), Japan (JP 2014/533943) and Europe (EP2776559). Any granted patents will expire in November 2033.

US 15/237496 (converted from United States provisional filing 62/204915); Therapeutic bacteriophage compositions

We own U.S. patent application 15/237496, which is directed to our AB-SA01 bacteriophage panel, mutants thereof, and methods of treating *Staphylococcus aureus* infections (including MRSA) comprising the use of same. Corresponding foreign applications are being pursued by way of a parallel PCT application. Any granted patent is expected to expire in August 2036 (absent extensions).

Our success in preserving market exclusivity for our product candidates relies on patent protection, including extensions to this where appropriate, and on data exclusivity relating to an approved biologic. This may be extended by orphan drug and/or pediatric use protection where appropriate. Once any regulatory period of data exclusivity expires, depending on the status of our patent coverage, we may not be able to prevent others from marketing and selling biosimilar versions of our product candidates. We are also dependent upon the diligence of our appointed agents in national jurisdictions, acting for and on our behalf, which manage the prosecution of pending domestic and foreign patent applications and maintain granted domestic and foreign patents.

Competition

We operate in highly competitive segments of the biotechnology and biopharmaceutical markets. We face competition from many different sources, including commercial pharmaceutical and biotechnology enterprises, academic institutions, government agencies and private and public research institutions all seeking to develop novel treatment modalities for bacterial infections. Many of our competitors have significantly greater financial, product development, manufacturing and marketing resources than we do. Large pharmaceutical companies have extensive experience in clinical development and obtaining regulatory approval for drugs. In addition, many universities and private and public research institutes are active in antibacterial research, some in direct competition with us. We also may compete with these organizations to recruit scientists and clinical development personnel.

There are a handful of small biotechnology companies developing bacteriophage products to treat human diseases. Other than our ongoing clinical trials there is, to our knowledge, one corporate-sponsored clinical trial currently enrolling. A French biotechnology company, Pherecydes Pharma, is acting as clinical trial sponsor of a Phase 1/2 clinical trial in Europe of a phage therapy for the treatment of burn wounds infected with either *E. coli* and *P. aeruginosa*, referred to as PhagoBurn. This clinical trial is a randomized, multi-center open label study to assess

tolerance and efficacy of local treatment with a bacteriophage cocktail. A multi-center clinical trial also sponsored by Pherecydes Pharma evaluating a bacteriophage cocktail versus placebo for diabetic foot ulcers, is listed on clinicaltrials.gov as active but not yet enrolling. To our knowledge, a small number of biotechnology companies, including Synthetic Genomics and LytPhage, Inc., as well as academic institutions, have earlier stage discovery programs utilizing synthetic biology approaches to genetically modify bacteriophages to remove or input genes to improve therapeutic properties such as increases to the bacterial host range to infect a larger number of bacterial strains and decrease the need for using multiple phages in a product.

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A related approach to treating *Staphylococcus* infections is being pursued by Contrafect Corporation using a bacteriophage lysin (a hydrolytic enzyme produced by bacteriophages) to treat *S. aureus* bacteremia (infection in the blood). Contrafect has recently completed a Phase 1 intravenous single dose escalation study in healthy volunteers.

Our bacteriophage programs may compete with or be synergistic with currently approved antibiotics, and experimental approaches such as novel antibiotics, antimicrobial peptides, antimicrobial vaccines, metals, antisense, monoclonal antibodies and possibly microbiome manipulation. For example, Seres Therapeutics is developing a single-dose capsule (SER-109) consisting of bacterial spores to treat recurrent CDI (*Clostridium difficile* infection). In May 2015, Seres initiated a multi-center, randomized, placebo-controlled Phase 2 clinical trial, to assess the efficacy and safety of SER-109. SER-109, or similar products that may be in development by third parties, could prove to be competitive to or used in conjunction with a bacteriophage therapeutic approach.

Manufacturing and Supply

We have developed our own manufacturing capabilities at a facility in Ljubljana, Slovenia that is leased by our wholly owned subsidiary, AmpliPhi, Biotehnolo ke Raziskave in Razvoj, d.o.o. We believe that our facility complies with applicable cGMP regulations, which require, among other things, quality control and quality assurance as well as the corresponding maintenance of records and documentation. Pharmaceutical product manufacturers and other entities involved in the manufacture and distribution of approved pharmaceutical products are required to register their establishments with the FDA, and certain state agencies, including the applicable government agency where the facility is located, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMP and other laws.

After conducting a global search, we elected to proceed with establishing a wholly owned cGMP compliant manufacturing facility in Ljubljana, Slovenia. Upon final product selection, we plan to manufacture each of our product candidates in this facility. We have been able to access and hire highly skilled process development and phage manufacturing expertise and believe that we have control of our proprietary platform from phage identification through final product fill and finish. Our facility is comprised of approximately 4,000 sq. ft. of laboratory and office space, where we produce cGMP clinical trial supplies for our current and planned clinical trials. We believe this facility will be sufficient to meet our manufacturing needs through initial Phase 3 clinical trials. Our current formulation for AB-SA01 is intended for sinonasal or topical delivery via a nasal wash solution or dressed bandage. We plan to further optimize future formulations of our product candidates.

Our facility in Ljubljana, Slovenia is subject to inspection and regulation by JAZMP, the Slovenian agency that regulates and supervises pharmaceutical products in Slovenia. Discovery of problems with a product after approval may result in restrictions on a product, manufacturer or holder of an approved New Drug Application/Biologics License Application, including withdrawal of the product from the market. In addition, changes to the manufacturing process generally require prior regulatory approval before being implemented and other types of changes to the approved product, such as adding new indications and additional labeling claims, are also subject to further regulatory review and approval, including approval by the FDA.

Commercialization and Marketing

We have full worldwide commercial rights to all of our phage-based product candidates to treat drug-resistant bacterial infections, including our product candidates: AB-PA01 for the treatment of CF patients with *P. aeruginosa* lung infections; AB-SA01, for the treatment of *S. aureus* infections; and AB-CD01 for the prevention or treatment of *C. difficile* infections. We believe we can maximize the value of our company by retaining substantial global

commercialization rights to these product candidates and, where appropriate, entering into partnerships to develop and commercialize our other product candidates. We plan to build a successful commercial enterprise using a sales team in the United States and possibly other major markets and with partners in other territories.

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We have not yet established a sales, marketing or product distribution infrastructure because our lead candidates are still in early clinical development. We generally expect to retain commercialization and co-commercialization rights in the United States for all of our product candidates for which we receive marketing approvals. Subject to receiving marketing approvals, we intend to explore building the necessary marketing and sales infrastructure to market and sell our current product candidates. We also intend to explore the use of a variety of distribution agreements and commercial partnerships in those territories where we do not establish a sales force for any of our product candidates that obtain marketing approval.

Government Regulation and Product Approval

Government authorities in the United States, at the federal, state and local level, and other countries extensively regulate, among other things, the research, development, testing, manufacture, quality control, approval, labeling, packaging, storage, record-keeping, promotion, advertising, distribution, post-approval monitoring and reporting, marketing and export and import of products such as those we are developing.

United States Product Development Process

In the United States, the FDA regulates biological products under the Federal Food, Drug and Cosmetic Act, or FDCA, and the Public Health Service Act, or the PHS Act, and related regulations. Biological products are also subject to other federal, state and local statutes and regulations. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources. Failure to comply with the applicable United States requirements at any time during the product development process or approval process, or after approval, may subject an applicant to administrative or judicial sanctions. FDA sanctions could include refusal to approve pending applications, withdrawal of an approval, a clinical hold, warning letters, product recalls, product seizures, total or partial suspension of production or distribution injunctions, fines, refusals of government contracts, restitution, disgorgement or civil or criminal penalties. Any agency or judicial enforcement action could have a material adverse effect on us. The process required by the FDA before a biological product may be marketed in the United States generally includes the following:

completion of preclinical laboratory tests, animal studies and formulation studies according to good laboratory practice requirements, or GLP, or other applicable regulations;
submission to the FDA of an IND, which must become effective before human clinical trials may begin in the United States;
performance of adequate and well-controlled human clinical trials according to the FDA s regulations commonly referred to as good clinical practices, or GCPs, and any additional requirements for the protection of human research subjects and their health information, to establish the safety and efficacy of the proposed biological product for its intended use or uses;
submission to the FDA of a Biologics License Application, or BLA, for a new biological product;
satisfactory completion of an FDA inspection of the manufacturing facility or facilities where the biological product is produced to assess compliance with the FDA s cGMP regulations, to assure that the facilities, methods and controls are adequate to preserve the biological product s identity, strength, quality and purity;
potential FDA audit of the nonclinical study sites and clinical trial sites that generated the data in support of the BLA; and
FDA review and approval, or licensure, of the BLA which must occur before a biological product can be marketed or sold.

The lengthy process of seeking required approvals and the continuing need for compliance with applicable statutes and regulations require the expenditure of substantial resources even when approvals are inherently uncertain.

The strategies, nature, and technologies of bacteriophage products are different from the conventional antibiotic therapy products. From the regulatory requirements established to ensure the safety, efficacy and

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quality of bacteriophage preparations, there are several major points to consider during the development, manufacturing, characterization, preclinical study and clinical trial of bacteriophage. The major issues include:

bacteriophage preparation design (single agent versus phage mixes and wild-type phage versus genetically engineered phage);

proof of concept in development of bacteriophage products;

selectivity of bacteriophage replication and targeting to specific species of bacteria;

relevant animal models in preclinical studies; and

clinical safety and efficacy.

Before testing any compounds with potential therapeutic value in humans, the biological product candidate enters the preclinical testing stage. Preclinical tests include laboratory evaluations of product biology, toxicity and formulation, as well as animal studies to assess the potential safety and activity of the biological product candidate. The conduct of the preclinical tests must comply with federal regulations and requirements including GLP. The sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and a proposed clinical protocol, to the FDA as part of the IND. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA places the IND on a clinical hold within that 30 day time period. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. The FDA may also impose clinical holds on a product candidate at any time before or during clinical trials due to safety concerns or non-compliance. Accordingly, we cannot be certain that submission of an IND will result in the FDA allowing clinical trials to begin, or that, once begun, issues will not arise that suspend or terminate such clinical trial.

Clinical trials involve the administration of the product candidate to healthy volunteers or patients under the supervision of qualified investigators, generally physicians not employed by the sponsor. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical trial, dosing procedures, subject inclusion and exclusion criteria and the parameters to be used to monitor subject safety. Each protocol must be submitted to the FDA. Clinical trials must be conducted in accordance with GCP requirements. Further, each clinical trial must be reviewed and approved by an independent institutional review board, or IRB, or ethics committee if conducted outside of the U.S., at or servicing each institution at which the clinical trial will be conducted. An IRB or ethics committee is charged with protecting the welfare and rights of trial participants and considers such items as whether the risks to individuals participating in the clinical trials are minimized and are reasonable in relation to anticipated benefits. The IRB or ethics committee also approves the informed consent form that must be provided to each clinical trial subject or his or her legal representative and must monitor the clinical trial until completed. We intend to use third-party Clinical Research Organizations, or CROs, to administer and conduct our planned clinical trials and will rely upon such CROs, as well as medical institutions, clinical investigators and consultants, to conduct our trials in accordance with our clinical protocols. The failure by any of such third parties to meet expected timelines, adhere to our protocols or meet regulatory standards could adversely impact the subject product development program and we remain legally responsible for compliance with applicable laws and regulations governing the conduct of these clinical trials.

Human clinical trials are typically conducted in three sequential phases that may overlap or be combined:

Phase 1: The product candidate is initially introduced into healthy human subjects and tested primarily for safety and dosage tolerance. Absorption, metabolism, distribution and excretion may also be tested.

Phase 2: The product candidate is evaluated in a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the product candidate for specific targeted diseases and to determine dosage tolerance, optimal dosage and dosing schedule.

Phase 3: Clinical trials are undertaken to further evaluate dosage, clinical efficacy and safety in an expanded patient population at geographically dispersed clinical trial sites. These clinical trials are

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intended to establish the overall risk/benefit ratio of the product and provide an adequate basis for product labeling. Generally, two adequate and well-controlled Phase 3 clinical trials are required by the FDA and other regulatory authorities for approval of a marketing application.

Post-approval studies, or Phase 4 clinical trials, may be requested by the FDA as a condition of approval and are conducted after initial marketing approval. These studies are used to gain additional experience from the treatment of patients in the intended therapeutic indication.

Progress reports detailing the results of the clinical trials must be submitted at least annually to the FDA and written safety reports must be submitted to the FDA and the investigators for serious and unexpected adverse events or any finding from tests in laboratory animals that suggest that there may be a significant risk for human subjects. The FDA or the sponsor or, if used, its data safety monitoring board may suspend a clinical trial at any time on various grounds, including a finding that the research subjects or patients are being exposed to an unacceptable health risk. Similarly, an IRB or ethics committee can suspend or terminate approval of a clinical trial at its institution if the clinical trial is not being conducted in accordance with the IRB s or ethics committee s requirements or if the pharmaceutical product has been associated with unexpected serious harm to patients. Suspension of a clinical trial due to safety risks attributed to the investigational product will result in termination of the trial and possibly others that are underway.

Concurrent with clinical trials, companies usually complete additional animal studies and must also develop additional information about the physical characteristics of the product candidate as well as finalize a process for manufacturing the product candidate in commercial quantities in accordance with cGMP requirements. To help reduce the risk of the introduction of adventitious agents or other impurities with the use of biological products, the PHS Act emphasizes the importance of manufacturing control for products whose attributes cannot be precisely defined. The manufacturing process must be capable of consistently producing quality batches of the product candidate and, among other things, the sponsor must develop methods for testing the identity, strength, quality, potency, and purity of the final biological product. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the biological product candidate does not undergo unacceptable deterioration over its shelf life.

United States Review and Approval Processes

In order to obtain approval to market a biological product in the United States, a BLA that provides data establishing to the FDA s satisfaction the safety and effectiveness of the investigational product candidate for the proposed indication must be submitted to the FDA. The application includes all data available from nonclinical studies and clinical trials, including negative or ambiguous results as well as positive findings, together with detailed information relating to the product s manufacture and composition, and proposed labeling, among other things. The testing and approval processes require substantial time and effort and there can be no assurance that the FDA will accept the BLA for filing and, even if filed, that any approval will be granted on a timely basis, if at all.

Each BLA must be accompanied by a significant user fee. The FDA adjusts the user fees on an annual basis. Fee waivers or reductions are available in certain circumstances, including a waiver of the application fee for the first application filed by a small business. Additionally, no user fees are assessed on BLAs for products designated as orphan drugs, unless the product also includes a non-orphan indication.

