

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Merck Sharp & Dohme LLC,
Petitioner,

v.

Halozyne Inc.,
Patent Owner.

Case No. PGR2025-00003
U.S. Patent No. 11,952,600

PETITIONER'S UPDATED EXHIBIT LIST

No.	Exhibit Description
1001	U.S. Patent No. 11,952,600
1002	File History of U.S. Patent No. 11,952,600
1003	Declaration of Dr. Michael Hecht
1004	Declaration of Dr. Sheldon Park
1005	U.S. Patent No. 7,767,429
1006	Chao et al., "Structure of Human Hyaluronidase-1, a Hyaluronan Hydrolyzing Enzyme Involved in Tumor Growth and Angiogenesis," <i>Biochemistry</i> , 46:6911-6920 (2007)
1007	WO 2010/077297, published 8 July 2010
1008	Stern et al., "The Hyaluronidases: Their Genomics, Structures, and Mechanisms of Action," <i>Chem. Rev.</i> 106:818-839 (2006)
1009	Jedzrejas et al., "Structures of Vertebrate Hyaluronidases and Their Unique Enzymatic Mechanism of Hydrolysis," <i>Proteins: Structure, Function and Bioinformatics</i> , 61:227-238 (2005)
1010	Zhang et al., "Hyaluronidase Activity of Human Hyal1 Requires Active Site Acidic and Tyrosine Residues," <i>J. Biol. Chem.</i> , 284(14):9433-9442 (2009)
1011	Arming et al., "In vitro mutagenesis of PH-20 hyaluronidase from human sperm," <i>Eur. J. Biochem.</i> , 247:810-814 (1997)
1012	Bordoli et al., "Protein structure homology modeling using SWISS-MODEL workspace," <i>Nature Protocols</i> , 4(1):1-13 (2008)
1013	Frost, "Recombinant human hyaluronidase (rHuPH20): an enabling platform for subcutaneous drug and fluid administration," <i>Expert Opinion on Drug Delivery</i> , 4(4):427-440 (2007)
1014	Brandon & Tooze, "Introduction to Protein Structure," Second Ed., Chapters 1-6, 11-12, 17-18 (1999)
1015	Table Associating Citations from the '600 Patent (EX1001) to Corresponding Citations in the '731 Application (EX1026)
1016	Steipe, "Consensus-Based Engineering of Protein Stability: From Intrabodies to Thermostable Enzymes," <i>Methods in Enzymology</i> , 388:176-186 (2004)

No.	Exhibit Description
1017	Green, “Computer Graphics, Homology Modeling, and Bioinformatics,” Protein Eng’g & Design, Ch. 10, 223-237 (2010)
1018	Chica et al., “Semi-rational approaches to engineering enzyme activity: combining the benefits of directed evolution and rational design,” Curr. Opin. Biotechnol., (4):378-384 (2005)
1019	Hardy et al., “Assessment of contraceptive vaccines based on recombinant mouse sperm protein PH20,” Reprod., 127:325-334 (2004)
1020	Pomering et al., “Restricted Entry of IgG into Male and Female Rabbit Reproductive Ducts Following Immunization with Recombinant Rabbit PH-20,” Am. J. Reprod. Immunol., (3):174-82 (2002)
1021	Baba et al., “Mouse Sperm Lacking Cell Surface Hyaluronidase PH-20 Can Pass through the Layer of Cumulus Cells and Fertilize the Egg,” J. Biol. Chem., 277(33):30310-4 (2002)
1022	Primakoff et al., “Reversible Contraceptive Effect of PH-20 Immunization in Male Guinea Pigs,” Biol Reprod., 56(5):1142-6 (1997)
1023	Tung et al., “Mechanism of Infertility in Male Guinea Pigs Immunized with Sperm PH-20,” Biol. Reprod., 56(5):1133-41 (1997)
1024	Rosengren et al., “Recombinant Human PH20: Baseline Analysis of the Reactive Antibody Prevalence in the General Population Using Healthy Subjects,” BioDrugs, 32(1):83-89 (2018)
1025	U.S. Patent No. 9,447,401
1026	U.S. Patent Application No. 13/694,731
1027	2024 Chemistry Nobel Prize Background
1028	[Reserved]
1029	Gmachl et al., “The human sperm protein PH-20 has hyaluronidase activity,” FEBS Letters, 3:545-548 (1993)
1030	Sills, “Retraction,” Science, 319:569 (2008)

