

PROTEGEN

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OUTLINE

- Purpose
 - What is Protegen?
 - Biological Information
 - Species in the Database
 - Biological Questions that can be Answered
 - Type of Database
 - Maintenance and Updates
 - Funding
 - Accessibility
 - External Links
 - Downloads
 - “User Friendliness”
-

PURPOSE

- Protegen contains curated information about protective antigens

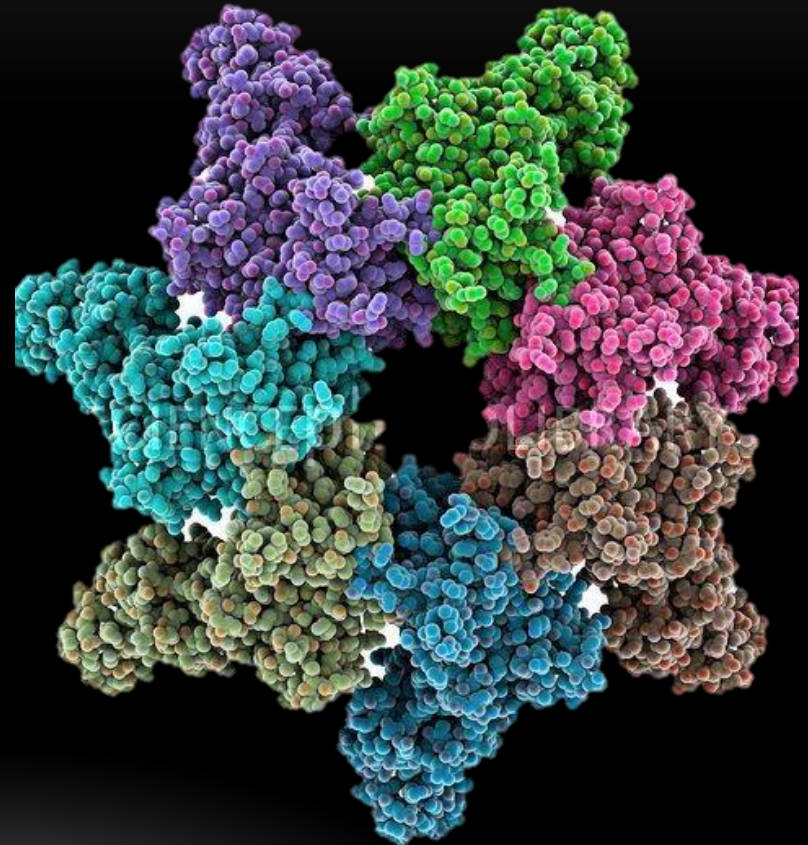
PROTEGEN

- One of the only databases to curate and analyze protective antigens that can be used for vaccine development
- This database has allowed for the "storage, annotation, comparison, and analysis of 854 protective antigens for 200 pathogens, including more than 50 protective antigens for cancer and allergy" (Yang, Sayers, Xiang, He, 2010).



BIOLOGICAL INFORMATION

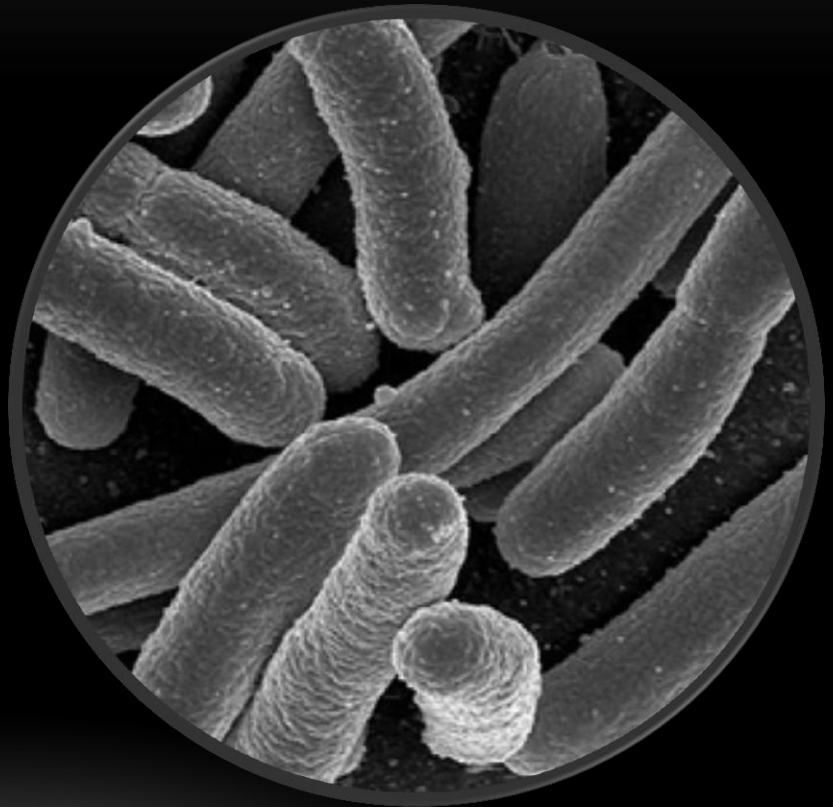
- 854 Protective Antigens for 200 pathogens
 - Storage
 - Annotation
 - Comparison
 - Analysis
 - 50+ Protective Antigens are used for cancer and allergy