The FDA has 60 days from its receipt of a BLA to determine whether the application will be accepted for filing based on the agency s threshold determination that the application is sufficiently complete to permit substantive review. The FDA may refuse to file any BLA that it deems incomplete or not properly reviewable at the time of submission and may request additional information. In this event, the BLA must be resubmitted with the additional information. The resubmitted application also is subject to review before the FDA accepts it for filing. After the BLA is accepted for

filing, the FDA reviews it to determine, among other things, whether the proposed product is safe and effective for its intended use, has an acceptable purity profile, and whether the product is being manufactured in accordance with cGMP to assure and preserve the product s identity, safety, strength, quality, potency, and purity. The FDA may refer applications for novel product candidates or those that present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved and, if so, under what conditions. The FDA is not bound by the

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recommendations of an advisory committee, but it considers such recommendations carefully when making decisions. The FDA may ultimately decide that the BLA does not satisfy the criteria for approval. If a product receives regulatory approval, the approval may be significantly limited to specific diseases and dosages or the indications for use may otherwise be limited, which could restrict the commercial value of the product. Further, the FDA may require that certain contraindications, warnings or precautions be included in the product labeling.

Special FDA Expedited Review and Approval Programs

The FDA has various programs, including Fast Track designation, accelerated approval and priority review, that are intended to expedite the process for the development and FDA review of drugs that are intended for the treatment of serious or life threatening diseases or conditions and demonstrate the potential to address unmet medical needs. The purpose of these programs is to provide important new drugs and biological products to patients earlier than under standard FDA review procedures.

To be eligible for a Fast Track designation, the FDA must determine, based on the request of a sponsor, that a product is intended to treat a serious or life threatening disease or condition and demonstrates the potential to address an unmet medical need, or if the drug or biological product qualifies as a qualified infectious disease product under the Generating Antibiotic Incentives Now Act, or GAIN Act. The FDA will determine that a product will fill an unmet medical need if it will provide a therapy where none exists or provide a therapy that may be potentially superior to existing therapy based on efficacy or safety factors. We intend to request Fast Track designation for our product candidates if applicable.

Specifically, new drugs and biological products are eligible for Fast Track designation if they are intended to treat a serious or life-threatening condition and demonstrate the potential to address unmet medical needs for the condition. Fast Track designation applies to the combination of the product and the specific indication for which it is being studied. The sponsor of a new drug or biological may request the FDA to designate the drug or biologic as a Fast Track product at any time during the clinical development of the product. Unique to a Fast Track product, the FDA may consider for review sections of the marketing application on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the application, the FDA agrees to accept sections of the application and determines that the schedule is acceptable, and the sponsor pays any required user fees upon submission of the first section of the application.

Any product submitted to the FDA for marketing, including under a Fast Track program, may be eligible for other types of FDA programs intended to expedite development and review, such as priority review and accelerated approval. Any product is eligible for priority review if it has the potential to provide safe and effective therapy where no satisfactory alternative therapy exists or a significant improvement in the treatment, diagnosis or prevention of a disease compared to marketed products. The FDA will attempt to direct additional resources to the evaluation of an application for a new drug or biological product designated for priority review in an effort to facilitate the review. Additionally, a product may be eligible for accelerated approval. Drug or biological products studied for their safety and effectiveness in treating serious or life-threatening illnesses and that provide meaningful therapeutic benefit over existing treatments may receive accelerated approval, which means that they may be approved on the basis of adequate and well-controlled clinical trials establishing that the product has an effect on a surrogate endpoint that is reasonably likely to predict a clinical benefit, or on the basis of an effect on a clinical endpoint other than survival or irreversible morbidity or mortality, that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity or prevalence of the condition and the availability or lack of alternative treatments.

As a condition of approval, the FDA may require a sponsor of a drug or biological product receiving accelerated approval to perform post-marketing studies to verify and describe the predicted effect on irreversible morbidity or mortality or other clinical endpoint, and the drug or biological product may be subject to accelerated withdrawal procedures. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials, which could adversely impact the timing of the commercial launch of the product. Fast Track designation, priority review and accelerated approval do not change the standards for approval but may expedite the development or approval process.

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A sponsor can also request designation of a product candidate as a breakthrough therapy. A breakthrough therapy is defined as a drug or biological product that is intended, alone or in combination with one or more other drugs or biological products, to treat a serious or life-threatening disease or condition, and preliminary clinical evidence indicates that the biological product or drug may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. Drugs or biological products designated as breakthrough therapies are also eligible for accelerated approval. The FDA must take certain actions, such as holding timely meetings and providing advice, intended to expedite the development and review of an application for approval of a breakthrough therapy. We intend to request breakthrough therapy designation for our product candidates if applicable.

Even if a product qualifies for one or more of these programs, the FDA may later decide that the product no longer meets the conditions for qualification or decide that the time period for FDA review or approval will not be shortened.

Patent Term Restoration and Marketing Exclusivity

Depending upon the timing, duration and specifics of FDA approval of our drugs, some of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, referred to as the Hatch Waxman Amendments. The Hatch Waxman Amendments permit a patent restoration term of up to five years as compensation for patent term lost during product development and the FDA regulatory review process. However, patent term restoration cannot extend the remaining term of a patent beyond a total of 14 years from the product s approval date. The patent term restoration period is generally one half the time between the effective date of an IND, and the submission date of an NDA or BLA, plus the time between the submission date of an NDA or BLA and the approval of that application. Only one patent applicable to an approved drug is eligible for the extension, and the extension must be applied for prior to expiration of the patent. The United States Patent and Trademark Office, in consultation with the FDA, reviews and approves the application for any patent term extension or restoration.

Pediatric exclusivity is a type of marketing exclusivity available in the U.S. under the Best Pharmaceuticals for Children Act, or BPCA, which provides for an additional six months of marketing exclusivity may be available if a sponsor conducts clinical trials in children in response to a written request from the FDA, or a Written Request. If the Written Request does not include clinical trials in neonates, the FDA is required to include its rationale for not requesting those clinical trials. The FDA may request studies on approved or unapproved indications in separate Written Requests. The issuance of a Written Request does not require the sponsor to undertake the described clinical trials.

Biologics Price Competition and Innovation Act of 2009

The Patient Protection and Affordable Care Act, which included the Biologics Price Competition and Innovation Act of 2009, or BPCIA, amended the PHSA to create an abbreviated approval pathway for two types of generic biologics biosimilars and interchangeable biologic products, and provides for a twelve year data exclusivity period for the first approved biological product, or reference product, against which a biosimilar or interchangeable application is evaluated; however if pediatric clinical trials are performed and accepted by the FDA, the twelve year data exclusivity period will be extended for an additional six months. A biosimilar product is defined as one that is highly similar to a reference product notwithstanding minor differences in clinically inactive components and for which there are no clinically meaningful differences between the biological product and the reference product in terms of the safety, purity and potency of the product. An interchangeable product is a biosimilar product that may be substituted for the reference product without the intervention of the health care provider who prescribed the reference product.

The biosimilar applicant must demonstrate that the product is biosimilar based on data from (1) analytical studies showing that the biosimilar product is highly similar to the reference product; (2) animal studies (including toxicity); and (3) one or more clinical trials to demonstrate safety, purity and potency in one or more appropriate conditions of use for which the reference product is approved. In addition, the applicant must show that the biosimilar and reference products have the same mechanism of action for the conditions of use on the label, route of administration, dosage and strength, and the production facility must meet standards designed to assure product safety, purity and potency.

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An application for a biosimilar product may not be submitted until four years after the date on which the reference product was first approved. The first approved interchangeable biologic product will be granted an exclusivity period of up to one year after it is first commercially marketed, but the exclusivity period may be shortened under certain circumstances. The FDA has issued a number of final and draft guidances in order to implement the law. The guidance documents provide FDA s current thinking on approaches to demonstrating that a proposed biological product is biosimilar to a reference product. The FDA intends to issue additional guidance documents in the future, and has identified considerations in demonstrating interchangeability to a reference product, labeling and nonproprietary naming as several of the issues that it hopes to address in calendar year 2015. Nonetheless, the absence of final guidance documents covering all biosimilars issues does not prevent a sponsor from seeking licensure of a biosimilar under the BPCIA, and the FDA has already approved two biosimilar applications in the United States.

FDA Post-Approval Requirements

Maintaining substantial compliance with applicable federal, state, local, and foreign statutes and regulations requires the expenditure of substantial time and financial resources. Rigorous and extensive FDA regulation of new products continues after approval, particularly with respect to cGMP. We will rely on third parties for the production of commercial quantities of any products that we may commercialize. We and third party manufacturers of our products are required to comply with applicable requirements in the cGMPs, including quality control and quality assurance and maintenance of records and documentation. We cannot be certain that we or our present or future suppliers will be able to comply with the cGMP and other FDA requirements. Other post-approval requirements applicable to biological products include reporting of cGMP deviations that may affect the identity, potency, purity and overall safety of a distributed product, record-keeping requirements, reporting of adverse effects, reporting updated safety and efficacy information, and complying with electronic record and signature requirements. After a BLA is approved, the product also may be subject to official lot release. As part of the manufacturing process, the manufacturer is required to perform certain tests on each lot of the product before it is released for distribution. If the product is subject to official release by the FDA, the manufacturer submits samples of each lot of product to the FDA together with a release protocol showing a summary of the history of manufacture of the lot and the results of all of the manufacturer s tests performed on the lot. The FDA also may perform certain confirmatory tests on lots of some products, such as viral vaccines, before releasing the lots for distribution by the manufacturer. In addition, the FDA conducts laboratory research related to the regulatory standards on the safety, purity, potency, and effectiveness of biological products.

Discovery of previously unknown problems or the failure to comply with the applicable regulatory requirements, by us or our suppliers, may result in restrictions on the marketing of a product or withdrawal of the product from the market as well as possible civil or criminal sanctions and adverse publicity. FDA sanctions could include refusal to approve pending applications, withdrawal of an approval, clinical hold, warning or untitled letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, mandated corrective advertising or communications with doctors, debarment, restitution, disgorgement of profits, or civil or criminal penalties. Any agency or judicial enforcement action could have a material adverse effect on us.

Biological product manufacturers and other entities involved in the manufacture and distribution of approved products are required to register their facilities with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMPs and other laws. In addition, changes to the manufacturing process or facility generally require prior FDA approval before being implemented and other types of changes to the approved product, such as adding new indications and additional labeling claims, are also subject to further FDA review and approval.

Labeling, Marketing and Promotion

The FDA closely regulates the labeling, marketing and promotion of drugs and biological products, including direct-to-consumer advertising, promotional activities involving the internet, and industry-sponsored scientific and educational activities. While doctors are free to prescribe any product approved by the FDA for any use, a company can only make claims relating to safety and efficacy of a product that are consistent with FDA approval, and the company is allowed to actively market a product only for the particular use and treatment

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approved by the FDA. In addition, any claims we make for our products in advertising or promotion must be appropriately balanced with important safety information and otherwise be adequately substantiated. Failure to comply with these requirements can result in adverse publicity, warning letters, corrective advertising, injunctions and potential civil and criminal penalties.

Other Healthcare Laws and Compliance Requirements

In the United States, our activities are potentially subject to regulation by various federal, state and local authorities in addition to the FDA, including the Centers for Medicare and Medicaid Services, other divisions of the United States Department of Health and Human Services (e.g., the Office of Inspector General), the United States Department of Justice and individual United States Attorney offices within the Department of Justice and state and local governments.

International Regulation

In addition to regulations in the United States, we will be subject to a variety of foreign regulations governing clinical trials and commercial sales and distribution of our future products. Our manufacturing facility in Ljubljana, Slovenia is subject to inspection and regulation by JAZMP, the Slovenian agency that regulates and supervises pharmaceutical products in Slovenia. Whether or not we obtain FDA approval for a product, we must obtain approval of a product by the comparable regulatory authorities of foreign countries before we can commence clinical trials or marketing of the product in those countries. The approval process varies from country to country, and the time may be longer or shorter than that required for FDA approval. The requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary greatly from country to country.

Under European Union regulatory systems, marketing authorizations may be submitted either under a centralized or a mutual recognition procedure. The centralized procedure, which is compulsory for medicinal products produced by biotechnology or those medicinal products containing new active substances for specific indications such as the treatment of AIDS, cancer, neurodegenerative disorders, diabetes, viral diseases and designated orphan medicines and optional for other medicines which are highly innovative. Under the centralized procedure, a marketing application is submitted to the European Medicines Agency where it will be evaluated by the Committee for Medicinal Products for Human Use and a favorable opinion typically results in the grant by the European Commission of a single marketing authorization that is valid for all European Union member states within 67 days of receipt of the opinion. The initial marketing authorization is valid for five years, but once renewed is usually valid for an unlimited period.

Pricing and Reimbursement

Although none of our product candidates has been commercialized for any indication, if they are approved for marketing, commercial success of our product candidates will depend, in part, upon the availability of third-party reimbursement from payors at the federal, state and private levels. Third-party payors include government healthcare programs, such as Medicare and Medicaid, private health insurers and managed-care plans. We anticipate third party payors will provide reimbursement for our products. However, these third party payors are increasingly challenging the price and examining the cost effectiveness of medical products and services. In addition, significant uncertainty exists as to the reimbursement status of newly approved healthcare products. We may need to conduct expensive pharmacoeconomic studies in order to demonstrate the cost effectiveness of our products. Our product candidates may not be considered cost effective. It is time consuming and expensive for us to seek reimbursement from third party payors. Reimbursement may not be available or sufficient to allow us to sell our products on a competitive and profitable basis.

We expect that there will continue to be a number of federal and state proposals to implement governmental pricing controls and limit the growth of healthcare costs, including the cost of prescription drugs. For example, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act of 2010 (collectively, ACA) enacted in March 2010, was expected to have a significant impact on the health care industry. ACA has resulted in expanded coverage for the uninsured and is expected to help contain overall healthcare costs. With regard to pharmaceutical products, among other things, ACA is expected to expand and increase industry rebates for drugs covered under Medicaid programs and make changes to the coverage requirements under the Medicare Part D program. We cannot predict the impact

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of ACA on pharmaceutical companies as many of the ACA reforms require the promulgation of detailed regulations implementing the statutory provisions which has not yet occurred. In addition, although the United States Supreme Court upheld the constitutionality of most of the ACA, some states have stated their intentions to not implement certain sections of ACA and some members of Congress are still working to repeal ACA. These challenges add to the uncertainty of the changes enacted as part of ACA.

In addition, in some foreign countries, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing vary widely from country to country. For example, the European Union provides options for its member states to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any of our products. Historically, products launched in the European Union do not follow price structures of the U.S. and generally tend to be significantly lower.

Employees

As of September 30, 2016, we had 32 full-time employees.