No.	Exhibit Description
1031	Yue et al., “Loss of Protein Structure Stability as a Major Causative Factor in Monogenic Disease,” J. Mol. Biol., 353:459-473 (2005)
1032	Wang & Moulton, “SNPs, Protein Structure, and Disease,” Hum. Mutation, 17:263-270 (2001)
1033	Marković-Housley et al., “Crystal Structure of Hyaluronidase, a Major Allergen of Bee Venom,” Structure, 8:1025-1035 (2000)
1034	“Negative Results,” Nature: Editorials, 453:258 (2008)
1035	Lins et al., “Analysis of Accessible Surface of Residues in Proteins,” Protein Sci., 12:1406-1417 (2003)
1036	Hayden, “Chemistry: Designer Debacle,” Nature, 453:275-278 (2008)
1037	Benkert et al., “Toward the Estimation of the Absolute Quality of Individual Protein Structure Models,” Bioinformatics, 27:343-350 (2010)
1038	Schwede et al., “SWISS-MODEL: An Automated Protein Homology-Modeling Server,” Nucleic Acids Res., 31:3381-3385 (2003)
1039	Alberts, “Molecular Biology of the Cell,” Fifth Edition, Chapter 3 (2007).
1040	He et al., “NMR Structures of Two Designed Proteins with High Sequence Identity but Different Fold and Function,” PNAS, 105:14412-14417 (2008)
1041	Alexander et al., “A Minimal Sequence Code for Switching Protein Structure and Function,” PNAS, 106:21149-21154 (2009)
1042	Ruan et al., “Design and Characterization of a Protein Fold Switching Network,” Nature Comm., 14 (2023)
1043	Sievers et al., “Fast, Scalable Generation of High-Quality Protein Multiple Sequence Alignments Using Clustal Omega,” Molecular Sys. Biology, 7.1 (2011)
1044	Mihel, “PSAIA – Protein Structure and Interaction Analyzer,” BMC Structural Biology, 8:21 (2008)
1045	Redline Comparison of the '731 and '600 Specifications

No.	Exhibit Description
1046	Beasley & Hecht, “Protein Design: The Choice of <i>de Novo</i> Sequences,” J. Biological Chemistry, 272:2031-2034 (1997)
1047	Xiong et al., “Periodicity of Polar and Nonpolar Amino Acids is the Major Determinant of Secondary Structure in Self-Assembling Oligomeric Peptides,” PNAS, 92: 6349-6353 (1995)
1048	Hayden, “Key Protein-Design Papers Challenged,” Nature, 461:859 (2009)
1049	KEGG, <i>DRUG: Hyaluronidase (human recombinant)</i> , available at: https://www.genome.jp/entry/D06604
1050	Pace & Scholtz, “A Helix Propensity Scale Based on Experimental Studies of Peptides and Proteins,” Biophysical J. 75:422-427 (1998)
1051	U.S. Patent Application No. 61/631,313
1052	U.S. Patent Application No. 61/796,208
1053	Hom_pre2011
1054	Hom_pre2011_header
1055	Hom_pre2011_header_clean
1056	Hom_pre2011.fasta
1057	Ph20_pre2011.aln-clustal_num
1058	Ph20_pre2011 Alignment html
1059	Leisola & Turunen, “Protein Engineering: Opportunities and Challenges,” Appl. Microbiol. Biotechnol. 75:1225-1232 (2007)
1060	Hecht et al., “De Novo Proteins from Designed Combinatorial Libraries,” Protein Sci., 13:1711-1723 (2004)
1061	Rosengren et al., “Clinical Immunogenicity of rHuPH20, a Hyaluronidase Enabling Subcutaneous Drug Administration,” AAPS J., 17:1144-1156 (2015)
1062-1063	[Reserved]
1064	Collection of BLAST Webpages from the Internet Archive, navigable from:

No.	Exhibit Description
	https://web.archive.org/web/20111022151531/http://www.clustal.org/omega/
1065	Collection of Clustal Omega Webpages from the Internet Archive, navigable from: https://web.archive.org/web/20111022151531/http://www.clustal.org/omega/
1066	Collection of SWISS-MODEL Webpages from the Internet Archive, navigable from: https://web.archive.org/web/20110519141121/http://swissmodel.expasy.org/?pid=smh01&uid=&token=
1067	Collection of PyMol Webpages from the Internet Archive, navigable from: https://web.archive.org/web/20110701072314/http://pymol.org/
1068	Declaration of Jeffrey P. Kushan
1069	Swiss Model Printout of PH20 Model
1070	Swiss Model Printout of PH20 Model with D320K Mutation
1071	Swiss Model Printout of PH20 Model with D320H Mutation
1072	Swiss Model Printout of PH20 Model with D320R Mutation
1073	Swiss Model Printout of PH20 Model with D320S Mutation
1074	Declaration of Leif E. Peterson
1075-1112	[Reserved]
1113	Declaration of Sue Wang
1114	Declaration of Brian M. Goldberg
1115	Declaration of Katherine A. Helm
1116	Declaration of Christine M. Engen
1117	Declaration of Amit Bhatla
1118	[Reserved]
1119 [NEW]	Csoka, A. et al., “The Six Hyaluronidase-Like Genes in the Human and Mouse Genomes” Matrix Biology 20:499-508 (2001)

No.	Exhibit Description
1120 [NEW]	Huo, Z. et al., “Systemic and Mucosal Immune Responses to Sublingual or Intramuscular Human Papilloma Virus Antigens in Healthy Female Volunteers,” PLoS ONE 7(3):e33736 (2012)
1121	[Reserved]
1122 [NEW]	Printz, M. et al., “Risk Factors, Hyaluronidase Expression, and Clinical Immunogenicity of Recombinant Human Hyaluronidase PH20, an Enzyme Enabling Subcutaneous Drug Administration,” AAPS 24(6):110 (2022)
1123-1124	[Reserved]
1125 [NEW]	Emails re: AutoDock Vina (Sept. 9, 2025 - Oct. 27, 2025)
1126 [NEW]	Im, S. et al., “Cryo-EM Structure of Human Hyaluronidase PH-20,” Proteins: Structure, Function, and Bioinformatics 93:1067-1073 (2025)
1127-1128	[Reserved]
1129 [NEW]	Transcript of the Deposition of Dr. Gary Cherr, Ph.D., November 12, 2025
1130 [NEW]	Melanie Ann Simpson, Ph.D. Deposition Transcript
1131 [NEW]	Gregory Petsko, Ph.D. Deposition Transcript
1132 [NEW]	Transcript of the Deposition of Dr. James Moon, Ph.D., November 18, 2025
1133 [NEW]	Declaration of James Naismith, Ph.D.
1134 [NEW]	Declaration of Dr. Garnett Kelsoe
1135 [NEW]	Dr. Naismith Analysis Spreadsheet
1136 [NEW]	Dobson, “Principles of protein folding, misfolding and aggregation” Semin. Cell. Dev. Biol. 15(1):3-16 (2004)