Anthrax Protective Antigen Molecule
Credit: Laguna Design/Science Photo Library

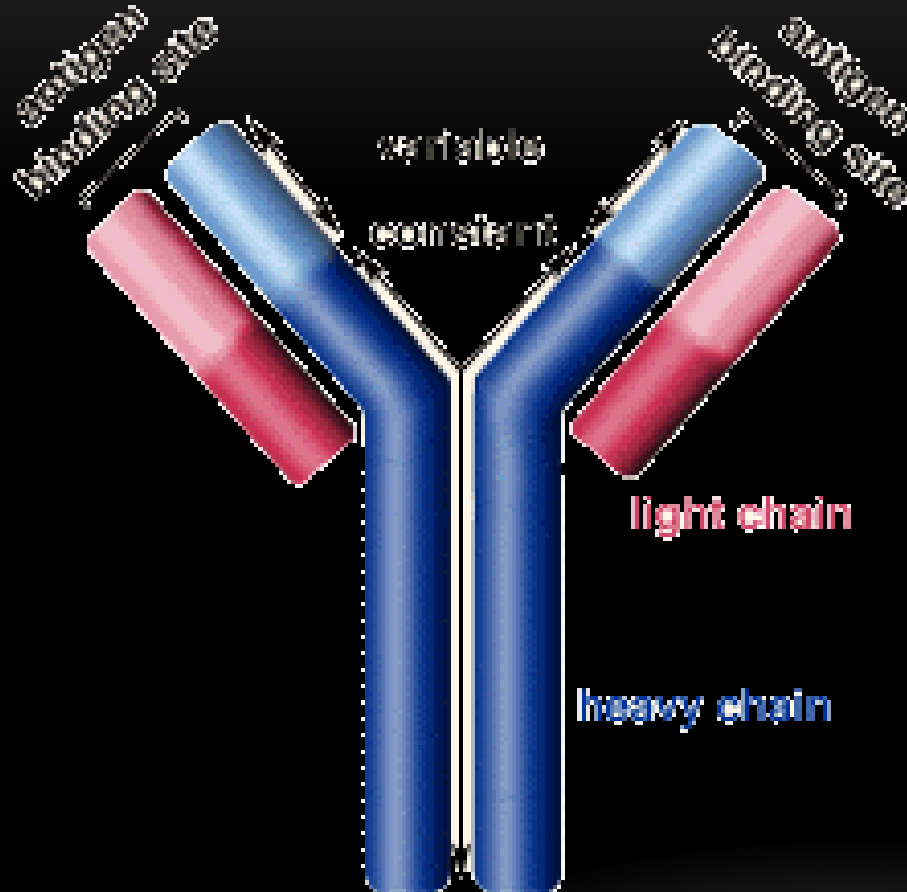
SPECIES

- Protective antigens
- Pathogens
 - Bacteria
 - Viruses
 - Parasites
 - Fungus



E. Coli

BIOLOGICAL QUESTIONS THAT CAN BE ANSWERED



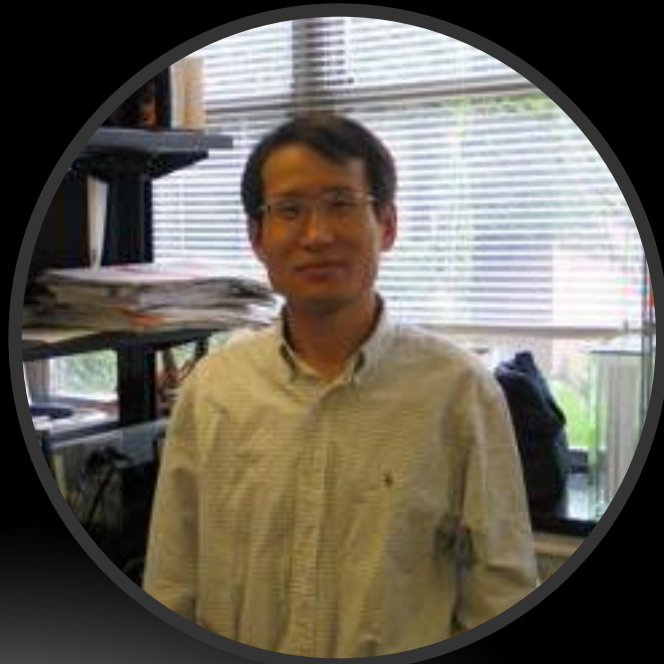
- What are protective antigens ?
- Importance of identification of protective antigens
- Protective Antigens as biological markers

TYPE OF DATABASE

- “Protegen stores manually curated protective antigens and associated information.”
 - Manual curation includes peer-reviewed publications from PubMed.
- Protegen is an integrated program of the VIOLIN
 - VIOLIN: vaccine investigation and online information network. vaccine database and analysis

MAINTENANCE

- University of Michigan Medical School, Ann, Arbor, MI.
 - Webmaster: Zuoshuang Xiang
- Database is SUPPOSED to update every quarter
 - Most recent update was on November 11, 2011



FUNDING

- National Institutes of Health-National Institute of Allergy and Infectious Diseases grant
 - (R01AI81062)



National Institutes of Health
Turning Discovery Into Health

ACCESSIBILITY

FREE!!!



EXTERNAL LINKS

- PubMed
 - Provides extensive information about a protegen
- Protein Data Bank
 - 3D Models can be found here



DOWNLOADS

- OWL Format: “Obfuscated Weird Language”
- FASTA: Common for gene sequences
- EXCEL
- HTML: easily accessible by any computer.

FASTA format of the Protegen sequences can be downloaded below.

- [protegen-all-2.0-2011-11-17.fna](#) ([fasta](#)) ([html](#))