Facilities

Our principal offices occupy approximately 1,000 square feet of leased office space pursuant to a month-to-month sublease, located at 3579 Valley Centre Drive, Suite 100, San Diego, California 92130. We also lease approximately 700 square feet of lab space in Richmond, Virginia, approximately 5,000 square feet of lab space in Brookvale, Australia, and approximately 6,000 square feet of lab and office space in Ljubljana, Slovenia. We believe our facilities are adequate for our current and near-term needs.

Legal Proceedings

On April 14, 2016, NRM VII Holdings I, LLC, or NRM, filed a complaint against us and the current members of our board of directors in the Superior Court of California, County of San Diego, which complaint was amended on July 25, 2016. NRM, together with its affiliates, is one of our principal stockholders. The amended complaint, which we refer to as the complaint, alleges that we breached the implied covenant of good faith and fair dealing by entering into a scheme to force NRM to convert its shares of Series B redeemable convertible preferred stock into shares of our common stock. The complaint further alleges that the members of the board of directors who are named as defendants breached their fiduciary duty of good faith and loyalty owed to NRM, as one of our stockholders, by participating in this alleged scheme. The complaint seeks unspecified monetary damages and other relief. We refer to the action pending against us and the members of our Board of Directors pursuant to the complaint as the Action .

On November 12, 2016, we entered into a settlement agreement with NRM to settle the Action. Pursuant to the settlement agreement, NRM has agreed to dismiss with prejudice the Action upon receipt of a cash payment of $2.0 million, which payment will be made to NRM by our insurance carrier on or before December 3, 2016.

The settlement agreement contains mutual releases covering all claims that we or our affiliates, or NRM or its affiliates, have or may have against the other party or such other party's affiliates in connection with the Action or

otherwise as of the date of the settlement agreement.

Upon the automatic conversion of NRM's shares of our Series B convertible preferred stock into shares of our common stock on April 8, 2016, we became obligated to pay NRM accrued dividends in the amount of approximately $914,000. The accrued dividends obligation to NRM is reflected in current liabilities on our consolidated balance sheet at September 30, 2016. Upon NRM's receipt of the $2.0 million settlement payment described above, our accrued dividends payment obligation to NRM will be extinguished. We have agreed to repay our insurance carrier an aggregate amount equal to the accrued dividends as follows: $100,000 on December 3, 2016, approximately $204,800 on January 2, 2017, approximately $304,800 on April 3, 2017 and approximately $304,800 on July 3, 2017.

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Corporate Information

We were incorporated under the laws of the State of Washington in March 1989 as a wholly owned subsidiary of Immunex Corporation and began operations as an independent company in 1992 as Targeted Genetics Corporation. In February 2011, we changed our name to AmpliPhi Biosciences Corporation.

Our principal executive offices are located at 3579 Valley Centre Drive, Suite 100, San Diego, California 92130. The telephone number at our principal executive office is (858) 829-0829. Our website address is *http://www.ampliphibio.com*. Our website and the information contained on, or that can be accessed through, our website will not be deemed to be incorporated by reference in, and are not considered part of, this prospectus. You should not rely on our website or any such information in making your decision whether to purchase our securities in this offering.

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MANAGEMENT

The following table sets forth information about our current executive officers and directors.

Name	Age	Position(s)
M. Scott Salka	54	Chief Executive Officer, Director
Steve R. Martin	55	Chief Financial Officer
Wendy S. Johnson	64	Interim Chief Operating Officer, Director
Non-Employee Directors		
Jeremy Curnock Cook[2][3]	67	Chairman of the Board
Louis Drapeau[1][3]	72	Director
Michael S. Perry, Ph.D.[1][2][3]	57	Director
Vijay B. Samant[1]	63	Director
Paul C. Grint, M.D.[2]	58	Director

(1) Member of the audit committee.
(2) Member of the compensation committee.
(3) Member of the nominating and corporate governance committee.

Executive Officers

M. Scott Salka has served as our Chief Executive Officer and a member of our board of directors since May 18, 2015. Mr. Salka served as the Chief Executive Officer of Aspyrian Therapeutics Inc., a company focused on developing near-infrared photoimmunotherapy therapies, from March 2010 to May 2015. Prior to that, Mr. Salka served as the Chief Executive Officer of Ambit Biosciences Corporation, a publicly traded company that developed a novel platform for discovering small molecule drugs for oncology, autoimmune and inflammatory diseases, that was acquired by Daiichi Sankyo in 2014. During Mr. Salka s tenure at Ambit, he was responsible for transforming the company from a service contract business to a fully-capable drug discovery and development enterprise. Prior to joining Ambit in 2001, Mr. Salka served as the President and Chief executive officer of two privately-held genomics companies, Arcaris, Inc. and 454 Corporation that was sold to Roche in 2007. He also previously co-founded one of the first commercial genomics companies, Sequana Therapeutics, Inc., a pioneer in the effort to commercialize the international Human Genome Project. From February 2012 to March 2014, Mr. Salka served on the board of directors of Sorrento Therapeutics, Inc. and since 2009, Mr. Salka has served on the board of directors of San Diego State University College of Business Administration. He received his M.B.A. from Carnegie Mellon University and his B.S. in finance from San Diego State University. The Nominating and Corporate Governance Committee and the board of directors believe that Mr. Salka s significant experience leading drug development companies, as well as his service as our Chief Executive Officer, qualifies him to serve on our board of directors.

Steve R. Martin has served as our Chief Financial Officer since January 2016. Mr. Martin served as Senior Vice President and Chief Financial Officer of Applied Proteomics, Inc., a molecular diagnostics company, from December 2014 to August 2015. From June 2011 to December 2014, Mr. Martin served as Senior Vice President and Chief Financial Officer of Apricus Biosciences, Inc., a publicly traded pharmaceutical company, and served as the Interim Chief Executive Officer of Apricus from November 2012 through March 2013. From 2008 to January 2011, Mr. Martin served as Senior Vice President and Chief Financial Officer of BakBone Software, a publicly traded software company. During his final 10 months with BakBone until the company s acquisition in January 2011, Mr. Martin also served as BakBone s Interim Chief Executive Officer. From 2005 to 2007, Mr. Martin served as Chief Financial

Officer of Stratagene Corporation, a publicly traded research products and clinical diagnostics company. Mr. Martin s previous experience also includes serving as Controller with Gen-Probe Incorporated, a publicly traded molecular diagnostics company, as well as 10 years with Deloitte & Touche LLP, a public accounting firm. Mr. Martin holds a B.S. degree from San Diego State University and is a certified public accountant.

Wendy S. Johnson has served as our Interim Chief Operating Officer since September 2014 and has served as a member of our board of directors since May 2014. From 2005 to January 2014, Ms. Johnson served as a venture partner at ProQuest Investments, a venture capital firm. From 2006 to January 2014, Ms. Johnson

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served as the President and Chief Executive Officer of Aires Pharmaceuticals, a ProQuest portfolio company. Prior to joining ProQuest, she served as Senior Vice President, Corporate Development, at Salmedix Inc., and she held senior business and corporate development positions at WomenFirst Healthcare, Prizm Pharmaceuticals (Selective Genetics Inc.), Cytel Corp., Synbiotics Corp., and Murex Corp. (Cambridge U.K.). Additionally, Ms. Johnson served as Assistant Director with the Center for Devices and Radiological Health at the FDA. Ms. Johnson received an M.B.A. from Loyola University, an M.S. in clinical microbiology from the Hahnemann Medical School and a B.S. in microbiology from the University of Maryland. The Nominating and Corporate Governance Committee and the board of directors believe that Ms. Johnson s significant experience in pharmaceutical drug development and business development, as well her strong background in microbiology, qualifies her to serve on our board of directors.

Non-Employee Directors

Jeremy Curnock Cook has served as a member of our board of directors since July 1995 and as Chairman of the board of directors since February 1998. From September 2014 to May 2015, he served as our Interim Chief Executive Officer. Mr. Curnock Cook has served as Chairman of International Bioscience Managers Limited, a corporate and investment advisory firm, since 2000, and also currently serves as Managing Director of Bioscience Managers Pty Ltd, a medical sciences fund manager. From 1987 to 2000, Mr. Curnock Cook was a director of Rothschild Asset Management Limited, a corporate and investment advisory company, and was responsible for the Rothschild Bioscience Unit. Mr. Curnock Cook founded the International Biochemicals Group in 1975, which was sold in 1985 to Royal Dutch Shell, where he served as Managing Director until 1987. He also serves as a member of the board of directors of Avita Medical Ltd, Nexus6 Ltd and SeaDragon Ltd, all private companies. Mr. Curnock Cook received an M.A. in natural sciences from Trinity College, Dublin. The Nominating and Corporate Governance Committee and the board of directors believe that Mr. Curnock Cook s significant experience as a board member of multiple biotechnology companies qualifies him to serve on our board of directors.

Louis Drapeau has served as a member of our board of directors since March 2011. Since October 2007 through February 2016, Mr. Drapeau served in various management positions of InSite Vision, a traded ophthalmology drug development company that was acquired in October 2015, including Vice President and Chief Financial Officer and Chief Executive Officer from November 2008 to December 2010. Prior to InSite Vision, he served as Chief Financial Officer, Senior Vice President, Finance, at Nektar Therapeutics, a biopharmaceutical company, from January 2006 to August 2007. Prior to Nektar, he served as Acting Chief Executive Officer from August 2004 to May 2005 and as Senior Vice President and Chief Financial Officer from August 2002 to August 2005 for BioMarin Pharmaceutical Inc. Previously, Mr. Drapeau spent 30 years at Arthur Andersen, including 19 years as an Audit Partner in Arthur Andersen s Northern California Audit and Business Consulting practice, which included 12 years as Managing Partner. Since February 2007, Mr. Drapeau has served as a member of the board of Bio-Rad Laboratories, Inc., a publicly traded pharmaceutical company, and since January 2016, Mr. Dapeau has served as a member of the board of directors of Avita Medical Ltd. Mr. Drapeau received a B.S. in mechanical engineering and an M.B.A. from Stanford University. The Nominating and Corporate Governance Committee and the board of directors believe that Mr. Drapeau s experience with respect to accounting and financial matters qualifies him to serve on our board of directors.

Michael S. Perry, D.V.M., Ph.D. has served as a member of our board of directors since November 2005. Since January of 2016 Dr. Perry has served as Senior Vice President and Chief Scientific Officer of Business Development and Licensing for Novartis AG. From September 2014 to January 2016 he served as Chief Scientific Officer for the Cell and Gene Therapy Unit of Novartis Pharmaceuticals Corporation and from October 2012 to September 2014, he served as Global Head of Stem Cell Therapy and Vice President of the Integrated Hospital Care Franchise for Novartis Pharmaceuticals Corporation. Prior to rejoining Novartis in October 2012, he was a Venture Partner with Bay City Capital, a venture capital firm, from 2005 to September 2012. While serving in this capacity, he concurrently

served as President and Chief Medical Officer at Poniard Pharmaceuticals, Inc., a publicly held drug development company, from 2009 to 2011. Dr. Perry also previously served as Chief Development Officer of VIA Pharmaceuticals, Inc., a publicly held biotechnology company, from 2005 to 2009. Dr. Perry served as Chairman and Chief Executive Officer of Extropy Pharmaceuticals, Inc., a privately held pediatric specialty pharmaceutical company, from

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2003 to 2005. From 2002 to 2003, Dr. Perry served as President and Chief Executive Officer of Pharsight Corporation, a publicly held software and consulting services firm. From 2000 to 2002, Dr. Perry served as Global Head of Research and Development for Baxter Healthcare s BioScience Division (now Baxalta). From 1997 to 2000, Dr. Perry served as President and Chief Executive Officer of SyStemix Inc. and Genetic Therapy Inc., two wholly owned subsidiaries of Novartis Pharma. Dr. Perry served as Vice President of Regulatory Affairs for Novartis from 1994 to 1997. Prior to 1994, Dr. Perry held various management positions with Syntex Corporation (now Roche), Schering-Plough Corporation (now Merck) and BioResearch Laboratories, Inc. Dr. Perry received a Doctor of Veterinary Medicine (DVM), a Ph.D. in biomedical science-pharmacology specialty and an Honours B.Sc. in physics from the University of Guelph in Ontario, Canada. He is also a graduate of the Harvard Business School International Management Forum. Dr. Perry has served as Adjunct Professor in the Gates Center for Regenerative Medicine at the University of Colorado School of Medicine, Anschutz Medical Campus since November 2013. He has served as a member of the board of directors of Arrowhead Research Corporation since December 2011 and as a member of the board of directors of Avita Medical Ltd since February 2013. The Nominating and Corporate Governance Committee and the board of directors believe that Dr. Perry s substantial scientific and medical knowledge, as well as his operational and investing experience, qualifies him to serve on our board of directors.

Vijay B. Samant has served as a member of our board of directors since November 2015. Since November 2000, Mr. Samant has served as President and Chief Executive Officer of Vical, Inc., a developer of biopharmaceutical products for the prevention and treatment of chronic life-threatening infectious diseases. Prior to joining Vical, he had 23 years of diverse U.S. and international sales, marketing, operations, and business development experience with Merck. From 1998 to 2000, he was Chief Operating Officer of the Merck Vaccine Division. From 1990 to 1998, he served in the Merck Manufacturing Division as Vice President of Vaccine Operations, Vice President of Business Affairs and Executive Director of Materials Management. Mr. Samant holds a master s degree in management studies from the Sloan School of Management at the Massachusetts Institute of Technology, a master s degree in chemical engineering from Columbia University, and a bachelor s degree in chemical engineering from the University of Bombay, University Department of Chemical Technology. Mr. Samant has been a member of the board of directors of Vical since 2000, and was a member of the board of directors of Raptor Pharmaceutical Corporation from 2011 to 2014, and was a member of the board of directors for BioMarin Pharmaceutical Inc. from 2002 to 2004. Mr. Samant was a Director of the Aeras Global TB Vaccine Foundation from 2001 to 2010, a member of the Board of Trustees for the National Foundation for Infectious Diseases from 2003 to 2012, and a member of the Board of Trustees for the International Vaccine Institute in Seoul, Korea from 2008 to 2012. The Nominating and Corporate Governance Committee and the board of directors believe that Mr. Samant s significant experience leading biopharmaceutical product development companies, as well his significant sales, marketing, operations, and business development expertise within the biotechnology and pharmaceutical industries, qualifies him to serve on our board of directors.

