A database of crop pest cell lines

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Running head: Cell line database

Summary

We have developed an online database describing the known cell lines from Coleoptera, Diptera, Hemiptera, Hymenoptera, and Lepidoptera that were developed from agricultural pests. Cell line information has been primarily obtained from previous compilations of insect cell lines. We conducted in-depth internet literature searches and drew on internet sources such as the Cellosaurus database (https://web.expasy.org/cellosaurus/), and inventories from cell line depositories. Here, we report on a new database of insect cell lines, which covers 719 cell lines from 86 species. We have not included cell lines developed from *Drosophila* because they are already known from published databases, such as https://dgrc.bio.indiana.edu/cells/Catalog. We provide the designation, tissue and species of origin, cell line developer, unique characteristics, its use in various applications, publications, and patents, and, when known, insect virus susceptibility. This information has been assembled and organized into a searchable database available at this link, https://entomology.ca.uky.edu/aginsectcellsdatabase which will be updated on an ongoing basis.

Key words: cell line, database, pest, Diptera, Hemiptera, Hymenoptera, and Lepidoptera

Introduction

The history of cell culture started with the first report from Harrison in 1907 on the culturing of frog nerve cells. In 1944, Earle introduced continuous cancer cell lines from a rodent. Gey et al. (1952) developed the first immortalized human cell line from cervical cancer cells, now known as HeLa cells. Gao 1957 drew on established cell culture methods to establish the first insect cell lines from the silkworm *Bombyx mori*. Though he published two papers on insect cell lines, his work received delayed recognition as it was published in journals mainly distributed in China. In his publication, he described the establishment of cell lines developed from various tissues, including the ovary, gonad, trachea, and muscle. In his second paper, he reported virus replication, especially polyhedrovirus. Grace 1962 established cell lines from ovaries of the moth, *Antheraea eucalypti,* and adapted them to a medium supplemented with fetal bovine serum (Yunker et al. 1967). Shortly thereafter, Grace established cell lines from *Aedes aegypti* and *Bombyx mori* larvae (Grace 1967). Since then, many agriculturally important insect lines that could support viral expression were developed.

There has been tremendous growth in insect cell line development and use during the last quarter-century and the number of established cell lines has been expanded. The field has grown to an extent that now >1270 insect cell lines, including *Drosophila spp.*, have been established from many insect orders and a variety of source tissues reported in Cellosaurus (Bairoch 2018). Insect cell lines are used in a variety of applications, including in the development and production of bio-insecticidal viruses and recombinant proteins, which have grown from laboratory to industrial scales (Smagghe et al. 2009; Caputo et al. 2011). Cell lines are employed as research tools in signaling mechanisms and insect immunity studies (Goodman et al. 2021) and to discover new insecticide chemistries in screening programs (Swevers and Smagghe 2012). Virologists have used cell lines to study virus/host interactions and to uncover signal transduction pathways (Smagghe et al. 2009; Monteiro et al. 2012; Wilde et al 2014; Goodman et al. 2021; Khorramnejad et al. 2021). Insect cell lines yield new insights into basic cellular processes, including cellular resistance mechanisms to baculovirus replication, and continue to expand other important frontiers of our knowledge (Smagghe et al. 2009; Goodman et al. 2021).

Our database only includes cell lines from insects associated with crops and not livestock. All reported cell lines are presented in a table detailing tissue of origin, species, common names and orders of the source insects, virus susceptibility, and references (**Table 1**). Most of the details on viruses in **Table 1** were presented in either the original publication describing the specific cell lines or in one of the published compilations on lepidopteran insect cell lines (Hink 1972; Hink 1976; Hink 1985; Lynn 2007; Lynn and Harrison 2016). Approximately 46% of the cell lines (lepidopteran) reported in **Table 1** are known to replicate one or more baculoviruses. The virus abbreviations used in **Table 1** are defined in **Table 2**. Over 143 cell lines replicate the *Autographa californica* multiple nucleopolyhedrovirus (AcMNPV).