- [protegen-all-2.0-2011-11-17.faa](#) ([fasta](#)) ([html](#))
- [protegen-bacterium-2.0-2011-11-17.fna](#) ([fasta](#)) ([html](#))
- [protegen-bacterium-2.0-2011-11-17.faa](#) ([fasta](#)) ([html](#))
- [protegen-virus-2.0-2011-11-17.fna](#) ([fasta](#)) ([html](#))
- [protegen-virus-2.0-2011-11-17.faa](#) ([fasta](#)) ([html](#))
- [protegen-parasite-2.0-2011-11-17.fna](#) ([fasta](#)) ([html](#))
- [protegen-parasite-2.0-2011-11-17.faa](#) ([fasta](#)) ([html](#))
- [protegen-fungus-2.0-2011-11-17.fna](#) ([fasta](#)) ([html](#))
- [protegen-fungus-2.0-2011-11-17.faa](#) ([fasta](#)) ([html](#))
- [protegen-allergy_cancer-2.0-2011-11-17.fna](#) ([fasta](#)) ([html](#))
- [protegen-allergy_cancer-2.0-2011-11-17.faa](#) ([fasta](#)) ([html](#))

Archives:

[Version 1.0.](#)

For other methods of data exchange, please visit [data exchange](#).

“USER-FRIENDLINESS”

- Very well organized and visually appealing
- Tutorial available right next to search bar
- Yields categorized searches



Search: for [Help](#)

Protegen: Protective Antigens

Protective antigens are specifically targeted by the acquired immune response of the host and are able to induce protection in the host against infectious and non-infectious diseases. Protective antigens play important roles in development of vaccines and biological markers for disease diagnosis and analysis of fundamental host immunity against diseases. Protegen is a web-based central database and analysis system that curates, stores, and analyzes protective antigens.