Paul C. Grint, M.D. has served as a member of our board of directors since November 2015. Since June 2015, Dr. Grint has served as President and Chief Executive Officer of Regulus Therapeutics Inc., a company focused on the discovery and development of microRNA therapeutics. From June 2014 until his appointment as President and Chief Executive Officer of Regulus Therapeutics, Dr. Grint served as Regulus Therapeutics Chief Medical Officer. From February 2011 to June 2014, Dr. Grint served as the President of Cerexa, Inc., a wholly owned subsidiary of Forest Laboratories, Inc., a pharmaceutical company, where he was responsible for the oversight of anti-infective product development. Before that, Dr. Grint served as Senior Vice President of Research at Forest Research Institute, Inc., the scientific development subsidiary of Forest Laboratories, Inc., from January 2009 to February 2011, as Chief Medical Officer of Kalypsys, Inc., a biopharmaceutical company, from 2006 to 2008, and as Senior Vice President and Chief Medical Officer of Zephyr Sciences, Inc., a biopharmaceutical company, during 2006. Dr. Grint also previously served in similar executive level positions at Pfizer Inc., IDEC Pharmaceuticals Corporation, and Schering-Plough Corporation. Dr. Grint has served on the board of directors of Synedgen, a privately-held bio-pharmaceutical company, since December 2014. Dr. Grint also served on the board of directors of Illumina Inc. from April 2005 to

May 2013. Dr. Grint received a B.S. in Medical Science from St. Mary s Hospital in London and his medical degree from St. Bartholomew s Hospital Medical College at the University of London. Dr. Grint is a Fellow of the Royal College of Pathologists, a member of numerous professional and medical societies, and the

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author or co-author of over 50 scientific publications. The Nominating and Corporate Governance Committee and the board of directors believe that Dr. Grint s significant experience in leading biotechnology and pharmaceutical companies, as well his significant experience in drug development and in the biotechnology industry, qualifies him to serve on our board of directors.

Director Independence

Our business and affairs are organized under the direction of our board of directors, which currently consists of seven members. The primary responsibilities of our board of directors are to provide oversight, strategic guidance, counseling and direction to our management. Our board of directors meets on a regular basis and additionally as needed.

As required under the NYSE MKT listing standards, a majority of the members of a listed company s board of directors must qualify as independent, as affirmatively determined by the board of directors. Our board of directors has affirmatively determined that all of our directors are independent directors within the meaning of the applicable NYSE MKT listing standards, other than Mr. Salka and Ms. Johnson. In making this determination, our board of directors found that none of these directors had a material or other disqualifying relationship with us. Our board of directors concluded that Mr. Salka and Ms. Johnson are not independent directors within the meaning of the applicable NYSE MKT listing standards rules given their roles as Chief Executive Officer and Interim Chief Operating Officer, respectively.

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CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

Related-Person Transactions Policy and Procedures

We have adopted a written related-person transactions policy that sets forth our policies and procedures regarding the identification, review, consideration and oversight of related-person transactions. For purposes of our policy only, a related-person transaction is a transaction, arrangement or relationship (or any series of similar transactions, arrangements or relationships) in which we and any related person are participants involving an amount that exceeds $120,000 (or such lower threshold as may be applicable to us from time to time pursuant to the rules and regulations of the SEC or the NYSE MKT).

Transactions involving compensation for services provided to us by an employee, consultant or director are not considered related-person transactions under this policy. A related person is any executive officer, director or a holder of more than 5% of our common stock, including any of their immediate family members and any entity owned or controlled by such persons.

Under the policy, where a transaction has been identified as a related-person transaction, management must present information regarding the proposed related-person transaction to our Audit Committee (or, where review by our Audit Committee would be inappropriate, to another independent body of our board of directors) for approval. The presentation must include a description of, among other things, the material facts, the direct and indirect interests of the related persons, the benefits of the transaction to us and whether any alternative transactions are available. To identify related-person transactions in advance, we rely on information supplied by our executive officers, directors and certain significant stockholders. In considering related-person transactions, our Audit Committee or other independent body of our board of directors takes into account the relevant available facts and circumstances including, but not limited to:

the risks, costs and benefits to us;
the impact on a director s independence in the event the related person is a director, immediate family member of a director or an entity with which a director is affiliated;
the terms of the transaction;
the availability of other sources for comparable services or products; and
the terms available to or from, as the case may be, unrelated third parties.

In the event a director has an interest in the proposed transaction, the director must recuse himself or herself from the deliberations and approval.

Certain Related-Person Transactions

The following includes a summary of transactions since January 1, 2013 to which we have been a party, in which the amount involved in the transaction exceeded the lesser of $120,000 or one percent of the average of our total assets at year-end for the last two completed fiscal years, and in which any of our directors, executive officers or, to our knowledge, beneficial owners of more than 5% of our capital stock or any member of the immediate family of any of the foregoing persons had or will have a direct or indirect material interest, other than equity and other compensation, termination, change in control and other arrangements, which are described in our filings with the SEC.

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Sale of Convertible Notes

In 2013, we sold convertible notes to Pendinas Limited in varying principal amounts for an aggregate total of $2,000,000. Additionally, we issued warrants to purchase an aggregate of up to approximately 140,000 shares of common stock at an exercise price of $7.00 per share. All such convertible notes have been converted as a result of the completion of our private placement of convertible preferred stock, as of July 15, 2013. The following table summarizes sales of such convertible notes to Pendinas Limited, which was a holder of more than 5% of our common stock as of the dates of each such transaction:

Date	Principal Amount
February 4, 2013	$ 500,000.00
March 12, 2013	$ 500,000.00
April 12, 2013	$ 500,000.00
May 13, 2013	$ 500,000.00

June 2013 Private Placement

In June 2013, we sold an aggregate of 9,357,935 shares of our Series B Convertible Preferred Stock and warrants to purchase an aggregate of 467,896 shares of our common stock. Pendinas Limited, a holder of more than 5% of our common stock as of the date of such transaction, converted all of its outstanding convertible notes into 3,225,061 shares of Series B Convertible Preferred Stock and a warrant to purchase 161,253 shares of our common stock in the transaction.

In connection with our June 2013 private placement of convertible preferred stock, we paid a placement fee to Griffin Securities, Inc. in the amount of $270,000 in cash and warrants to purchase 85,714 shares of common stock at an exercise price of $7.00 per share, and to Phillip Capital Ltd in the amount of $60,000 in cash and warrants to purchase 14,285 shares of common stock at an exercise price of $7.00 per share.

In addition, in connection with the June 2013 private placement, NRM VII Holdings I, LLC purchased 2,142,857 shares of our Series B Convertible Preferred Stock and warrants to purchase an additional 107,142 shares of our common stock. NRM VII Holdings I, LLC is controlled by Randal J. Kirk, who at the time of the transaction was a holder of more than 5% of the shares of our common stock. Phillip Asset Management Ltd also purchased 714,285 shares of our Series B Convertible Preferred Stock and warrants to purchase an additional 35,714 shares of our common stock. Phillip Asset Management Ltd holds its shares in its capacity as trustee for Bioscience Managers Pty Ltd. Jeremy Curnock Cook, the Chairman of our board of directors, is a Managing Director and holds an ownership interest in Bioscience Managers Pty Ltd.

The shares issued in the June 2013 private placement are entitled to certain piggyback registration rights, as described in Description of Capital Stock Registration Rights in this prospectus.

December 2013 Private Placement

In December 2013, in connection with a private placement of our common stock, we sold an aggregate of 6,000 shares of our common stock to Baxter F. Phillips III, who at the time was our Vice President, Corporate Strategy and Business Development, for $12.50 per share, which was the same price paid by the other investors participating in the private placement.

In addition, in connection with the December 2013 private placement, NRM VII Holdings I, LLC and Phillip Asset Management Ltd purchased 400,000 shares and 120,000 shares, respectively, of our common stock at a price per share of $12.50, which was the same price paid by the other investors participating in the offering.

The shares of common stock purchased in the December 2013 private placement are entitled to certain registration rights, as described in Description of Capital Stock Registration Rights in this prospectus.

March 2015 Private Placements

In March 2015, in connection with a private placement of our common stock, we sold an aggregate of 68,455 shares at a price of $8.25 per share, and warrants exercisable for 17,113 shares of common stock at a price of $10.75 per share, to One Fund Management Limited as Trustee for Asia Pacific Healthcare Fund II (One Funds), which is also known as Phillip Asset Management Limited as Trustee for Asia Pacific

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Healthcare Fund II, or Phillip Asset Management. Jeremy Curnock Cook, our then-interim Chief Executive Officer and the current Chairman of our board of directors, is a Managing Director and holds an ownership interest in Bioscience Managers Pty Ltd. Phillip Asset Management Limited is 100% owned by Phillip Capital Holdings Ltd., an Australian stockbroker. Phillip Asset Management holds all shares in its capacity as trustee for Bioscience Managers Pty Ltd.

In addition, in connection with the March 2015 private placement, we sold an aggregate of 278,788 shares and warrants exercisable for 69,697 shares of common stock, at the prices set forth above, to Intrexon Corporation. Randal J. Kirk, directly and through certain affiliates, has voting and dispositive power over a majority of the outstanding capital stock of Intrexon Corporation. At the time of the transaction, Randal J. Kirk was a holder of more than 5% of the shares of our common stock. In connection with the March 2015 private placement, we entered into a registration rights agreement with Intrexon and certain other purchasers in the private placement, pursuant to which we registered for resale on Form S-1 (File No. 333-203454) 824,848 shares of common stock held or issuable upon exercise of warrants by Intrexon. We also granted Intrexon certain piggyback registration rights, as described in Description of Capital Stock Registration Rights in this prospectus.

Exclusive Channel Collaboration

Pursuant to that certain Exclusive Channel Collaboration Agreement, dated as of March 29, 2013, with Intrexon Corporation, which we refer to as the ECC Agreement, we agreed to pay Intrexon Corporation royalties as a percentage in the upper-single digits of the net product sales of a product developed under the collaboration, and up to $7.5 million in aggregate milestone payments for each product developed. Intrexon Corporation owned more than 5% of our common stock at the time of the transaction. On April 13, 2016, we provided written notice to Intrexon Corporation of our election to voluntarily terminate the ECC Agreement. The effective date of termination was July 12, 2016.

Common Stock Issuance Agreement

On April 8, 2016, we entered into a Common Stock Issuance Agreement, or the CSIA, with certain former holders of our Series B convertible preferred stock, including Pendinas Limited and One Funds. Pursuant to the CSIA, we issued shares of our common stock to such holders, and amended certain warrants to purchase common stock issued to such holders in the private placement of Series B convertible preferred stock in June 2013 and/or July 2013, in order to reduce the exercise price of such warrants from $7.00 per share to $4.05 per share and extend the expiration date thereof from June 26, 2018 to March 31, 2021. As consideration for the transactions described above, such holders waived their right to receive approximately $2.2 million in aggregate cash payments to which they were entitled upon the conversion of all outstanding shares of Series B redeemable convertible preferred stock into shares of common stock on April 8, 2016, in respect of accrued dividends on their former shares of Series B convertible preferred stock. Such holders also waived their registration rights with respect to certain future registration statements that may be filed, and certain future public offerings that may be conducted, by us.

The table below summarizes the shares issued to Pendinas Limited and One Funds and the accrued dividends waived by such parties:

Related Person	Shares Issued	Accrued Dividends Waived

Pendinas Limited	584,556	$ 1,504,433
One Funds	171,298	$ 440,859

Pursuant to the terms of the CSIA and in connection with the registered direct public offering that we completed in June 2016, on June 21, 2016 we issued 513,837 and 150,576 shares of common stock to Pendinas Limited and One Funds, respectively, for no additional consideration.

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We may be required to issue additional shares to Pendinas and One Funds pursuant to the CSIA in connection with the closing of this offering, as described elsewhere in this prospectus and the documents incorporated herein by reference.

Settlement Agreement

On November 12, 2016, we entered into a settlement agreement with NRM. See Business Legal Proceedings for more information.

Indemnification Agreements

We have entered, and intend to continue to enter, into separate indemnification agreements with each of our directors and executive officers, as described in our filings with the SEC.

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PRINCIPAL STOCKHOLDERS

The following table sets forth information regarding beneficial ownership of our capital stock by:

each person, or group of affiliated persons, known by us to beneficially own more than 5% of our common stock;
each of our directors;
each of our named executive officers; and
all of our current executive officers and directors as a group.

The percentage ownership information before the offering is based on 11,120,394 shares of common stock outstanding as of September 30, 2016. The percentage ownership information after the offering assumes the sale of 5,300,000 shares in this offering and assumes no exercise of any warrants issued in this offering, and does not reflect any shares of common stock we may issue in connection with the closing of this offering pursuant to the CSIA.

The following table is based upon information supplied by officers, directors and principal stockholders and/or a review of Schedules 13D and 13G, if any, and other documents filed with the SEC. We have determined beneficial ownership in accordance with the rules of the SEC. These rules generally attribute beneficial ownership of securities to persons who possess sole or shared voting power or investment power with respect to those securities. In addition, the rules include shares of our common stock issuable pursuant to the exercise of stock options or warrants that are either immediately exercisable or exercisable on or before November 29, 2016, which is 60 days after September 30, 2016. These shares are deemed to be outstanding and beneficially owned by the person holding those options or warrants for the purpose of computing the percentage ownership of that person, but they are not treated as outstanding for the purpose of computing the percentage ownership of any other person. Unless otherwise indicated, the persons or entities identified in this table have sole voting and investment power with respect to all shares shown as beneficially owned by them, subject to applicable community property laws.

Except as otherwise noted below, the address for each person or entity listed in the table is c/o AmpliPhi Biosciences Corporation, 3579 Valley Centre Drive, Suite 100, San Diego, California 92130.

Name and Address of Beneficial Owner	Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned Before Offering	Percentage of Shares Beneficially Owned After Offering
Greater than 5% Stockholders			
Pendinas Limited[1] Ballacarrick, Pooilvaaish Road Isle of Man, IM9 4PJ	2,144,742	18.7 %	12.8 %
Randal J. Kirk[2] c/o Third Security, LLC 1881 Grove Avenue Radford, Virginia 24141	1,764,199	15.6 %	10.6 %
Hudson Bay Master Fund Ltd.[3] 777 Third Ave., 30th Floor New York, NY 10017	1,071,406	9.3 %	6.4 %
Empery Asset Management LP[4] 1 Rockefeller Plaza, Suite 1205 New York, NY 10020	1,070,389	9.3 %	6.4 %

Sabby Healthcare Master Fund, Ltd.[5] 10 Mountainview Road Upper Saddle River, NJ 07458	1,063,830	9.3 %	6.3 %
Phillip Asset Management Limited[6] Level 12, 15 William Street, Melbourne Vic Australia	819,777	7.3 %	5.0%

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Name and Address of Beneficial Owner	Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned Before Offering	After Offering
Directors and Named Executive Officers			
M. Scott Salka[7]	54,164	*	*
Jeremy Curnock Cook[8]	847,370	7.5 %	5.1 %
Louis Drapeau[9]	14,431	*	*
Michael S. Perry, Ph.D.[10]	8,931	*	*
Vijay B. Samant[11]	4,050	*	*
Paul C. Grint, M.D.[12]	4,050	*	*
Wendy Johnson[13]	52,996	*	*
David E. Bosher			
All current executive officers and directors as a group (8 persons)[14]	985,992	8.7 %	5.9 %

* Represents beneficial ownership of less than 1%.