Researchers interested in any of the cell lines in our database can obtain them directly from the laboratory that developed them or from a variety of repositories as indicated in our database. Researchers are advised to validate the identity of all cell lines before publication using well-established molecular methods (Almeida et al. 2016).

Scope of the Database

This database covers information on agriculturally important cell lines, which are arranged alphabetically from Coleoptera to Lepidoptera.

Short Fields	
Order	The order name is based on taxonomic convention.
Species	We use the NCBI Taxonomy database as our reference taxonomic resource.
Primary designation	This is frequently the name provided in the original publication.
Accession number	This number is used to unambiguously reference a specific cell line from the Cellosaurus database. Numbers are preceded by “CVCL” and then followed by an underscore and 4 alpha-numerical characters (e.g., CVCL_Z891).
Other designation	Secondary designations are given, if available.
Stage	The life stage of the insect species from which the cell line was established.
Tissue	The tissue of origin from which the cell line was developed.
Initiator	The name of the researcher who developed the cell line.
Status	This section provides information about the availability of the cell line.

Descriptive fields	
Notes	Brief characteristics of the individual cell lines are described and include morphology, original authentication methods/results, parental cell line of origin (for clonal lines or sublines), distinguishing characteristics and unique properties.
Medium	This field describes the medium required to maintain the cell line.
Cell culture collection	This section provides information related to the organization(s) curating the cell line, if available.
Email	The researcher who is actively curating the cell line, if available (name and email address).
Website	The link to obtain or buy the cell lines from a repository, if available.
Viral propagation	If determined, this field provides information on viruses propagated by the cell line.
Adventitious Microorganism	This describes the occurrence of adventitious microorganisms in the cell line, if known.
References	We provide the references for publications describing the establishment of a cell line, its characterization, as well as relevant information such as reports on high-throughput omics experiments. Publications include published papers and book chapters. This is not an exhaustive list.
Patents	Patents describing specific uses of a cell line are reported here.
Cell Line Collection	The current availability of some insect cell lines is unknown.

Future scope

Insect cell lines are a valuable resource for the agriculture community (Lynn 1999; Smagghe et al. 2009; Arunkarthick et al. 2017), although their utility in many research areas has not been fully explored. Billions of dollars are spent managing pest insects using non-specific chemical pesticides that have harmful impacts on the environment (Alavanja 2009). It is necessary to identify environmentally friendly alternatives to these chemicals. Working with cell cultures is much more cost-efficient than working with whole insects in some areas of research. Other advantages of continuous cell line work are that the cell lines can be cryopreserved for decades, leading to more reproducible results, and they can be employed in high throughput screening assays (Smagghe et al. 2009; Swevers and Smagghe 2012). Currently, two cell lines from *Spodoptera frugiperda* and one from *Trichoplisia ni* are the most widely used in academic research, SF21, Sf9, and BTI-Tn-5B1-4 (High Five cells), respectively (Vaughn et al 1977; Summers & Smith 1987; Wickham et al 1992), to produce proteins. Recently, many small to midsize startup companies are using this technology to produce custom recombinant proteins for research and commercial applications.

In the last decade, the availability of cell lines has led to many advances in *in vitro* technologies, enabling researchers to explore new areas of biology, especially in the biomedical field. These state-of-the-art methods can all be applied to insect cell line studies. scRNA (single-cell RNA) sequence analysis is used to investigate cellular heterogeneity and regulatory changes in different tissue types (Cocanougher et al. 2019; Kwon et al. 2021; Liu et al. 2022). Three-dimensional (3D) cell culture systems, that more closely resemble *in vivo* cell environments, are under intense study as they are expected to accommodate better precision in drug discovery (Fang and Eglen 2017; Lv et al. 2017; Belfiore et al. 2021). 3D printing for the production of scaffolds holds promise for tissue engineering, providing a rapid and robust approach to assembling functional tissues *in vitro* (Richards et al. 2013; Poomathi et al. 2020). Cellular agriculture, using insect as well as fish cells, is also under study as an alternative source of meat production (Rubio et al. 2019; Campuzano and Pelling 2019; Ben-Arye and Levenberg 2019; Bomkamp et al. 2022). Gene editing tools may lead to specialized cell lines engineered for specific and novel purposes not yet developed (Lo et al. 2017; Mabashi-Asazuma and Jarvis 2017; Dangi et al. 2018; Giuliano et al. 2019). While insect cell line research and products have developed at an impressive pace, we believe we are in the early stage of their potential advancement. The information in this new database will help interested scientists advance their research and product development.