No.	Exhibit Description
1137 [NEW]	Dobson, “Protein folding and misfolding” <i>Nature</i> . 18;426(6968):884-90 (2003)
1138 [NEW]	Dobson, “Experimental investigation of protein folding and misfolding” <i>Methods</i> 34(1):4-14 (2004)
1139 [NEW]	Chiti & Dobson, “Protein Misfolding, Functional Amyloid, and Human Disease” <i>Annu. Rev. Biochem.</i> 75:333–66 (2006)
1140 [NEW]	Dobson, “Protein misfolding, evolution and Disease” <i>Trends Biochem. Sci.</i> (9):329-32 (1999)
1141 [NEW]	Goldsmith & Tawfik, “Directed enzyme evolution: beyond the low-hanging fruit” <i>Curr. Opin. Struct. Biol.</i> 22(4):406-12 (2012)
1142 [NEW]	Farber & Petsko, “The evolution of alpha/beta barrel enzymes” <i>Trends Biochem. Sci.</i> 15(6):228-34 (1990)
1143 [NEW]	Nagano et al., “One Fold with Many Functions: The Evolutionary Relationships between TIM Barrel Families Based on their Sequences, Structures and Functions” <i>J. Mol. Biol.</i> 30;321(5):741-65 (2002)
1144 [NEW]	Ochoa-Levy et al., “Protein Design through Systematic Catalytic Loop Exchange in the (beta/alpha) ₈ Fold” <i>J. Mol. Biol.</i> 10 387(4):949-64 (2009)
1145 [NEW]	AutoDock Vina Tutorial 2011
1146 [NEW]	Pal et al., “Comprehensive and Quantitative Mapping of Energy Landscapes for Protein-Protein Interactions by Rapid Combinatorial Scanning” <i>J. Biol. Chem.</i> 4;281(31):22378-22385 (2006)
1147 [NEW]	Van Rossum et al., “Reporter-based screening and selection of enzymes” <i>FEBS J.</i> 280:2979-96 (2013)
1148 [NEW]	Reed et al., “Use of Coefficient of Variation in Assessing Variability of Quantitative Assays” <i>Clin. Diagn. Lab Immunol.</i> 9(6):1235-9 (2002)

No.	Exhibit Description
1149 [NEW]	Ten Have et al., “Cloning and characterization of the cDNA encoding the PH20 protein in the European red fox <i>Vulpes vulpes</i> ” <i>Reprod. Fertil. Dev.</i> 10(2):165-72 (1998)
1150 [NEW]	Chowpongpan et al., “Cloning and characterization of the bovine testicular PH-20 hyaluronidase core domain” <i>Biotechnol. Lett.</i> 26(15):1247-52 (2004)
1151 [NEW]	Fowler et al., “High-resolution mapping of protein sequence-function relationships” <i>Nature Methods</i> 7, 741–746 (2010)
1152 [NEW]	Ringe & Petsko, “Q&A: What are pharmacological chaperones and why are they interesting?” <i>J. Biol.</i> 8:80 (2009)
1153 [NEW]	Petsko, “Herding CATS” <i>Sci. Transl. Med.</i> 24;3(97):97 (2011)
1154 [NEW]	Second Table Associating Citations from the '600 Patent (EX1001) to Corresponding Citations in the '731 Application (EX1026)
1155 [NEW]	Calloni et al., “Investigating the Effects of Mutations on Protein Aggregation in the Cell” <i>J. Biol. Chem.</i> 10607-13 (2005)
1156 [NEW]	Chiti et al., “Studies of aggregation of mutant proteins in vitro provided insights into genetics of amyloid diseases” <i>PNAS</i> 99:16419-26 (2002)
1157 [NEW]	Chiti et al., “Rationalization of the effects of mutations on peptide and protein aggregation rates” <i>Nature</i> , 424:805-808 (2003)
1158 [NEW]	Wang et al., “Immunogenicity of protein aggregates-Concerns and Realities” <i>Int. J. Pharmaceutics</i> 431:1-11, (2012)
1159 [NEW]	Brachmann et al., “Genetic selection of intragenic suppressor mutations that reverse the effect of common p53 cancer mutations” <i>EMBO Journal</i> 17:1847–59 (1998)
1160 [NEW]	Poelwijk, Frank J., et al., “Empirical fitness landscapes reveal accessible evolutionary paths” <i>Nature</i> 445.7126 (2007): 383-386
1161 [NEW]	Primakoff, P. et al., “Purification of the guinea pig sperm PH-20 antigen and detection of a site-specific endoproteolytic activity in sperm preparations that cleaves PH-20 into two disulfide-linked fragments,” <i>Biology of Reproduction</i> 38:921-934 (1988)