(1) Based in part upon a Form 4 filed with the SEC on February 24, 2014 filed by Gwynn Williams, who may be deemed to control Pendinas Limited. After giving effect to the 1-for-50 reverse split of our common stock effected in August 2015 and the conversion of all outstanding shares of Series B redeemable convertible preferred stock into shares of common stock on April 8, 2016, or the Series B Conversion, consists of 1,808,698 shares of common stock and 336,044 shares of common stock issuable upon exercise of warrants.

(2) Based solely upon a Schedule 13D filed with the SEC on March 16, 2015. According to the Schedule 13D and giving effect to the 1-for-50 reverse split of our common stock effected in August 2015 and the Series B Conversion, consists of (a) 828,571 shares of common stock held by NRM VII Holdings I, LLC, which we refer to as NRM VII Holdings, (b) 107,143 shares of common stock issuable upon exercise of warrants held by NRM VII Holdings, (c) 758,788 shares of common stock held by Intrexon Corporation, and (d) 69,697 shares of common stock issuable upon exercise of warrants held Intrexon Corporation. Third Security, LLC is the Manager of Third Security Capital Partners VII, LLC, which is the Manager of NRM VII Holdings. Third Security, LLC has sole voting and investment power over the shares beneficially owned by NRM VII Holdings listed in the foregoing clauses (a) and (b), and consequently Third Security beneficially owns approximately 11.2% of our common stock. Randal J. Kirk is the Manager of Third Security, LLC. Shares held by this entity may be deemed to be indirectly beneficially owned (as defined under Rule 13d-3 promulgated under the Exchange Act) by Mr. Kirk. Mr. Kirk disclaims beneficial ownership of such shares, except to the extent of any pecuniary interest therein. Randal J. Kirk, directly and through certain affiliates, has voting and dispositive power over a majority of the outstanding capital stock of Intrexon Corporation. Mr. Kirk may therefore be deemed to have voting and dispositive power over the shares of the issuer owned by Intrexon Corporation. Shares held by Intrexon Corporation may be deemed to be indirectly beneficially owned (as defined under Rule 13d-3 promulgated under the Exchange Act) by Mr. Kirk. Mr. Kirk disclaims beneficial ownership of such shares, except to the extent of any pecuniary interest therein.

(3) Consists of 709,220 shares of common stock and 362,186 shares of common stock issuable upon exercise of warrants. Hudson Bay Capital Management LP, the investment manager of Hudson Bay Master Fund Ltd., has voting and investment power over such securities. Sander Gerber is the managing member of Hudson Bay Capital GP LLC, which is the general partner of Hudson Bay Capital Management LP. Each of the foregoing persons and entities disclaim beneficial ownership of the securities held by them except to the extent of his or its pecuniary interest therein.

(4) Consists of (a) 269,236 shares of common stock held by Empery Asset Master Ltd., which we refer to as EAM, and 136,629 shares of common stock issuable upon exercise of warrants held by EAM, (b) 181,862 shares of

common stock held by Empery Tax Efficient, LP, which we refer to as ETE, and 93,144 shares of common stock issuable upon exercise of warrants held by ETE and (c) 258,122 shares of common stock held by Empery Tax Efficient II, LP, which we refer to as ETE II, and 131,396 shares of common stock issuable upon exercise of warrants held by ETE II. Empery Asset Management LP is the authorized agent of EAM, ETE and ETE II, and has discretionary authority to vote and dispose of the shares held by EAM, ETE and ETE II, respectively, and may be deemed to be the beneficial owner of

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the securities held by each such entity. Martin Hoe and Ryan Lane, in their capacity as investment managers of Empery Asset Management LP, may also be deemed to have investment discretion and voting power over the shares held by EAM, ETE and ETE II. Each of the foregoing persons and entities disclaim beneficial ownership of the securities held by them except to the extent of his or its pecuniary interest therein.

(5) Consists of (a) 354,610 shares of common stock held by Sabby Healthcare Master Fund, Ltd., which we refer to as Sabby HMF, and 177,305 shares of common stock issuable upon exercise of warrants held by Sabby HMF and (b) 354,610 shares of common stock held by Sabby Volatility Warrant Master Fund, Ltd., which we refer to as Sabby VWMF, and 177,305 shares of common stock issuable upon exercise of warrants held by Sabby VWMF. Sabby Management, LLC serves as the investment manager of Sabby HMF and Sabby VWMF. Hal Mintz is the manager of Sabby Management, LLC and has voting and investment control of the securities held by Sabby HMF and Sabby VWMF. Each of the foregoing persons and entities disclaim beneficial ownership of the securities held by them except to the extent of his or its pecuniary interest therein.

(6) Consists of (a) 718,479 shares of common stock held by One Fund Management Limited as Trustee for Asia Pacific Healthcare Fund II, which is also known as Phillip Asset Management Limited as Trustee for Asia Pacific Healthcare Fund II, and which we refer to as Phillip Asset Management, and (b) an aggregate of 101,298 shares of common stock issuable upon exercise of warrants held by Phillip Asset Management. Phillip Asset Management holds all securities in its capacity as trustee for Bioscience Managers Pty Ltd. Jeremy Curnock Cook, the Chairman of our Board of Directors, is a Managing Director and holds an ownership interest in Bioscience Managers Pty Ltd.

(7) Includes 49,964 shares of common stock that Mr. Salka has the right to acquire from us within 60 days following September 30, 2016, pursuant to the exercise of stock options.

(8) Includes the shares reference in Footnote 6 above and 24,293 shares of common stock that Mr. Curnock Cook has the right to acquire from us within 60 days following September 30, 2016, pursuant to the exercise of stock options.

(9) Includes 4,431 shares of common stock that Mr. Drapeau has the right to acquire from us within 60 days following September 30, 2016, pursuant to the exercise of stock options.

(10) Includes 6,631 shares of common stock that Dr. Perry has the right to acquire from us within 60 days following September 30, 2016, pursuant to the exercise of stock options.

(11) Includes 4,050 shares of common stock that Mr. Samant has the right to acquire from us within 60 days following September 30, 2016, pursuant to the exercise of stock options.

(12) Includes 4,050 shares of common stock that Dr. Grint has the right to acquire from us within 60 days following September 30, 2016, pursuant to the exercise of stock options.

(13) Includes 52,996 shares of common stock that Ms. Johnson has the right to acquire from us within 60 days following September 30, 2016, pursuant to the exercise of stock options.

(14) Consists of (a) 739,279 shares of common stock, (b) 101,298 shares of common stock issuable upon exercise of warrants and (c) 145,415 shares of common stock that may be acquired from us within 60 days following September 30, 2016, pursuant to the exercise of stock options.

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DESCRIPTION OF CAPITAL STOCK

The following description of our capital stock, certain provisions of our articles of incorporation and bylaws, and certain provisions of Washington law are summaries. The following description is not complete and is subject to and qualified in its entirety by our articles of incorporation and bylaws, which are filed as exhibits to the registration statement of which this prospectus is a part, and by the relevant provisions of the Washington Business Corporation Act.

Our articles of incorporation authorize us to issue up to 670,000,000 shares of common stock, par value $0.01 per share, and 10,000,000 shares of preferred stock, par value $0.01 per share.

As of September 30, 2016, we had 156 holders of record of our common stock. The actual number of stockholders is greater than the number of record holders, and includes stockholders who are beneficial owners, whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

Common Stock

Voting

Our common stock is entitled to one vote for each share held on all matters submitted to a vote of the stockholders, including the election of directors, and does not have cumulative voting rights. Accordingly, the holders of a majority of the shares of our common stock entitled to vote in any election of directors can elect all of the directors standing for election.

Dividends

Subject to preferences that may be applicable to any then-outstanding preferred stock, the holders of common stock are entitled to receive dividends, if any, as may be declared from time to time by our board of directors out of legally available funds.

Liquidation

In the event of our liquidation, dissolution or winding-up, holders of our common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities, subject to the satisfaction of any liquidation preference granted to the holders of any outstanding shares of preferred stock.

Rights and Preferences

Holders of our common stock have no preemptive, conversion or subscription rights, and there are no redemption or sinking fund provisions applicable to our common stock. The rights, preferences and privileges of the holders of our common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of our preferred stock that are outstanding or that we may designate and issue in the future.

Preferred Stock

Our board of directors has the authority, without further action by the stockholders, to issue up to 10,000,000 shares of preferred stock in one or more series, to establish from time to time the number of shares to be included in each such series, to fix the rights, preferences and privileges of the shares of each wholly unissued series and any qualifications, limitations or restrictions thereon and to increase or decrease the number of shares of any such series, but not below the number of shares of such series then outstanding.

Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the common stock. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in our control that may otherwise benefit holders of our common stock and may adversely affect the market price of the common stock and the voting and other rights of the holders of common stock.

There currently are no provisions under our amended and restated articles of incorporation or under any other contractual obligations whereby we are authorized or required to issue or sell shares of preferred stock and we have no present plans to issue any shares of preferred stock.

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Registration Rights

Certain holders of shares of our common stock and of warrants to purchase shares of our common stock, or their transferees, are entitled to certain registration rights under the Securities Act as set forth below.

Demand registration rights. Pursuant to that certain Subscription Agreement, dated June 26, 2013, which we refer to as the June 2013 Subscription Agreement, from the date that is the earlier of (a) June 26, 2018 and (b) 180 days after the effective date of the registration statement for our initial public offering, the holders of at least 50% of our common stock issued upon conversion of shares of our Series B redeemable convertible preferred stock and/or issued or issuable upon the exercise of warrants issued pursuant to the June 2013 Subscription Agreement are entitled to request to have such shares registered by us on a Form S-1 registration statement. As of September 30, 2016, the holders of an aggregate of 2,114,534 shares of common stock and holders of warrants to purchase an aggregate of 467,035 shares of our common stock are entitled to such rights.

Form S-3 registration rights. At any time we are eligible to use a Form S-3 registration statement, holders of at least 30% of our common stock issued upon conversion of shares of our Series B redeemable convertible preferred stock and/or issued or issuable upon the exercise of warrants issued pursuant to the June 2013 Subscription Agreement are entitled to request to have such shares registered by us on a Form S-3 registration statement. As of September 30, 2016, the holders of an aggregate of 2,114,534 shares of common stock and holders of warrants to purchase an aggregate of 467,035 shares of our common stock are entitled to such rights.

Piggyback registration rights. If we propose to file a registration statement to register any of our securities under the Securities Act either for our own account or for the account of other securityholders, the holders of warrants to purchase an aggregate of 27,102 shares of our common stock are entitled to notice of the registration and will be entitled to include the shares of common stock issued or issuable upon exercise of such warrants in any such registration statement. These piggyback registration rights are subject to specified conditions and limitations, including, in the case of an underwritten offering, the right of the underwriters to limit the number of shares included in any such registration under specified circumstances. The warrants described above in this paragraph have an exercise price of $23.00 per share and will expire in December 2016.

In addition, so long as we are required to maintain an effective registration statement covering shares of common stock issued pursuant to that certain Subscription Agreement, dated December 16, 2013, which we refer to as the December 2013 Subscription Agreement, or shares of common stock issued pursuant to that certain Subscription Agreement, dated March 10, 2015, which we refer to as the March 2015 Subscription Agreement, then, if there is not an effective registration statement covering such shares, the holders of such shares will be eligible for the rights contained in the immediately preceding paragraph. With respect to each holder of the foregoing registration rights, we are required to keep a registration statement covering such shares effective until all applicable shares of common stock held by such holder may be sold under Rule 144 of the Securities Act. As of September 30, 2016, the holders of an aggregate of 867,241 shares of common stock were entitled to such rights.

If we propose to file a registration statement under the Securities Act with respect to an underwritten offering for our own account, the holders of the securities issued pursuant to the June 2013 Subscription Agreement, as well as the shares held by Intrexon Corporation, will be entitled to advance notice of the proposed filing of such registration statement and will be entitled to include the securities described above or, in the case of Intrexon Corporation, the shares of common stock held by Intrexon Corporation, in any such registration statement. These piggyback registration rights are subject to specified conditions and limitations, including, in the case of an underwritten offering, the right of the underwriters to limit the number of shares included in any such registration under specified

circumstances.

From the date that is the earlier of (a) December 31, 2016 or (b) the closing of our first underwritten public offering, the holders of warrants to purchase an aggregate of 170,000 shares of our common stock, which warrants were issued by us pursuant to our acquisition of certain assets of Novolytics Limited in January 2016, will be entitled to piggyback registration rights provided such securities are not then covered by an effective registration statement.

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Resale registration statements. Pursuant to that certain Registration Rights Agreement, dated December 16, 2013, by and between us and the purchasers of shares of common stock and warrants to purchase common stock named therein, and that certain Registration Rights Agreement, dated March 10, 2015, by and between us and the purchasers of shares of common stock and warrants to purchase common stock named therein, we agreed to file registration statements on Form S-1 covering the resale of the shares of common stock purchased under the December 2013 Subscription Agreement or March 2015 Subscription Agreement, as applicable, which became effective on December 29, 2014 and May 14, 2015, respectively. With respect to each holder of the foregoing registration rights, we are required to keep such registration statements effective until all applicable shares of common stock may be sold under Rule 144 of the Securities Act.

Expenses of registration. We will pay all expenses relating to any piggyback or Form S-1 or S-3 registration, other than underwriting discounts and commissions, subject to specified conditions and limitations.

Anti-Takeover Effects of Provisions of Our Articles of Incorporation, Our Bylaws and Washington Law

Provisions in our articles of incorporation, our bylaws and under Washington law may delay or prevent an acquisition of us or a change in our management, including transactions in which stockholders might otherwise receive a premium for their shares or transactions that our stockholders might otherwise deem to be in their best interests. These provisions include a classified board of directors and a requirement for the vote of stockholders holding at least two-thirds of all shares of our issued and outstanding capital stock to approve certain changes to our articles of incorporation or certain business combinations. These provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management. Additionally, because we are incorporated in Washington, we are governed by the provisions of Chapter 23B.19 of the Washington Business Corporation Act, which, among other things, prohibits a target corporation, with certain exceptions, from engaging in certain significant business transactions for a period of five years after the share acquisition by an acquiring person , unless (a) the significant business transaction is approved by a majority of the members of the target corporation s board of directors prior to the time of acquisition or (b) the significant business transaction was approved by both the majority of the members of the target corporation s board of directors and approved at a stockholder meeting by at least two-thirds of the outstanding voting shares (excluding the acquiring person s shares or shares over which the acquiring person has voting control) at or subsequent to the acquiring person s share acquisition. An acquiring person is defined as a person or group of persons which beneficially owns 10% or more of the voting securities of the target corporation. Such prohibited transactions may include, among other things:

any merger or consolidation with, disposition of assets to, or issuance or redemption of stock to or from, the acquiring person;
any termination of 5% or more of the employees of the target corporation as a result of the acquiring person s acquisition of 10% or more of the shares; or
allowing the acquiring person to receive any disproportionate benefit as a stockholder.