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Table 1. Insect cell lines from order Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera.

	Species	Common name(s)	Primary designation	Stage	Tissue	Microorganism Propagation	References
Coleoptera							
1.	*Agrilus planipennis*	Emerald ash borer	NRCAN-AP-5862A	Larva	Fat Body		
2.	*Agrilus planipennis*	Emerald ash borer	NRCAN-AP-5862B	Larva	Fat Body		
3.	*Agrilus planipennis*	Emerald ash borer	NRCAN-AP-5862E	Larva	Fat Body		
4.	*Agrilus planipennis*	Emerald ash borer	NRCAN-AP-5862-AFC-CAE	Larva	Fat Body		
5.	*Anthonomus grandis*	boll weevil	AGE	Egg	Embryo		(Barcenas 1989; McIntosh et al. 1992)
6.	*Anthonomus grandis*	boll weevil	AGF2	Egg	Embryo	AcMNPV	(Barcenas 1989; McIntosh et al. 1992)
7.	*Anthonomus grandis*	boll weevil	BRL-AG-1	Egg	Embryo		(Stiles et al. 1992; McIntosh et al. 1996a)
8.	*Anthonomus grandis*	boll weevil	BRL-AG-2	Egg	Embryo		(Stiles et al. 1992; McIntosh et al. 1996a)
9.	*Anthonomus grandis*	boll weevil	BRL-AG-3A	Egg	Embryo		(Stiles et al. 1992; McIntosh et al. 1996a)
10.	*Anthonomus grandis*	boll weevil	BRL-AG-3C	Egg	Embryo		(Stiles et al. 1992; McIntosh et al. 1996a)
11.	*Anthonomus grandis*	boll weevil	BRL-AG-4	Egg	Embryo		(Stiles et al. 1992; McIntosh et al. 1996a)
12.	*Diabrotica undecimpunctata*	Southern corn rootworm	IPLB-DU182A	Egg	Embryo		(Lynn and Stoppleworth 1984)
13.	*Diabrotica undecimpunctata*	Southern corn rootworm	IPLB-DU182	Egg	Embryo		
14.	*Diabrotica undecimpunctata*	Southern corn rootworm	IPLB-DU182E	Egg	Embryo		(Lynn and Stoppleworth 1984)
15.	*Diabrotica undecimpunctata*	Southern corn rootworm	IPLB-DU102 clone A4	Egg	Embryo		