No.	Exhibit Description
1162 [NEW]	Koch, C. et al., “A Comparison of the Immunogenicity of the Native and Denatured Forms of a Protein,” APMIS 104:115-125 (1996)
1163 [NEW]	Leder, L. et al., “Genuine and Apparent Cross-Reaction of Polyclonal Antibodies to Proteins and Peptides,” Eur. J. Biochem. 219:73-81 (1994)
1164	MERCK_PGR00355 - PTAB-PGR2021-00036-1 Merck-Genentech PGR
1165	MERCK_PGR00458 - PTAB-PGR2021-00036-16 Merck-Genentech PGR
1166	MERCK_PGR00462 - RE_2_25-cv-03179-ES-JRA_HALOZYME, INC. v. MERCK SHARP & DOHME CORP.
1167	MERCK_PGR00094 - DNJ-2-25-cv-03179 Stipulation to Substitute Parties
1168	MERCK_PGR00090 - DNJ-2-25-cv-03179 2025-07-14 [019] Corporate Disclosure Statement
1169 [NEW]	Declaration of Jeffrey P. Kushan (Petitioner's Reply)
1170 [NEW]	Murphy, K., “Janeway’s Immuno Biology,” (8th 2012), Chapters 1, 4, 8, 10, 11, 12, 15, and Appx I
1171 [NEW]	Yang, X. et al., “An Introduction to Epitope Prediction Methods and Software,” Rev. Med. Virol., 19: 77–96 (2009)
1172 [NEW]	Bolland, S., “An Innate Path to Human B Cell Tolerance,” Immunity, 29(5):667-9 (2008)
1173 [NEW]	Anderson, M. et al., “Projection of an Immunological Self Shadow Within the Thymus by the Aire Protein,” Science, 298(5597):1395-401 (2002)
1174 [NEW]	Yewdell, J. et al., “Immunodominance in Major Histocompatibility Complex Class I-restricted T Lymphocyte Responses,” Annu. Rev. Immunol., 17:51–88 (1999)
1175 [NEW]	Popova, L. et al., “Immunodominance of Antigenic Site B over Site A of Hemagglutinin of Recent H3N2 Influenza Viruses,” PLoS One, 7(7):e41895 (2012)

No.	Exhibit Description
1176 [NEW]	Gershoni, J. et al., “Epitope Mapping: The First Step in Developing Epitope-Based Vaccines,” <i>BioDrugs</i> , 21(3):145-56 (2007)
1177 [NEW]	Rolland, M. et al., “Recognition of HIV-1 Peptides by Host CTL Is Related to HIV-1 Similarity to Human Proteins,” <i>PLoS One</i> , 2(9):e823 (2007)
1178 [NEW]	Nelson, C. et al., “Peptides Determine the Lifespan of MHC Class II Molecules in the Antigen-Presenting Cell,” <i>Nature</i> , 371(6494):250-2 (1994)
1179 [NEW]	Dormitzer, P. et al., “Influenza Vaccine Immunology,” <i>Immunol Rev.</i> , 239(1):167-77 (2011)
1180 [NEW]	Mantis, NJ., et al., “Secretory IgA ’ s Complex Roles in Immunity and Mucosal Homeostasis in the Gut,” <i>Mucosal Immunol.</i> , 4(6):603-11 (2011)
1181 [NEW]	Siskin, G. and Eisen, H., “Effect of Variation in Antibody-Hapten Association Constant upon the Biologic Activity of the Antibody,” <i>J Immunol.</i> , 95(3):436-41 (1965)
1182 [NEW]	Levine, B. and Levytska, V., “A Sensitive Hemagglutination Assay Method for Dinitrophenyl-Specific Antibodies. The Effect of Antibody Binding Affinity on Titers,” <i>J Immunol.</i> , 98(3):648-52 (1967)
1183 [NEW]	Fauci, A. et al., “The Relationship between Antibody Affinity and the Efficiency of Complement Fixation,” <i>J Immunol.</i> , 105(1):215-20 (1970)
1184 [NEW]	Laver, W. et al., “Epitopes on Protein Antigens: Misconceptions and Realities,” <i>Cell</i> 61:553-556 (1990)
1185 [NEW]	Lu, X. et al., “Anti-gp160 IgG and IgA Antibodies Associated with a Large Increase in Total IgG in Cervicovaginal Secretions from Human Immunodeficiency Virus Type 1-Infected Women,” <i>Journal of Infectious Disease</i> , 167(5):1189-92 (1993)
1186 [NEW]	Kemp, T. et al., “Evaluation of Systemic and Mucosal Anti-HPV16 and Anti-HPV18 Antibody Responses from Vaccinated Women,” <i>Vaccine</i> , 26(29-30):3608-16 (2008)