After the five-year period, a significant business transaction may take place as long as it complies with certain fair price provisions of the statute or is approved by a majority of the votes entitled to be counted within each voting group entitled to vote separately on the transaction (excluding the acquiring person s shares or shares over which the acquiring person has voting control) at an annual or special meeting of stockholders.

NYSE MKT Listing

Our common stock is listed on the NYSE MKT under the symbol APHB.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare. The transfer agent and registrar s address is 250 Royall Street, Canton, MA 02021.

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DESCRIPTION OF SECURITIES WE ARE OFFERING

We are offering (i) 5,300,000 shares of our common stock and (ii) warrants to purchase up to 5,300,000 shares of our common stock. Each share of common stock is being sold together with a warrant to purchase one share of common stock. The shares of common stock and warrants will be issued separately. We are also registering the shares of common stock issuable from time to time upon exercise of the warrants offered hereby.

Common Stock

The material terms and provisions of our common stock and each other class of our securities which qualifies or limits our common stock are described under the caption Description of Capital Stock in this prospectus.

Warrants

The following summary of certain terms and provisions of warrants that are being offered hereby is not complete and is subject to, and qualified in its entirety by, the provisions of the warrant, the form of which is filed as an exhibit to the registration statement of which this prospectus forms a part. Prospective investors should carefully review the terms and provisions of the form of warrant for a complete description of the terms and conditions of the warrants.

Duration and Exercise Price. Each warrant offered hereby will have an exercise price per share equal to $. The warrants will be immediately exercisable and will expire on the fifth anniversary of the original issuance date. The exercise price and number of shares of common stock issuable upon exercise is subject to appropriate adjustment in the event of stock dividends, stock splits, reorganizations or similar events affecting our common stock and the exercise price. The warrants will be issued separately from the common stock, and may be transferred separately immediately thereafter. A warrant to purchase one share of our common stock will be issued for every one share purchased in this offering.

Exercisability. The warrants will be exercisable, at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice accompanied by payment in full for the number of shares of our common stock purchased upon such exercise (except in the case of a cashless exercise as discussed below). A holder (together with its affiliates) may not exercise any portion of the warrant to the extent that the holder would own more than 4.99% of the outstanding common stock immediately after exercise, except that upon at least 61 days prior notice from the holder to us, the holder may increase the amount of ownership of outstanding stock after exercising the holder s warrants up to 9.99% of the number of shares of our common stock outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the warrants. No fractional shares of common stock will be issued in connection with the exercise of a warrant. In lieu of fractional shares, we will either pay the holder an amount in cash equal to the fractional amount multiplied by the exercise price or round up to the next whole share.

Cashless Exercise. If, at the time a holder exercises its warrant, a registration statement registering the issuance of the shares of common stock underlying the warrants under the Securities Act is not then effective or available, then in lieu of making the cash payment otherwise contemplated to be made to us upon such exercise in payment of the aggregate exercise price, the holder may elect instead to receive upon such exercise (either in whole or in part) the net number of shares of common stock determined according to a formula set forth in the warrant.

Fundamental Transactions. In the event of a fundamental transaction, as described in the warrants and generally including any reorganization, recapitalization or reclassification of our common stock, the sale, transfer or other disposition of all or substantially all of our properties or assets, our consolidation or merger with or into another person, the acquisition of more than 50% of our outstanding common stock, or any person or group becoming the beneficial owner of 50% of the voting power represented by our outstanding common stock, then we will be obligated to purchase the warrants from the holders thereof concurrently with the consummation of such transaction by paying the holders an amount of cash based on a Black Scholes formula as set forth in the warrants.

Transferability. Subject to applicable laws, the warrant may be transferred at the option of the holder upon surrender of the warrant to us together with the appropriate instruments of transfer.

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Exchange Listing. We do not intend to list the warrants on any securities exchange or nationally recognized trading system.

Right as a Stockholder. Except as otherwise provided in the warrants or by virtue of such holder s ownership of shares of our common stock, the holders of the warrants do not have the rights or privileges of holders of our common stock, including any voting rights, until they exercise their warrants.

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UNDERWRITING

We have entered into an underwriting agreement with the several underwriters listed in the table below. Roth Capital Partners, LLC is the representative of the underwriters. We refer to the several underwriters listed in the table below as the underwriters. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriters, and the underwriters have agreed to purchase from us, shares of our common stock and warrants to purchase shares of our common stock. Our common stock trades on the NYSE MKT under the symbol APHB.

Pursuant to the terms and subject to the conditions contained in the underwriting agreement, we have agreed to sell to the underwriters named below, and each underwriter severally has agreed to purchase from us, the respective number of shares of common stock and warrants to purchase common stock set forth opposite its name below:

Underwriter	Number of Shares	Number of Warrants
Roth Capital Partners, LLC		
Griffin Securities, Inc.		
Total		

The underwriting agreement provides that the obligation of the underwriters to purchase the shares of common stock and the warrants to purchase shares of common stock offered by this prospectus is subject to certain conditions. The underwriters are obligated to purchase all of the shares of common stock and the warrants to purchase shares of our common stock offered hereby if any of the securities are purchased.

Discounts, Commissions and Expenses

The underwriters propose to offer the shares of common stock and the accompanying warrants purchased pursuant to the underwriting agreement to the public at the public offering price set forth on the cover page of this prospectus and to certain dealers at that price less a concession not in excess of $ per share. After this offering, the public offering price and concession may be changed by the underwriters. No such change shall change the amount of proceeds to be received by us as set forth on the cover page of this prospectus.

In connection with the sale of the common stock and warrants to be purchased by the underwriters, the underwriters will be deemed to have received compensation in the form of underwriting commissions and discounts. The underwriters commissions and discounts will be 6% of the gross proceeds of this offering, or $ per share of common stock and the accompanying warrant, based on the combined public offering price per share and warrant set forth on the cover page of this prospectus.

We have also agreed to reimburse Roth Capital Partners at closing for reasonable out of pocket expenses, including reasonable legal expenses, incurred by it in connection with the offering, up to a maximum of $70,000 unless we otherwise agree.

The following table shows the underwriting discounts and commissions payable to the underwriters by us in connection with this offering:

	Per	Total

	Combined Share and Warrant	
Public offering price	$	$
Underwriting discounts and commissions payable by us	$	$

Indemnification

Pursuant to the underwriting agreement, we have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act, or to contribute to payments that the underwriters or such other indemnified parties may be required to make in respect of those liabilities.

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Lock-Up Agreements

We have agreed not to (i) offer, pledge, issue, sell, contract to sell, purchase, contract to purchase, lend or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for our common stock; (ii) enter into any swap or other arrangement that transfers, in whole or in part, any of the economic consequences of ownership of shares of common stock; or (iii) file any registration statement with the SEC relating to the offering of any shares of our common stock or any securities convertible into or exercisable or exchangeable for shares of our common stock, without the prior written consent of Roth Capital Partners for a period of 90 days following the date of this prospectus (the Lock-up Period). This consent may be given at any time without public notice. These restrictions on future issuances are subject to exceptions for (i) the issuance of shares of our common stock, warrants and shares of our common stock underlying the warrants sold in this offering, (ii) the issuance of shares of our common stock upon the exercise of outstanding options or warrants, (iii) the issuance of shares of our common stock or options to acquire shares of our common stock pursuant to our existing equity incentive plans and (iv) the filing of one or more registration statements on Form S-8 with respect to shares of our common stock underlying our equity incentive plans from time to time.

In addition, subject to certain limited circumstances, each of our directors and executive officers, and certain of our principal stockholders, has entered into a lock-up agreement with the underwriters. Under the lock-up agreements, the directors, executive officers and applicable stockholders may not, directly or indirectly, sell, offer to sell, contract to sell, or grant any option for the sale (including any short sale), grant any security interest in, pledge, hypothecate, hedge, establish an open put equivalent position (within the meaning of Rule 16a-1(h) under the Securities Exchange Act of 1934, as amended, or the Exchange Act), or otherwise dispose of, or enter into any transaction which is designed to or could be expected to result in the disposition of, any shares of our common stock or securities convertible into or exchangeable for shares of our common stock, or publicly announce any intention to do any of the foregoing, without the prior written consent of Roth Capital Partners, for a period of 90 days from the date of this prospectus. This consent may be given at any time without public notice.

Electronic Distribution

This prospectus may be made available in electronic format on websites or through other online services maintained by the underwriters or by their affiliates. In those cases, prospective investors may view offering terms online and prospective investors may be allowed to place orders online. Other than this prospectus in electronic format, the information on the underwriters websites or our website and any information contained in any other websites maintained by the underwriters or by us is not part of this prospectus or the registration statement of which this prospectus forms a part, has not been approved and/or endorsed by us or the underwriter in its capacity as underwriter, and should not be relied upon by investors.

Price Stabilization, Short Positions and Penalty Bids

In connection with the offering the underwriters may engage in stabilizing transactions, syndicate covering transactions and penalty bids in accordance with Regulation M under the Exchange Act:

Stabilizing transactions permit bids to purchase the underlying security so long as the stabilizing bids do not exceed a specified maximum.

Sales by the underwriters of securities in excess of the number of securities the underwriters are obligated to purchase creates a syndicate short position. The underwriters may close out any syndicate short position by purchasing shares

in the open market.

Syndicate covering transactions involve purchases of the common stock in the open market after the distribution has been completed in order to cover syndicate short positions.

Penalty bids permit the underwriters to reclaim a selling concession from a syndicate member when the common stock originally sold by the syndicate member is purchased in a stabilizing or syndicate covering transaction to cover syndicate short positions.

These stabilizing transactions, syndicate covering transactions and penalty bids may have the effect of raising or maintaining the market price of our common stock or preventing or retarding a decline in the market price

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of the common stock. As a result, the price of our common stock may be higher than the price that might otherwise exist in the open market. These transactions may be discontinued at any time.

Neither we nor the underwriters make any representation or prediction as to the direction or magnitude of any effect that the transactions described above may have on the price of our shares of common stock. In addition, neither we nor the underwriters make any representation that the underwriter will engage in these transactions or that any transaction, if commenced, will not be discontinued without notice.

Other Relationships

From time to time, certain of the underwriters and their affiliates have provided, and may provide in the future, various advisory, investment and commercial banking and other services to us in the ordinary course of business, for which they have received and may continue to receive customary fees and commissions. We currently have such an agreement for advisory services in place with Griffin Securities, Inc. Roth Capital Partners, LLC and Griffin Securities, Inc. acted as our co-placement agents for our registered direct offering that closed on June 3, 2016.

Selling Restrictions

European Economic Area

This prospectus does not constitute an approved prospectus under Directive 2003/71/EC and no such prospectus is intended to be prepared and approved in connection with this offering. Accordingly, in relation to each Member State of the European Economic Area which has implemented Directive 2003/71/EC (each, a Relevant Member State) an offer to the public of any securities which are the subject of the offering contemplated by this prospectus may not be made in that Relevant Member State except that an offer to the public in that Relevant Member State of any securities may be made at any time under the following exemptions under the Prospectus Directive, if and to the extent that they have been implemented in that Relevant Member State:

(a) to any legal entity which is a qualified investor as defined in the Prospectus Directive;

(b) to fewer than 100 or, if the Relevant Member State has implemented the relevant provision of the 2010 PD Amending Directive, 150, natural or legal persons (other than qualified investors as defined in the Prospectus Directive), subject to obtaining the prior consent of the representatives of the underwriter for any such offer; or

(c) in any other circumstances which do not require any person to publish a prospectus pursuant to Article 3 of the Prospectus Directive.

For the purposes of this provision, the expression an offer to the public in relation to any securities in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and any securities to be offered so as to enable an investor to decide to purchase any securities, as the expression may be varied in that Member State by any measure implementing the Prospectus Directive in that Member State and the expression Prospectus Directive means Directive 2003/71/EC (and any amendments thereto including the 2010 PD Amending Directive to the extent implemented in each Relevant Member State) and includes any relevant implementing measure in each Relevant Member State and the expression 2010 PD Amending Directive means Directive 2010/73/EU.

United Kingdom

This prospectus is not an approved prospectus for purposes of the UK Prospectus Rules, as implemented under the EU Prospectus Directive (2003/71/EC), and has not been approved under section 21 of the Financial Services and Markets Act 2000 (as amended) (the FSMA) by a person authorized under FSMA. The financial promotions contained in this prospectus is directed at, and this prospectus is only being distributed to, (1) persons who receive this prospectus outside of the United Kingdom, and (2) persons in the United Kingdom who fall within the exemptions under articles 19 (investment professionals) and 49(2)(a) to (d) (high net worth companies, unincorporated associations, etc.) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (all such persons together being referred to as Relevant Persons). This prospectus must not be acted upon or relied upon by any person who is not a Relevant Person. Any

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investment or investment activity to which this prospectus relates is available only to Relevant Persons and will be engaged in only with Relevant Persons. This prospectus and its contents are confidential and should not be distributed, published or reproduced (in whole or in part) or disclosed by recipients to any other person that is not a Relevant Person.

Each of the underwriters has represented, warranted and agreed that:

(d) it has only communicated or caused to be communicated and will only communicate or cause to be communicated any invitation or inducement to engage in investment activity (within the meaning of section 21 of the FSMA in connection with the issue or sale of any of the securities in circumstances in which section 21(1) of the FSMA does not apply to the issuer; and

(e) it has complied with and will comply with all applicable provisions of the FSMA with respect to anything done by it in relation to the securities in, from or otherwise involving the United Kingdom.

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LEGAL MATTERS

The validity of the securities being offered by this prospectus will be passed upon for us by Cooley LLP, San Diego, California. The underwriters are being represented by Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., New York, New York.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2015, as set forth in their report (which contains an explanatory paragraph describing conditions that raise substantial doubt about our ability to continue as a going concern as described in Note 2 to the consolidated financial statements), which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP s report, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

We have filed with the SEC a registration statement on Form S-1 under the Securities Act, with respect to the securities being offered by this prospectus. This prospectus does not contain all of the information in the registration statement and its exhibits. For further information with respect to us and the securities offered by this prospectus, we refer you to the registration statement and its exhibits. Statements contained in this prospectus as to the contents of any contract or any other document referred to are not necessarily complete, and in each instance, we refer you to the copy of the contract or other document filed as an exhibit to the registration statement. Each of these statements is qualified in all respects by this reference.