16.	*Heteronychus arator*	African black beetle	DSIR-HA1179	Egg	Embryo		(Crawford 1982)
17.	*Leptinotarsa decemlineata*	Colorado potato beetle	IPLB-CPB2	Egg	Embryo		(Lynn 1995)
18.	*Pissodes strobi*	white pine weevil	FPMI-PS-1	Neonate	Whole organism		(Caputo et al. 2011)
19.	*Pissodes strobi*	white pine weevil	FPMI-PS-4	Neonate	Whole organism		(Caputo et al. 2011)
20.	*Pissodes strobi*	white pine weevil	FPMI-PS-5	Neonate	Whole organism		(Caputo et al. 2011)
21.	*Pissodes strobi*	white pine weevil	FPMI-PS-6	Neonate	Whole organism		(Caputo et al. 2011)
22.	*Tylonotus bimaculatus*	Ash and privet borer	NRCAN-TB-521	Larva	Whole organism		(Caputo et al. 2011; Wen et al. 2015)
23.	*Aethina tumida*	Small hive beetle	BCIRL-AtuNE-1129-SGS sublines D6, D12, F10	Neonate/Egg	Whole organism		
24.	*Aethina tumida*	Small hive beetle	BCIRL-AtuE-1127-SGS sublines A3, A10, B7, B15, C1, C3, C10R, C11, D3a, D3b, D5, E1, H3, H8, H12	Egg	Embryo		
25.	*Diabrotica virgifera virgifera*	Western corn rootworm	CT/BCIRL-DvWL1-0619-KZ	Larva	Whole organism		(Zhou et al. 2020b)
26.	*Diabrotica virgifera virgifera*	Western corn rootworm	CT/BCIRL-DvWL2-0619-KZ	Larva	Whole organism		(Zhou et al. 2020b)
27.	*Diabrotica virgifera virgifera*	Western corn rootworm	CT/BCIRL-DvWL3-0619-KZ	Larva	Whole organism		(Zhou et al. 2020b)
28.	*Diabrotica virgifera virgifera*	Western corn rootworm	CT/BCIRL-DvWL3-B4-0619-KZ	Larva	Whole organism		
29.	*Diabrotica virgifera virgifera*	Western corn rootworm	CT/BCIRL-DvWL3-C5-0619-KZ	Larva	Whole organism		
30.	*Diabrotica virgifera virgifera*	Western corn rootworm	CT/BCIRL-DvWL3-C6-0619-KZ	Larva	Whole organism		
31.	*Tribolium castaneum*	Red flour beetle	BCIRL-TcA-CLG1	Adult/Pupa	Whole organism		(Goodman et al. 2012; Silver et al. 2015)
32.	*Tribolium castaneum*	Red flour beetle	Tc81	Egg	Embryo		(Kayukawa et al. 2013)
33.	*Anomala costata*	Larger striated chafer	FRI-AnCo-5B	Egg	Embryo	SIV and CZIV	(Mitsuhashi 1989a)
34.	*Anomala cuprea*	Cupreous chafer beetle	FRI-AnCu-35	Egg	Embryo		(Mitsuhashi 2003)
35.	*Rhynchophorus ferrugineus*	Red Palm Weevil	RPW-1	Larva	Midgut		(Aljabr et al. 2014; Rizwan-ul-Haq 2015)
Diptera							
36.	*Sarcophaga peregrina*	Flesh fly	NIH-SaPe-4	Egg	Embryo		(Takahashi et al. 1980; Mitsuhashi 1989b; Kawai and Mitsuhashi 1997)
37.	*Sarcophaga peregrina*	Flesh fly	Sp-E-HNU11	Egg	Embryo		(Wang et al. 2011)
38.	*Ceratitis capitata*	Mediterranean fruit fly	CEC CC 128	Egg	Embryo		(Hink 1980; Cavalloro 1981; Rossi 2000; Plus 1981)
39.	*Ceratitis capitata*	Mediterranean fruit fly	CEC CC 130	Egg	Embryo	DXV	(Cavalloro 1980; Hink 1980; Cavalloro 1981; Plus 1981)
40.	*Ceratitis capitata*	Mediterranean fruit fly	CEC CC 228	Egg	Embryo	DXV	(Plus 1981)
41.	*Bactrocera dorsalis*	Oriental fruit fly	QAU-Bd-E-2	Egg	Embryo	BdCV	(Zhen et al. 2021)