No.	Exhibit Description
1187 [NEW]	Montefiori, D. et al., “Magnitude and Breadth of the Neutralizing Antibody Response in the RV144 and Vax003 HIV-1 Vaccine Efficacy Trials,” <i>Journal of Infectious Disease</i> , 206(3):431-41 (2012)
1188 [NEW]	Cherr, G. et al., “The Dual Functions of GPI-Anchored PH-20: Hyaluronidase and Intracellular Signaling,” <i>Matrix Biol.</i> , 20(8):515-25 (2001)
1189 [NEW]	Martin-Deleon, “Epididymal SPAM1 and its Impact on Sperm Function” <i>Molecular and Cellular Endocrinology</i> 250:114-121 (2006)
1190 [NEW]	Nolan et al., “The Safety of Recombinant Human Hyaluronidase PH20 in Nonclinical Models: An Overview of Toxicology, Pharmacology, and Impact of Anti-PH20 Antibodies,” <i>Journal of Controlled Release</i> , 374:369-383 (2024)
1191 [NEW]	McCutcheon, J. et al., “HLA-B*0702 Antibody Epitopes are Affected Indirectly by Distant Antigen Residues,” <i>Hum Immunol.</i> , 36(2):69-75 (1993)
1192 [NEW]	Nobusawa, E. et al., “Comparison of Complete Amino Acid Sequences and Receptor-Binding Properties among 13 Serotypes of Hemagglutinins of Influenza A Viruses,” <i>Virology</i> , 182(2):475-85 (1991)
1193 [NEW]	CDC on H5N1 CDC Press Release: “Highly Pathogenic Avian Influenza A (H5N1) Virus Infection Reported in a Person in the U.S.” (Apr. 1, 2024)
1194	[Reserved]
1195 [NEW]	Zhang, H. et al., “Mouse Spam1 (PH-20) Is a Multifunctional Protein: Evidence for Its Expression in the Female Reproductive Tract,” <i>Biol Reprod.</i> , 69(2):446-54 (2003)
1196 [NEW]	Dunn, C. et al., “Transcription of the Human and Rodent SPAM1 / PH-20 Genes Initiates Within an Ancient Endogenous Retrovirus,” <i>BMC Genomics</i> , 6:47 (2005)
1197 [NEW]	Hirsch, C. et al., “The Ubiquitylation Machinery of the Endoplasmic Reticulum,” <i>Nature</i> , 458(7237):453-60 (2009)

No.	Exhibit Description
1198 [NEW]	Singh, S., et al., “Solubilization and Refolding of Bacterial Inclusion Body Proteins,” Journal of Bioscience and Bioengineering 99:303-310 (2005)
1199 [NEW]	Li, M. et al., “Importance of Glycosylation and Disulfide Bonds in Hyaluronidase Activity of Macaque Sperm Surface PH-20,” J Androl., 23(2):211-9 (2002)
1200	[Reserved]
1201 [NEW]	Rodriguez, L. et al., “Foot and mouth disease virus vaccines,” Vaccine 27:D90-D94 (2009)
1202 [NEW]	Redwood, A. et al., “Viral Vectored Immunocontraception: Screening of Multiple Fertility Antigens using Murine Cytomegalovirus as a Vaccine Vector,” Vaccine, 25(4):698-708 (2007)
1203 [NEW]	Russell, M. et al., “Complement-Fixing Properties of Human IgA Antibodies. Alternative Pathway Complement Activation by Plastic-Bound, but not Specific Antigen-Bound, IgA,” Scand J Immunol., 30(2):175-83 (1989)
1204 [NEW]	Nikolova E. et al., “All Forms of Human IgA Antibodies Bound to Antigen Interfere with Complement (C3) Fixation Induced by IgG or by Antigen Alone,” Scand J Immunol., 39(3):275-80 (1994)
1205 [NEW]	Goodey, N. et al., “Allosteric Regulation and Catalysis Emerge via a Common Route,” Nat Chem Biol. 4(8):474-82 (2008)
2010	Primakoff, P., et al., “Fully effective contraception in male and female guinea pigs immunized with the sperm protein PH-20,” Nature 335:543-546 (October 6, 1988)
2013	Lin, Y., et al., “Molecular cloning of the human and monkey sperm surface protein PH-20,” Proc. Natl. Acad. Sci USA 90:10071-10075 (November 1993)
2068	Declaration of Melanie A. Simpson, Ph.D. in Support of Patent Owner’s Response
2070	Declaration of Gregory A. Petsko, Ph.D. in Support of Patent Owner’s Response