You can read our SEC filings, including the registration statement, over the Internet at the SEC s website at *www.sec.gov*. You may also read and copy any document we file with the SEC at its public reference facilities at 100 F Street NE, Washington, D.C. 20549. You may also obtain copies of these documents at prescribed rates by writing to the Public Reference Section of the SEC at 100 F Street N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for further information on the operation of the public reference facilities. You may also request a copy of these filings, at no cost, by writing us at 3579 Valley Centre Drive, Suite 100, San Diego, California 92130 or telephoning us at (858) 829-0829.

We are subject to the information and periodic reporting requirements of the Exchange Act, and we file periodic reports, proxy statements and other information with the SEC. These periodic reports, proxy statements and other information are available for inspection and copying at the public reference room and website of the SEC referred to above. We maintain a website at *http://www.ampliphibio.com*. You may access our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act with the SEC free of charge at our website as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC. The information contained in, or that can be accessed through, our website is not incorporated by reference in, and is not part of, this prospectus.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to incorporate by reference information from other documents that we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus. Information in this prospectus supersedes information incorporated by reference that we filed with the SEC prior to the date of this prospectus.

We incorporate by reference into this prospectus and the registrations statement of which this prospectus is a part the information or documents listed below that we have filed with the SEC (Commission File No. 001-37544):

our annual report on Form 10-K for the year ended December 31, 2015, filed with the SEC on March 30, 2016;
our definitive proxy statement on Schedule 14A, filed with the SEC on May 20, 2016 (other than the portions thereof which are furnished and not filed);

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our quarterly reports on Form 10-Q for the quarters ended March 31, 2016, June 30, 2016 and September 30, 2016, filed with the SEC on May 12, 2016, August 15, 2016 and November 10, 2016;
our current reports on Form 8-K, filed with the SEC on January 8, 2016, January 19, 2016, March 29, 2016, April 8, 2016, April 14, 2016, April 20, 2016, June 1, 2016, June 23, 2016, September 1, 2016, September 29, 2016, October 25, 2016 and November 14, 2016; and
the description of our common stock contained in our registration statement on Form 8-A, filed with the SEC on August 18, 2015, including all amendments and reports filed for the purpose of updating such description.

In addition, all documents subsequently filed by us pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act, prior to the termination of the offering, shall be deemed to be incorporated by reference into this prospectus.

We will provide to each person, including any beneficial owners, to whom a prospectus is delivered, a copy of any or all of the reports or documents that have been incorporated by reference in the prospectus contained in the registration statement but not delivered with the prospectus. We will provide these reports or documents upon written or oral request at no cost to the requester. You should direct any written requests for documents to AmpliPhi Biosciences Corporation, Attn: Chief Financial Officer, 3579 Valley Centre Drive, Suite 100, San Diego, California 92130. You may also telephone us at (858) 829-0829.

In accordance with Rule 412 of the Securities Act, any statement contained in a document incorporated by reference herein shall be deemed modified or superseded to the extent that a statement contained herein or in any other subsequently filed document which also is or is deemed to be incorporated by reference herein modifies or supersedes such statement.

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5,300,000 Shares of Common Stock

Warrants to Purchase 5,300,000 Shares of Common Stock

PROSPECTUS

Sole Book-Running Manager

Roth Capital Partners

Co-Manager

Griffin Securities, Inc.

, 2016

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PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution.

The following table sets forth all costs and expenses, other than underwriting discounts and commissions, paid or payable by the Registrant, in connection with the sale of the securities being registered under this registration statement. All amounts shown are estimates except for the Securities and Exchange Commission, or SEC, registration fee and the Financial Industry Regulatory Authority, Inc., or FINRA, filing fee.

	Amount
SEC registration fee	$ 1,229
FINRA filing fee	2,000
Legal fees and expenses	270,000
Accounting fees and expenses	30,000
Miscellaneous expenses	46,771
Total	$ 350,000

Item 14. Indemnification of Directors and Officers.

The Registrant is incorporated under the laws of the State of Washington. Sections 23B.08.510 and 23B.08.570 of the Washington Business Corporation Act authorize Washington corporations to indemnify directors and officers under certain circumstances against expenses (including legal expenses) and liabilities incurred in legal proceedings in which they are involved by reason of being a director or officer, as applicable. Section 23B.08.560 of the Washington Business Corporation Act authorizes a corporation, if authorized by its articles of incorporation or by a provision in the corporation s bylaws approved by its stockholders, to indemnify or agree to indemnify a director made a party to a proceeding, or obligate itself to advance or reimburse expenses incurred in a proceeding, without regard to the limitations imposed by Sections 23B.08.510 through 23B.08.550; provided that no such indemnity shall indemnify any director from or on account of (a) acts or omissions of the director finally adjudged to be intentional misconduct or a knowing violation of law, (b) conduct of the director finally adjudged to be in violation of Section 23B.08.310 of the Washington Business Corporation Act (which section relates to unlawful distributions) or (c) any transaction with respect to which it was finally adjudged that such director personally received a benefit in money, property or services to which the director was not legally entitled.

Article 11 of the Registrant s articles of incorporation, provides that, to the fullest extent that the Washington Business Corporation Act permits the limitation or elimination of the liability of a director, a director shall not be liable to the Registrant or its stockholders for monetary damages for conduct as a director. Section 10 of the Registrant s amended and restated bylaws requires the Registrant to indemnify every present or former director or officer against expenses, liabilities and losses incurred in connection with serving as a director or officer, as applicable, and to advance expenses of such director or officer incurred in defending any proceeding covered by the indemnity.

The Registrant maintains a policy of directors and officers liability insurance that insures the directors and officers against the cost of defense, settlement or payment of a judgment under certain circumstances. The Registrant has also entered into indemnification agreements with its executive officers and directors that provide for the indemnification of directors and executive officers to the fullest extent permitted by the Washington Business Corporation Act against

expenses reasonably incurred by such persons in any threatened, pending or completed action, suit, investigation or proceeding in connection with their service as (i) a director or officer or (ii) a director, officer, employee or agent of another corporation or of a partnership, joint venture, trust or other enterprise, including service with respect to employee benefit plans, at the Registrant s request. In addition, the indemnification agreements provide the Registrant with the obligation to advance expenses under certain circumstances and provide for procedural protections, including a determination by a reviewing party as to whether the indemnitee is permitted to be indemnified under applicable law. In addition, the Registrant acknowledges that it will be the indemnitor of first resort should the indemnitee have rights to indemnification provided by other persons.

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The Registrant plans to enter into an underwriting agreement that provides that the underwriters are obligated, under some circumstances, to indemnify the Registrant s directors, officers and controlling persons against specified liabilities, including liabilities under the Securities Act.

Item 15. Recent Sales of Unregistered Securities.

Set forth below is information regarding securities issued and options granted by us since January 1, 2013 that were not registered under the Securities Act. Also included is the consideration, if any, received by the Registrant, for such securities and options and information relating to the Securities Act, or rule of the SEC, under which exemption from registration was claimed.

(1) Between November 23, 2010 and February 1, 2012, the Registrant sold convertible promissory notes to a total of 22 different parties in varying principal amounts for an aggregate total of $1,872,462. All such convertible notes were converted in connection with the Registrant s private placement of Series B redeemable convertible preferred stock in June/July 2013. The offer, sales and issuances of convertible promissory notes were deemed to be exempt from registration under the Securities Act. The purchasers of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the securities issued in these transactions. Each of such purchasers was an accredited investor under Rule 506 of Regulation D or not a U.S. person under Regulation S.

(2) Between April 13, 2012 and May 13, 2013, the Registrant sold convertible promissory notes to Pendinas Limited in varying principal amounts for an aggregate total of $2,750,000. Additionally, the Registrant issued warrants to purchase up to an aggregate of up to approximately 140,000 shares of common stock at an exercise price of $7.00 per share. All such convertible notes were converted in connection with the Registrant s private placement of Series B redeemable convertible preferred stock in June/July 2013. The offers, sales and issuances of convertible promissory notes and warrants to purchase common stock were deemed to be exempt from registration under the Securities Act. The purchaser of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the securities issued in these transactions. Pendinas Limited was both an accredited investor under Rule 506 of Regulation D and not a U.S. person under Regulation S.

(3) On March 29, 2013, pursuant to the terms of a Stock Issuance Agreement, the Registrant issued 480,000 shares of its common stock to Intrexon Corporation. The Stock Issuance Agreement also provides for the potential future issuance by the Registrant of additional shares of its common stock having a fair market value of up to $7,500,000, depending upon the completion of certain milestones. The purchaser of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the securities issued in these transactions. The issuance of shares of common stock under the Stock Issuance Agreement was deemed to be exempt from registration under the Securities Act as Intrexon was an accredited investor under Rule 506 of Regulation D.

(4) On June 25, 2013, the Registrant granted stock options under its 2012 Stock Incentive Plan to purchase an aggregate of 232,000 shares of common stock to its employees, directors and consultants with an exercise price of $8.00 per share, of which 214,815 shares have been exercised through the date hereof. These issuances of securities were deemed to be exempt from registration under the Securities Act in reliance on Rule 701 in that the transactions were under compensatory benefit plans and contracts relating to compensation as provided under Rule 701. Appropriate legends were affixed to the securities issued in this transaction.

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(5) On June 26, 2013, the Registrant held an initial closing of a private placement, in which the Registrant issued an aggregate of 9,357,935 shares of Series B redeemable convertible preferred stock and warrants to purchase up to an aggregate of 467,896 shares of its common stock at an exercise price of $7.00 per share. On July 15, 2013, the Registrant held a second closing of a private placement, in which the Registrant issued an aggregate of 658,145 shares of Series B redeemable convertible preferred stock and warrants to purchase up to an aggregate of 32,907 shares of its common stock at an exercise price of $7.00 per share. All of the shares of Series B redeemable convertible preferred stock issued on June 26, 2013 and July 15, 2013 were converted on April 8, 2016 into an aggregate of 1,037,053 shares of common stock. Also at the initial closing, the Registrant issued warrants to purchase up to an aggregate of 99,999 shares of its common stock at an exercise price of $7.00 per share as partial compensation of its fee arrangement with two placement agents. Certain of the foregoing warrants were amended on April 8, 2016, pursuant to the terms of a Common Stock Issuance Agreement, to reduce the exercise price per share from $7.00 to $4.05. The offers, sales and issuances of Series B redeemable convertible preferred stock and warrants to purchase common stock were deemed to be exempt from registration under the Securities Act. The purchasers of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the securities issued in these transactions. Each of such purchasers was an accredited investor under Rule 506 of Regulation D or not a U.S. person under Regulation S.

(6) On December 16, 2013, the Registrant entered into subscription agreements to issue an aggregate amount of 1,440,140 shares of its common stock. The Registrant also issued warrants to purchase up to an aggregate of 86,408 shares of its common stock as partial compensation of its fee arrangement with two placement agents. Pursuant to the terms thereof, the exercise price per share of each of these warrants was adjusted from $12.50 per share to $8.25 per share in March 2015. The offers, sales and issuances were deemed to be exempt from registration under the Securities Act. The purchasers of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the securities issued in these transactions. Each of such purchasers was an accredited investor under Rule 506 of Regulation D or not a U.S. person under Regulation S.

(7) From September 5, 2014 to April 21, 2016, the Registrant granted stock options under its 2013 Stock Incentive Plan to purchase an aggregate of 835,777 shares of common stock to its employees, directors and consultants, having exercise prices ranging from $2.82 to $14.00 per share, of which no shares have been exercised through the date hereof. These issuances of securities were deemed to be exempt from registration under the Securities Act in reliance on Rule 701 in that the transactions were under compensatory benefit plans and contracts relating to compensation as provided under Rule 701. Appropriate legends were affixed to the securities issued in these transactions.

(8) On March 10, 2015, the Registrant entered into subscription agreements to issue an aggregate amount of 1,575,757 shares of its common stock and warrants to purchase up to an aggregate of 393,939 shares of its common stock at an exercise price of $10.75 per share. The offers, sales and issuances were deemed to be exempt from registration under the Securities Act. The purchasers of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the securities issued in these transactions. Each of such purchasers was an accredited investor under Rule 506 of Regulation D or not a U.S. person under Regulation S.

(9) In February 2016, pursuant to the terms of an Asset Purchase Agreement, dated January 4, 2016, the Registrant issued warrants to purchase up to an aggregate of 170,000 shares of its common stock at an exercise price of $12.00 per share to former shareholders of Novolytics Limited. The offers, sales and issuances were deemed to be exempt from registration under the Securities Act. The purchasers of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed

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to the securities issued in these transactions. Each of such purchasers was an accredited investor under Rule 506 of Regulation D or not a U.S. person under Regulation S.

(10) On April 8, 2016, pursuant to the terms of a Common Stock Issuance Agreement, the Registrant issued 853,465 shares of its common stock to certain former holders of its Series B redeemable convertible preferred stock. As consideration for the common stock issued and the amendments to certain warrants to purchase common stock (which warrants are described in paragraph (5) above), the recipients waived their right to receive approximately $2.2 million in aggregate cash payments to which they were entitled upon the conversion of their shares of Series B redeemable convertible preferred stock in respect of accrued dividends on their former shares of Series B redeemable convertible preferred stock. The recipients also waived their registration rights with respect to certain future registration statements that may be filed, and certain future public offerings that may be conducted, by the Registrant. The issuance of shares of common stock under the Common Stock Issuance Agreement was deemed to be exempt from registration under the Securities Act. Each of the recipients of such shares acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof and appropriate legends were affixed to the securities issued in these transactions. Each recipient was also an accredited investor under Rule 506 of Regulation D or not a U.S. person under Regulation S.

(11) On June 21, 2016, the Registrant issued 750,206 shares of its common stock to certain former holders of its Series B convertible preferred stock, for no additional consideration pursuant to Section 3 of the Common Stock Issuance Agreement, dated April 8, 2016, between the Registrant and such holders. The issuance of such shares of common stock was deemed to be exempt from registration under Section 4(a)(2) of the Securities Act or Rule 506 of Regulation D thereunder. Appropriate legends were affixed to the shares issued in this transaction.

Item 16. Exhibits and financial statement schedules.

(a) Exhibits.

See the Exhibit Index attached to this registration statement, which is incorporated by reference herein.

(b) Financial statement schedules.

No financial statement schedules are provided because the information called for is not required or is shown either in the financial statements or the notes thereto.

Item 17. Undertakings.