Protegen Search	
Search Field	Search Parameter
Pathogen or Disease	<input type="text" value="Any pathogen"/>
Gene Name	<input type="text"/> (e.g., sodC)
Locus Tag	<input type="text"/> (e.g., BAB2_0535)
Database ID	<input type="text" value="NCBI Gene GI"/> <input type="text"/>
COG category	<input type="text" value="Any"/> Amino acid transport and metabolism Carbohydrate transport and metabolism Cell cycle control, cell division, chromosome partitioning
Subcellular Localization	<input type="text" value="Any Localization"/> Cellwall Cytoplasmic Cytoplasmic Membrane
Maximum Number of Transmembrane Helices	<input type="text" value="1"/> <input type="checkbox"/> (Note: check box to include)
Minimum Adhesin Probability (0-1.0)	<input type="text" value="0.51"/> <input type="checkbox"/>
No Similarity to Human Proteins	<input type="checkbox"/>
No Similarity to Mouse Proteins	<input type="checkbox"/>
Description	<input type="text"/> (e.g., superoxide dismutase)

Statistics: Protegen includes 854 protective antigens for now.

Provenance: The data in Protegen originates from our literature curation and bioinformatics analyses.



EXAMPLE SEARCH

- RB51

- 4 Categories


- Vaccine

- Pathogen

- Vaccine-Related

- Vaccine-Related Literature

- Offers links to PubMed or Protein Data Bank when available.



Search: for

About
Introduction
Statistics
VIOLIN News

Your VIOLIN
Register or Login
Submission
Tutorial

Vaccine & Components
Vaxquery
Vaxgen
VIBLAST
Protegen
VimmugenDB
DNAVaxDB
Vaxjo
Vaxvec
Vevax
Huvax

Vaccine Mechanisms
Vaxism
Vaxar

Vaccine Literature
VO-SciMiner
Litesearch
Vaxmesh
Vaxier


Vaccine Design
Vaxign

Community Efforts
Vaccine Ontology
ICoVax 2012
Advisory Committee

Vaccine Society
Vaxperts
VaxPub
VaxCom
VaxLaw
VaxMedia
VaxMeet
VaxFund
VaxCareer

Data Exchange
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University of Michigan
Medical School

Advanced Search
Search Help

This search engine searches curated vaccine data in VIOLIN.

1. Vaccine Search:

Found 14 vaccine(s) whose description contains the queried keyword(s). Please click a vaccine name for detail. To compare vaccines, check two or more vaccines and click "Compare".

Selection	Vaccine Name	Status	Target Pathogen
<input type="checkbox"/>	<i>B. abortus</i> DNA vaccine encoding RpiI ₆ and Omp16	Research	<i>Brucella</i> spp.
<input type="checkbox"/>	<i>B. abortus</i> strain 19	Licensed (Cattle)	<i>Brucella</i> spp.
<input type="checkbox"/>	<i>B. abortus</i> vaccine strain RB51	Licensed (Cattle)	<i>Brucella</i> spp.
<input type="checkbox"/>	<i>B. melitensis</i> bp26 and TP Nasal Vaccine		<i>Brucella</i> spp.
<input type="checkbox"/>	<i>B. melitensis</i> strain VTRM1		<i>Brucella</i> spp.
<input type="checkbox"/>	<i>B. suis</i> strain VTR51		<i>Brucella</i> spp.
<input type="checkbox"/>	<i>Brucella abortus</i> exsA mutant vaccine	Research	<i>Brucella</i> spp.
<input type="checkbox"/>	<i>Brucella abortus</i> pgk mutant vaccine	Research	<i>Brucella</i> spp.
<input type="checkbox"/>	Divalent DNA <i>B. abortus</i> Vaccine pCDNA3.1-L7L12-Omp16		<i>Brucella</i> spp.
<input type="checkbox"/>	Live attenuated <i>B. abortus</i> with deletion of znuA		<i>Brucella</i> spp.
<input type="checkbox"/>	Raborat	Licensed (Dog)	Rabies virus
<input type="checkbox"/>	Recombinant <i>B. abortus</i> RB51SOD		<i>Brucella</i> spp.
<input type="checkbox"/>	Recombinant <i>B. abortus</i> RB51WboA		<i>Brucella</i> spp.
<input type="checkbox"/>	Recombinant <i>O. anthropi</i> 492375OD		<i>Brucella</i> spp.