No.	Exhibit Description
2072	Declaration of Gary N. Cherr, Ph.D. in Support of Patent Owner's Response
2074	Declaration of James J. Moon, Ph.D. in Support of Patent Owner's Response
2076	Transcript of the Deposition of Michael Hecht, Ph.D., August 26, 2025
2077	Transcript of the Deposition of Dr. Sheldon Park, August 7, 2025
2078	Transcript of the Deposition of Dr. Sheldon Park, August 21, 2025
2108	Hunnicut, G. et al., "Sperm Surface Protein PH-20 Is Bifunctional: One Activity Is a Hyaluronidase and a Second, Distinct Activity is Required in Secondary Sperm-Zona Binding," Biology of Reproduction, 55:80-86 (1996)
2114	Frayne, J. et al., "The potential use of sperm antigens as targets for immunocontraception; past, present and future," Journal of Reproductive Immunology, 43:1-33 (1999)
2119	Myles, D. et al., "Localized Surface Antigens of Guinea Pig Sperm Migrate to New Regions Prior to Fertilization," The Journal of Cell Biology, 99:1634-1641 (1984)
2120	Chan, C. et al., "Identification of Linear Surface Epitopes on the Guinea Pig Sperm Membrane Protein PH-20," Life Sciences, 64(22):1989-2000 (1999)
2137	Lipman, N. et al., "Monoclonal Versus Polyclonal Antibodies: Distinguishing Characteristics, Applications, and Information Resources," ILAR Journal, 46(3):258-268 (2005)
2164	Petsko, G., et al., Protein Structure and Function, New Science Press (2004)
2165	U.S. Patent Application Publication No. 2010/0143457 A1 to Wei et al., published June 10, 2010
2166	Petsko Patent Analysis Data
2167	Huang, C. et al., "Effect of sublingual administration with a native or denatured protein allergen and adjuvant CpG oligodeoxynucleotides or cholera toxin on systemic TH2 immune

No.	Exhibit Description
	responses and mucosal immunity in mice,” <i>Annals of Allergy, Asthma, and Immunology</i> , 99:443-452 (November 2007)
2176	Park Analysis Spreadsheet

Dated: January 23, 2026

Respectfully Submitted,

/Jeffrey P. Kushan/

Jeffrey P. Kushan
Reg. No. 43,401
Sidley Austin LLP
1501 K Street, N.W.
Washington, D.C. 20005
jkushan@sidley.com
(202) 736-8914
Attorney for Petitioner

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I hereby certify that on this 23rd day of January, 2025, I caused to be served a true and correct copy of the foregoing and any accompanying exhibits by e-mail on the following counsel of record for Patent Owner:

Eldora L. Ellison, eellison-PTAB@sternekessler.com
R. Wilson Powers III, tpowers-PTAB@sternekessler.com
Jennifer Meyer Chagnon, jchagnon-PTAB@sternekessler.com
David H. Holman, dholman-PTAB@sternekessler.com
Tyler C. Liu, tliu-PTAB@sternekessler.com
David J. Kappos, dkappos@cravath.com
Aubrey Haddach, ahaddach@halozyme.com
Louis P. Panzica, Jr., lpantzica-PTAB@sternekessler.com
Joshua A. Mack, jmack@halozyme.com
Lauren N. Martin, laurenmartin@quinnemanuel.com
Mark H. Snyder, msnyder@halozyme.com
Pratibha Khanduri, pkhanduri-PTAB@sternekessler.com
PTAB@sternekessler.com

Dated: January 23, 2026

Respectfully Submitted,

/Jeffrey P. Kushan/

Jeffrey P. Kushan
Reg. No. 43,401
Sidley Austin LLP
1501 K Street, N.W.
Washington, D.C. 20005
jkushan@sidley.com
(202) 736-8914
Attorney for Petitioner