Hemiptera							
42.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-21	Neonate	Whole organism		(Caputo et al. 2011)
43.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-21A	Neonate	Whole organism		(Caputo et al. 2011)
44.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-27	Neonate	Whole organism		(Caputo et al. 2011)
45.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-27A	Neonate	Whole organism		(Caputo et al. 2011)
46.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-31	Neonate	Whole organism		(Caputo et al. 2011)
47.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-31A	Neonate	Whole organism		(Caputo et al. 2011)
48.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-32	Neonate	Whole organism		(Caputo et al. 2011)
49.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-32A	Neonate	Whole organism		(Caputo et al. 2011)
50.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-33	Neonate	Whole organism		(Caputo et al. 2011)
51.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-33A	Neonate	Whole organism		(Caputo et al. 2011)
52.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-34	Neonate	Whole organism		(Caputo et al. 2011)
53.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-34A	Neonate	Whole organism		(Caputo et al. 2011)
54.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-36	Neonate	Whole organism		(Caputo et al. 2011)
55.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-36A	Neonate	Whole organism		(Caputo et al. 2011)
56.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-37	Neonate	Whole organism		(Caputo et al. 2011)
57.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-39	Neonate	Whole organism		(Caputo et al. 2011)
58.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-39A	Neonate	Whole organism		(Caputo et al. 2011)
59.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-40	Neonate	Whole organism		(Caputo et al. 2011)
60.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-41	Neonate	Whole organism		(Caputo et al. 2011)
61.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-41A	Neonate	Whole organism		(Caputo et al. 2011)
62.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-42	Neonate	Whole organism		(Caputo et al. 2011)
63.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-42A	Neonate	Whole organism		(Caputo et al. 2011)
64.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-83	Egg	Embryo		(Caputo et al. 2011)
65.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-84	Egg	Embryo		(Caputo et al. 2011)
66.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-84A	Egg	Embryo		(Caputo et al. 2011)
67.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-87	Egg	Embryo		(Caputo et al. 2011)
68.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-87A	Egg	Embryo		(Caputo et al. 2011)
69.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-88	Egg	Embryo		(Caputo et al. 2011)

70.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-88A	Egg	Embryo		(Caputo et al. 2011)
71.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-95	Egg	Embryo		(Caputo et al. 2011)
72.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-95 A	Egg	Embryo		(Caputo et al. 2011)
73.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-99	Egg	Embryo		(Caputo et al. 2011)
74.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-99A	Egg	Embryo		(Caputo et al. 2011)
75.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-181		Hemocytes		(Caputo et al. 2011)
76.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-182A		Hemocytes		(Caputo et al. 2011)
77.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-184	Egg	Embryo		(Caputo et al. 2011)
78.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-185	Egg	Embryo		(Caputo et al. 2011)
79.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-185A	Egg	Embryo		(Caputo et al. 2011)
80.	*Lygus lineolaris*	Tarnished plant bug	NRCAN-LL-217	Neonate	Whole organism		(Caputo et al. 2011)
81.	*Nephotettix cincticeps*	Green rice leafhopper	NC-15	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
82.	*Nephotettix cincticeps*	Green rice leafhopper	NC-19	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
83.	*Nephotettix cincticeps*	Green rice leafhopper	NC-20	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
84.	*Nephotettix cincticeps*	Green rice leafhopper	NC-21	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
85.	*Nephotettix cincticeps*	Green rice leafhopper	NC-24	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
86.	*Nephotettix cincticeps*	Green rice leafhopper	NC-25	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
87.	*Nephotettix nigropictus*	Rice green leafhopper	NN-1	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
88.	*Nephotettix nigropictus*	Rice green leafhopper	NN-2	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
89.	*Nephotettix nigropictus*	Rice green leafhopper	NN-5	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
90.	*Nephotettix nigropictus*	Rice green leafhopper	NN-7	Egg	Embryo	RDV	(Kimura 1984, 1988, 1989; Kimura and Omura 1988)
91.	*Anasa tristis*	Squash bug	BCIRL-AtE-CLG15, sublines 15A and 15B	Egg	Embryo		(Goodman et al. 2017)
92.	*Anasa tristis*	Squash bug	BCIRL-AtE-CLG11	Egg	Embryo		(Goodman et al. 2017)
93.	*Anasa tristis*	Squash bug	Bayer/BCIRL-AtE2-1201-TR	Egg	Embryo		
94.	*Bemisia tabaci*	Silverleaf whitefly	ATCC-Btb(Ba)97	Egg	Embryo		(Hunter and Polston 2001)
95.	*Cimex hemipterus*	Bedbug	NIVI-CH 440, 442, 445	Egg	Embryo		(Pant et al. 1988)