2. Pathogen Search:

Found 2 pathogen(s) related to the query keywords:

#	Pathogen Name	Disease Name	# of Associated Vaccines	# of vaccine-related pathogen genes	# of vaccine-related host genes	# of references
1	Rabies virus	Rabies	27	0	0	16
2	<i>Brucella</i> spp.	Brucellosis	60	34	6	110
Total			87	39	6	135

3. Vaccine-related Gene Search:

Found 3 vaccine-related gene(s).

Gene ID	Gene Name	Sequence Strain (Species/Organism)	VO ID	NCBI Gene ID	NCBI Nucleotide ID	3D structure: PDB ID	Related Vaccines(s)	Details
934	exsA	<i>Brucella melitensis</i> biovar Abortus 2308		3787220			<ul style="list-style-type: none"> Brucella abortus exsA mutant vaccine Divalent DNA <i>B. abortus</i> Vaccine pCDNA3.1-L7L12-Omp16 	More
1677	L7L12	<i>Brucella abortus</i> RB51-AHVLA		17439499			<ul style="list-style-type: none"> Divalent DNA <i>B. abortus</i> Vaccine pCDNA3.1-L7L12-Omp16 	More
1678	omp16	<i>Brucella abortus</i> RB51-AHVLA					<ul style="list-style-type: none"> Divalent DNA <i>B. abortus</i> Vaccine pCDNA3.1-L7L12-Omp16 	More

NOTE: Go to [Vaxgen](#) for advanced vaccine gene search.

4. Vaccine-related Literature:

Found 22 vaccine-related articles(s).