The undersigned Registrant hereby undertakes to provide to the underwriters at the closing specified in the Underwriting Agreement certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the Registrant pursuant to the foregoing provisions, or otherwise, the Registrant has been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the Registrant of expenses incurred or paid by a director, officer or controlling person of the Registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

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The undersigned Registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

(i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;

(ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20 percent change in the maximum aggregate offering price set forth in the Calculation of Registration Fee table in the effective registration statement;

(iii) To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

(2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser in the initial distribution of the securities, the undersigned Registrant undertakes that in a primary offering of securities of the undersigned Registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned Registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser:

(i) Any preliminary prospectus or prospectus of the undersigned Registrant relating to the offering required to be filed pursuant to Rule 424 (§230.424 of this chapter);

(ii) Any free writing prospectus relating to the offering prepared by or on behalf of the undersigned Registrant or used or referred to by the undersigned Registrant;

(iii) The portion of any other free writing prospectus relating to the offering containing material information about the undersigned Registrant or its securities provided by or on behalf of the undersigned Registrant; and

(iv) Any other communication that is an offer in the offering made by the undersigned Registrant to the purchaser.

(5) For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the Registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this registration statement as of the time it was declared effective.

(6) For the purpose of determining any liability under the Securities Act, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

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SIGNATURES

Pursuant to the requirements of the Securities Act, the Registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of San Diego, California, on the 14th day of November, 2016.

AMPLIPHI BIOSCIENCES CORPORATION

By: /s/ M. Scott Salka

M. Scott Salka
Chief Executive Officer

Pursuant to the requirements of the Securities Act, this registration statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
/s/ M. Scott Salka M. Scott Salka	Chief Executive Officer and Member of the Board of Directors *(Principal Executive Officer)*	November 14, 2016
/s/ Steve R. Martin Steve R. Martin	Chief Financial Officer *(Principal Financial and Accounting Officer)*	November 14, 2016
/s/ Wendy Johnson* Wendy Johnson	Interim Chief Operating Officer and Member of the Board of Directors	November 14, 2016
/s/ Jeremy Curnock Cook* Jeremy Curnock Cook	Chairman of the Board of Directors	November 14, 2016
/s/ Louis Drapeau* Louis Drapeau	Member of the Board of Directors	November 14, 2016
/s/ Michael S. Perry* Michael S. Perry, Ph.D.	Member of the Board of Directors	November 14, 2016
/s/ Vijay B. Samant* Vijay B. Samant	Member of the Board of Directors	November 14, 2016
/s/ Paul C. Grint* Paul C. Grint, M.D.	Member of the Board of Directors	November 14, 2016

* Pursuant to Power of Attorney

By: /s/ M. Scott Salka

M. Scott Salka

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EXHIBIT INDEX

Exhibit number	Description of document
1.1	Form of Underwriting Agreement. Previously filed.
3.1	Amended and Restated Articles of Incorporation, as currently in effect (incorporated by reference to Exhibit 3.1 to the Registrant s Quarterly Report on Form 10-Q, filed with the SEC on November 16, 2015).
3.2	Amended and Restated Bylaws (incorporated by reference to Exhibit 3.2 to the Registrant s Quarterly Report on Form 10-Q, filed with the SEC on November 16, 2015).
4.1	Reference is made to Exhibits 3.1 and 3.2.
4.2	Form of Common Stock Certificate (incorporated by reference to Exhibit 4.1 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
4.3	Form of Common Stock Warrant issued in June 2013, July 2013 and December 2013 (incorporated by reference to Exhibit 4.2 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
4.4	Subscription Agreement, dated June 26, 2013 (incorporated by reference to Exhibit 4.3 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
4.5	Registration Rights Agreement, dated December 16, 2013 (incorporated by reference to Exhibit 4.4 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
4.6	Subscription Agreement, dated December 16, 2013 (incorporated by reference to Exhibit 4.5 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
4.7	Subscription Agreement, dated March 10, 2015 (incorporated by reference to Exhibit 10.1 to the Registrant s Current Report on Form 8-K, filed with the SEC on March 19, 2015).
4.8	Form of Common Stock Warrant issued in March 2015 (incorporated by reference to Exhibit 10.2 to the Registrant s Current Report on Form 8-K, filed with the SEC on March 19, 2015).
4.9	Registration Rights Agreement, dated March 10, 2015 (incorporated by reference to Exhibit 10.3 to the Registrant s Current Report on Form 8-K, filed with the SEC on March 19, 2015).
4.10	Form of Amendment to Common Stock Warrants (incorporated by reference to Exhibit 10.1 to the Registrant s Current Report on Form 8-K, filed with the SEC on May 15, 2015).
4.11	Form of Common Stock Warrant issued in December 2011 (incorporated by reference to Exhibit 4.11 to the Registrant s Annual Report on Form 10-K, filed with the SEC on March 30, 2016).
4.12	Form of Common Stock Warrant issued in February 2013, March 2013, April 2013 and May 2013 (incorporated by reference to Exhibit 4.12 to the Registrant s Annual Report on Form 10-K, filed with the SEC on March 30, 2016).
4.13	Form of Common Stock Warrant issued in February 2016 (incorporated by reference to Exhibit 4.13 to the Registrant s Annual Report on Form 10-K, filed with the SEC on March 30, 2016).
4.14	Common Stock Issuance Agreement, dated April 8, 2016, by and among the Registrant and the persons and entities thereto (incorporated by reference to Exhibit 4.1 to the Registrant s Current Report on Form 8-K, filed with the SEC on April 8, 2016).

4.15	Form of Common Stock Warrant issued in June 2016 (incorporated by reference to Exhibit 4.1 to the Registrant s Current Report on Form 8-K, filed with the SEC on June 1, 2016).

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Exhibit number	Description of document
4.16	Form of Securities Purchase Agreement, dated May 31, 2016 (incorporated by reference to Exhibit 99.3 to the Registrant s Current Report on Form 8-K, filed with the SEC on June 1, 2016).
4.17	Form of Warrant. Previously filed.
5.1	Opinion of Cooley LLP. Previously filed.
10.1	Loan Repayment Deed, dated as of September 28, 2012, by and among the Registrant, Cellabs Pty Ltd and Special Phage Holdings Pty Ltd (incorporated by reference to Exhibit 10.1 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.2	Stock Issuance Agreement, dated as of March 29, 2013, by and between the Registrant and Intrexon Corporation (incorporated by reference to Exhibit 10.3 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.3*	Collaboration Agreement, dated as of April 24, 2013, by and between the Registrant and the University of Leicester (incorporated by reference to Exhibit 10.4 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.4*	License, dated as of September 5, 2013, by and between the Registrant and the University of Leicester (incorporated by reference to Exhibit 10.6 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.5*	Cooperative Research and Development Agreement, dated as of June 13, 2013, by and between the Registrant and United States Army Medical Research and Materiel Command (incorporated by reference to Exhibit 10.7 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.6	Agreement of Lease, dated as of February 23, 2011, by and between the Registrant and Virginia Biotechnology Research Partnership Authority (incorporated by reference to Exhibit 10.9 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.7	Lease, dated as of December 8, 2011, by and among Biocontrol Limited, Nevis Limited and Charter Limited (incorporated by reference to Exhibit 10.11 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.8+	Targeted Genetics Corporation 2009 Stock Incentive Plan (incorporated by reference to Exhibit 10.12 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.9+	AmpliPhi Biosciences Corporation 2012 Stock Incentive Plan (incorporated by reference to Exhibit 10.13 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.10+	Forms of Stock Option Agreement and Notice of Stock Option Grant under AmpliPhi Biosciences Corporation 2012 Stock Incentive Plan (incorporated by reference to Exhibit 10.14 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.11*	License Agreement, dated as of July 3, 2007, by and between Biocontrol Limited and Health Protection Agency, Centre for Emergency Preparedness and Response (incorporated by reference to Exhibit 10.18 to the Registrant s Registration Statement on Form S-1 (File No.

333-193458), filed with the SEC on January 21, 2014, as amended).

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Exhibit number	Description of document
10.12	Shareholder Sale Agreement, dated as of September 8, 2012, by and among the Registrant, Anthony Smithyman and Margaret Smithyman, AmpliPhi Australia Pty Ltd, Special Phase Holdings Pty Ltd and certain other parties listed therein (incorporated by reference to Exhibit 10.19 to the Registrant s Registration Statement on Form S-1 (File No. 333-193458), filed with the SEC on January 21, 2014, as amended).
10.13	Agreement and Plan of Merger, dated as of November 12, 2010, by and among the Registrant, Sheffield Acquisition 1, Inc. and Sheffield Acquisition 2, Inc. (incorporated by reference to Exhibit 10.20 to the Registrant s Registration Statement on Form S-1 (File No. 333-193458), filed with the SEC on January 21, 2014, as amended).
10.14+	AmpliPhi Biosciences Corporation 2013 Stock Incentive Plan (incorporated by reference to Exhibit 10.21 to the Registrant s Registration Statement on Form 10 (File No. 333-193458), filed with the SEC on December 16, 2013, as amended).
10.15+	Form of Grant Notice and Stock Option Agreement under AmpliPhi Biosciences Corporation 2013 Stock Incentive Plan (incorporated by reference to Exhibit 10.16 to the Registrant s Annual Report on Form 10-K, filed with the SEC on March 30, 2016).
10.16	Agreement of Lease of Business Premises, dated as of February 21, 2014, by and between Avtotehna d.d. and AmpliPhi, Biotehnolo ke Raziskave in Razvoj, d.o.o. (incorporated by reference to Exhibit 10.22 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.17	Collaboration Agreement, dated as of November 9, 2014, by and between the Registrant and the University of Leicester (incorporated by reference to Exhibit 10.23 to the Registrant s Registration Statement on Form 10 (File No. 000-23930), filed with the SEC on December 16, 2013, as amended).
10.18+	Interim Chief Operating Officer Agreement, dated as of September 18, 2014, by and between the Registrant and Wendy S. Johnson (incorporated by reference to Exhibit 10.1 to the Registrant s Quarterly Report on Form 10-Q, filed with the SEC on November 14, 2014).
10.19+	Amendment to Interim Chief Operating Officer Agreement, dated as of January 15, 2015, by and between the Registrant and Wendy S. Johnson (incorporated by reference to Exhibit 10.25 to the Registrant s Registration Statement on Form S-1 (File No. 333-203454), filed with the SEC on April 16, 2015, as amended).
10.20	Agreement of Sublease, dated as of April 17, 2015, by and between the Registrant and Virginia Biotechnology Research Partnership Authority (incorporated by reference to Exhibit 10.26 to the Registrant s Annual Report on Form 10-K, as amended, filed with the SEC on April 30, 2015).
10.21+	Consulting Agreement, dated as of September 3, 2015, by and between the Registrant and Wendy S. Johnson (incorporated by reference to Exhibit 10.1 to the Registrant s Quarterly Report on Form 10-Q, filed with the SEC on November 16, 2015).
10.22+	Offer Letter, dated as of April 28, 2015, by and between the Registrant and M. Scott Salka (incorporated by reference to Exhibit 10.23 to the Registrant s Annual Report on Form 10-K, filed with the SEC on March 30, 2016).
10.23+	Master Services Agreement, dated as of June 30, 2014, by and between the Registrant and The Fahrenheit Group, LLC (incorporated by reference to Exhibit 10.24 to the Registrant s Annual Report on Form 10-K, filed with the SEC on March 30, 2016).
10.24*	Collaboration Agreement, dated as of November 4, 2015, by and between the Registrant and the University of Leicester (incorporated by reference to Exhibit 10.25 to the Registrant s

	Annual Report on Form 10-K, filed with the SEC on March 30, 2016).
10.25	Asset Purchase Agreement, dated as of January 4, 2016, by and between the Registrant and Novolytics Limited (incorporated by reference to Exhibit 10.26 to the Registrant s Annual Report on Form 10-K, filed with the SEC on March 30, 2016).

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Exhibit number	Description of document
10.26+	Offer Letter, dated as of January 18, 2016, by and between the Registrant and Steve R. Martin (incorporated by reference to Exhibit 99.1 to the Registrant s Current Report on Form 8-K, filed with the SEC on January 19, 2016).
10.27+	Form of Indemnity Agreement with the Registrant s Directors and Executive Officers (incorporated by reference to Exhibit 99.2 to the Registrant s Current Report on Form 8-K, filed with the SEC on January 19, 2016).
10.28	Placement Agency Agreement, dated May 31, 2016, by and among the Registrant, Roth Capital Partners, LLC and Griffin Securities, Inc. (incorporated by reference to Exhibit 99.2 to the Registrant s Current Report on Form 8-K, filed with the SEC on June 1, 2016).
10.29+	AmpliPhi Biosciences Corporation 2016 Equity Incentive Plan (incorporated by reference to Exhibit 99.1 to the Registrant s Registration Statement on Form S-8 (File No. 333-212183), filed with the SEC on June 22, 2016).
10.30+	Form of Stock Option Grant Notice, Option Agreement and Notice of Exercise under AmpliPhi Biosciences Corporation 2016 Equity Incentive Plan (incorporated by reference to Exhibit 99.1 to the Registrant s Registration Statement on Form S-8 (File No. 333-212183), filed with the SEC on June 22, 2016).
10.31+	AmpliPhi Biosciences Corporation 2016 Employee Stock Purchase Plan (incorporated by reference to Exhibit 99.3 to the Registrant s Registration Statement on Form S-8 (File No. 333-212183), filed with the SEC on June 22, 2016).
10.32+	Amendment to Consulting Agreement, dated September 27, 2016, by and between the Registrant and Wendy S. Johnson (incorporated by reference to Exhibit 99.1 to the Registrant s Current Report on Form 8-K, filed with the SEC on September 29, 2016).
10.33	Settlement Agreement, dated November 12, 2016, by and between the Registrant and NRM VII Holdings I, LLC (incorporated by reference to Exhibit 99.1 to the Registrant's Current Report on Form 8-K, filed with the SEC on November 14, 2016).
16.1	Letter to Securities and Exchange Commission from PBMares, LLP, dated January 22, 2015 (incorporated by reference to Exhibit 16.1 to the Registrant s Current Report on Form 8-K, filed with the SEC on January 23, 2015).
21.1	Subsidiaries of the Registrant (incorporated by reference to Exhibit 21.1 to the Registrant s Annual Report on Form 10-K, filed with the SEC on March 30, 2016).
23.1	Consent of an Independent Registered Public Accounting Firm.
23.2	Consent of Cooley LLP. Reference is made to Exhibit 5.1.
24.1	Power of Attorney. Previously filed.

\+ Indicates management contract or compensatory plan

* The Registrant has obtained confidential treatment with respect to certain portions of this exhibit