96.	*Neoaliturus haematoceps*	Circulifer haematoceps	Ciha-1	Egg	Embryo		(Duret et al. 2010)
97.	*Dalbulus maidis*	Corn leaf hopper	DM-II-AM (BCIRL)	Egg	Embryo		(Rechtoris and McIntosh 1976)
98.	*Agallia constricta*	Constricted leafhopper	Acan-20 (BCIRL)	Egg	Embryo		(Chiu and Black 1967; Kimura and Black 1971)
99.	*Homalodisca coagulata*	Glassy-winged sharpshooter	GWSS Z10 sublines G3	Egg	Embryo		(Kamita et al. 2005; Boyapalle et al. 2007)
100.	*Homalodisca coagulata*	Glassy-winged sharpshooter	GWSS Z15	Egg	Embryo		(Kamita et al. 2005)
101.	*Homalodisca coagulata*	Glassy-winged sharpshooter	GWSS LH	Egg	Embryo		(Kamita et al. 2005)
102.	*Laodelphax striatellus*	Small brown planthopper	SBPH	Egg	Embryo	Rice stripe virus (RSV)	(Ma et al. 2013)
103.	*Nilaparvata lugens*	Rice brown planthopper	BPH	Egg	Embryo		(Xu et al. 2014)
104.	*Neoaliturus tenellus*	Beet leafhopper	CT 1	Egg	Embryo		(Wayadande and Fletcher 1998)
Hymenoptera							
105.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-1	Egg	Embryo		(Sohi and Ennis 1981)
106.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-28	Egg	Embryo		(Sohi and Ennis 1981)
107.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-31	Egg	Embryo		(Sohi and Ennis 1981)
108.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-32	Egg	Embryo		(Sohi and Ennis 1981)
109.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-2	Egg	Embryo		(Sohi and Ennis 1981)
110.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-4	Egg	Embryo		(Sohi and Ennis 1981)
111.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-10	Egg	Embryo		(Sohi and Ennis 1981)
112.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-18	Egg	Embryo		(Sohi and Ennis 1981)
113.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-21	Egg	Embryo		(Sohi and Ennis 1981)
114.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-22	Egg	Embryo		(Sohi and Ennis 1981)
115.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-25/26	Egg	Embryo		
116.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-27	Egg	Embryo		(Sohi and TJ 1981)
117.	*Trichogramma confusum*	Parasitic wasp	IPLB-Tcon1	Egg	Embryo		(Lynn and Hung 1991)
118.	*Trichogramma exiguum*	Parasitic wasp	IPLB-Tex2	Egg	Embryo		(Lynn and Hung 1991)
119.	*Trichogramma pretiosum*	Parasitoid wasp	IPLB-TpE1	Egg	Embryo		(Lynn and Hung 1986)
120.	*Hyposoter didymator*	Hyposoter wasp	Hd-AA	Pupae	Whole organism		(Rocher et al. 2004)
121.	*Hyposoter didymator*	Hyposoter wasp	Hd-AD	Pupae	Whole organism		(Rocher et al. 2004)
122.	*Hyposoter didymator*	Hyposoter wasp	Hd-BBA	Pupae	Whole organism		(Rocher et al. 2004)
123.	*Hyposoter didymator*	Hyposoter wasp	Hd-K	Pupae	Whole organism		(Rocher et al. 2004)