- Trant CG, Lacerda TL, Carvalho NB, Azevedo V, Rosinha GM, Salcedo SP, Corvel JP, Oliveira SC. The *Brucella abortus* phosphoglycerate kinase mutant is highly attenuated and induces protection superior to that of vaccine strain 19 in immunocompromised and immunocompetent mice. *Infection and Immunity*. 2010; 78(5): 2283-2291. [PubMed: 20194591]
- Martins H, Garin-Bastuji B, Lima F, Flor L, Pina Fonseca A, Boinas F. Eradication of bovine brucellosis in the Azores. Partial outcome of a 3-year programme (2002-2007) based on test-and-slaughter and RB51 vaccination. *Preventive veterinary medicine*. 2009; 90(1-2): 80-89. [PubMed: 19439382]
- Nol P, Olsen SC, Rhyan JC. Experimental infection of Richardson's ground squirrels (*Spermophilus richardsonii*) with attenuated and virulent strains of *Brucella abortus*. *Journal of wildlife diseases*. 2009; 45(1): 189-195. [PubMed: 19204349]
- Yang X, Walters N, Robison A, Trunke T, Pascual DW. Nasal B immunization with recombinant *Brucella melitensis* bp26 and bigger-factor with cholera toxin reduces *B. melitensis* colonization. *Vaccine*. 2007; 25(12): 2201-2206. [PubMed: 17439499]
- Olsen SC, Walters VR, Stoffregen WS. An aerosolized *Brucella* spp. challenge model for laboratory animals. *Zoonoses and public health*. 2007; 54(8): 281-285. [PubMed: 17614037]
- Yang X, Becker T, Walters N, Pascual DW. Deletion of znuA virulence factor attenuates *Brucella abortus* and confers protection against wild-type challenge. *Infection and Immunity*. 2006; 74(7): 3874-3879. [PubMed: 16790759]
- Luo D, Ni B, Li P, Shi W, Zhang S, Han Y, Mao L, He Y, Wu Y, Wang X. Protective immunity elicited by a divalent DNA vaccine encoding both the L7L12 and Omp16 genes of *Brucella abortus* in BALB/c mice. *Infection and Immunity*. 2006; 74(5): 2734-2741. [PubMed: 16622210]
- Vemulapalli R, Trezza A, Saranikayala N, Srinanganathan N, Boyle SM, Schurig GG. Enhanced efficacy of recombinant *Brucella abortus* RB51 vaccine against *B. melitensis* infection in mice. *Veterinary microbiology*. 2004 Sep; 102(3-4): 237-45. [PubMed: 15343990]
- Rupprecht CE, Hanlon CA, Slate D. Oral vaccination of wildlife against rabies: opportunities and challenges in prevention and control. *Developments in biologicals*. 2004; 119: 173-184. [PubMed: 15742629]
- Pasquali P, Rosanna A, Platola C, Petrucci P, Ciuchini F. *Brucella abortus* RB51 induces protection in mice orally with virulent strain *B. abortus* 2308. *Infection and Immunity*. 2003; 71(5): 2326-2330. [PubMed: 12704101]
- He Y, Vemulapalli R, Schurig GG. Recombinant *Chobactadum anthropi* expressing *Brucella abortus* Cu₂Zn superoxide dismutase protects mice against *B. abortus* infection only after switching of immune response to Th1. *Infection and Immunity*. 2002 May; 70(5): 2535-43. [PubMed: 11953933]
- Schurig GG, Srinanganathan N, Corbel MJ. Brucellosis vaccines: past, present and future. *Veterinary microbiology*. 2002 Dec 20; 90(1-4): 479-96. [PubMed: 12414166]
- Ko J, Gerion-Fitzpatrick A, Ficht TA, Spittler CA. Virulence criteria for *Brucella abortus* strains as determined by interferon regulatory factor 1-deficient mice. *Infection and Immunity*. 2002; 70(12): 7004-7012. [PubMed: 12439380]
- Rosinha GM, Freitas DA, Miyoshi A, Azevedo V, Campos E, Cravero SL, Rossetti O, Spittler C, Oliveira SC. Characterization of a *Brucella abortus* ATP-binding cassette transporter homolog to *Rhizobium meliloti* ExsA and its role in virulence and protection in mice. *Infection and Immunity*. 2005; 73(9): 5036-5044. [PubMed: 12183553]
- He Y, Vemulapalli R, Zeytun A, Schurig GG. Induction of specific cytotoxic lymphocytes in mice vaccinated with *Brucella abortus* RB51. *Infection and Immunity*. 2001 Sep; 69(9): 5502-8. [PubMed: 11900423]
- Vemulapalli R, He Y, Cravero S, Srinanganathan N, Boyle SM, Schurig GG. Overexpression of protective antigen: a novel vaccine approach to enhance vaccine efficacy of *Brucella abortus* strain RB51. *Infection and Immunity*. 2000 Jun; 68(6): 3286-9. [PubMed: 10816475]
- Vemulapalli R, He Y, Buccolo LS, Boyle SM, Srinanganathan N, Schurig GG. Complementation of vaccine efficacy but no change in rough phenotype and attenuation. *Infection and Immunity*. 2000 Jul; 68(7): 3927-32. [PubMed: 10888200]
- Chevillat NF. Development, testing and commercialization of a new brucellosis vaccine for cattle. *Annals of the New York Academy of Sciences*. 2000; 916: 147-53. [PubMed: 11193651]
- Mackowiak M, Maki J, Motes-Kreimeyer L, Harbin T, Van Kampen K. Vaccination of wildlife against rabies: susceptibility studies by recombinant technology. *Advances in veterinary medicine*. 1999; 41: 571-583. [PubMed: 9890044]
- Winter AJ, Schurig GG, Boyle SM, Srinanganathan N, Bevins JS, Enright FM, Elzer FH, Kopec JD. Protection of BALB/c mice against homologous and heterologous species of *Brucella* by rough strain vaccines derived from *Brucella melitensis* and *Brucella suis* biovar 4. *American journal of veterinary research*. 1996 May; 57(5): 677-83. [PubMed: 8723881]
- Schurig GG, Roop RM 2nd, Bagchi T, Boyle S, Buhman D, Srinanganathan N. Biological properties of RB51, a stable clone of *Brucella abortus*. *Veterinary microbiology*. 1991 Jul; 26(2): 171-189. [PubMed: 1908108]
- Brochier B, Koury M, Costy F, Coppens P, Bauduin B, Lecocq JP, Languiet B, Chappuis G, Desmettre P, Alademyan K. Large-scale eradication of rabies using recombinant vaccinia virus vaccine. *Nature*. 1991; 354(6354): 520-522. [PubMed: 1758494]

NOTE: Go to [Litesearch](#), [Vaxpresso](#) and [Vaxmesh](#) for advanced literature search.

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