124.	*Apis mellifera*	Honey bee	AmE-711	Egg	Embryo		(Goblirsch et al. 2013; Carrilo et al. 2016; Guo et a. 2020)
125.	*Apis mellifera*	Honey bee	MYN9	Egg	Embryo		(Matsuda et al. 2011; Guo et a. 2020)
126.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-28	Egg	Embryo		(Sohi and Ennis 1982)
127.	*Neodiprion lecontei*	Redheaded pine sawfly	FPMI-NL-31	Egg	Embryo		(Sohi and Ennis 1982)
Lepidoptera							
128.	*Agrotis ipsilon*	Black cutworm	IPLB-AiE1611T	Egg	Embryo	AgipMNPV; AnfaNPV; AgMNPV; GmDNV; HearMNPV; PxGV; RoMNPV	(Harrison and Lynn 2008)
129.	*Agrotis ipsilon*	Black cutworm	IPLB-AiEd6T	Egg	Embryo	AgipMNPV; AnfaNPV; AgMNPV; GmDNV; HearMNPV; PxGV; RoMNPV	(Harrison and Lynn 2008)
130.	*Agrotis ipsilon*	Black cutworm	IPLB-AiE1611S	Egg	Embryo	AgipMNPV; AfMNPV; AgMNPV; GmDNV; HearMNPV; PxGV; RoMNPV	(Harrison and Lynn 2008)
131.	*Agrotis ipsilon*	Black cutworm	BCIRL/AMCY-AiOV-CLG	Adult	Ovary/Fat Body	AcMNPV; PxMNPV	(Goodman et al. 2001a, b)
132.	*Agrotis ipsilon*	Black cutworm	BCIRL/AMCY-AiTS-CLG	Adult	Testes/Fat Body	AcMNPV	(Goodman et al. 2001a, b)
133.	*Anagrapha falcifera*	Celery looper	BCIRL/AMCY-AfOV-CLG	Adult	Ovary	AcMNPV	(Goodman et al. 2001a, b)
134.	*Anagrapha falcifera*	Celery looper	BCIRL/AMCY-AfTS-CLG	Adult	Testes/Fat Body		(Goodman et al. 2001a, b)
135.	*Antheraea eucalypti*	gum moth	B/B				
136.	*Antheraea eucalypti*	gum moth	GML				
137.	*Antheraea eucalypti*	gum moth	RML-2	Pupa	Ovary		(Grace 1962; Hukuhara 1966; Yunker et al. 1967; Greene et al. 1972; Asaoka 1987; Mitsuhashi 1989b; Tremblay et al. 1995)
138.	*Antheraea eucalypti*	gum moth	Ae	Pupa	Ovary		
139.	*Anticarsa gemmatalis*	Velvetbean caterpillar moth	BCIRL/AMCY-AgE-CLG	Egg	Embryo	AcMNPV	(Goodman et al. 2001a, b)
140.	*Anticarsa gemmatalis*	Velvetbean caterpillar moth	BCIRL/AMCY-AgOV-CLG1	Egg	Embryo	AgMNPV; AcMNPV	(Goodman et al. 2001a, b)
141.	*Anticarsa gemmatalis*	Velvetbean caterpillar moth	BCIRL/AMCY-AgOV-CLG2	Egg	Embryo	AgMNPV; AcMNPV	(Goodman et al. 2001a, b)
142.	*Anticarsa gemmatalis*	Velvetbean caterpillar moth	BCIRL/AMCY-AgOV-CLG3	Egg	Embryo	AgMNPV; AcMNPV	(Goodman et al. 2001a, b)
143.	*Anticarsa gemmatalis*	Velbetbean caterpillar moth	UFL-AG286	Egg	Embryo	AcMNPV; AfMNPV; AgMNPV	(Sieburth and Maruniak 1988; Hink et al. 1991; Lynn 2003; Gioria et al. 2006)

144.	*Anticarsa gemmatalis*	Velbetbean caterpillar moth	BCIRL-AgAM1	Pupa	Ovary	AcMNPV	(McIntosh and Ignoffo 1989; McIntosh 1991b)
145.	*Bombyx mandarina*	Wild silk moth	SES-Bma-01	Egg	Embryo		(Ninaki 1988; Hink and Hall 1989)
146.	*Bombyx mandarina*	Wild silk moth	SES-Bma-01R	Egg	Embryo		(Ninaki 1988; Hink and Hall 1989)
147.	*Bombyx mandarina*	Wild silk moth	SES-Bma-01A	Egg	Embryo		(Ninaki 1988)
148.	*Bombyx mandarina*	Wild silk moth	NIAS-Boma-529b	Larva	Fat Body	BmNPV	(Iwanaga et al. 2009)
149.	*Bombyx mori*	Silk moth	BM-21E-HNU5	Egg	Embryo	HaMPV; AcNPV; PcrNPV; PxGV	(Quhou et al., 1991; Alhag et al., 2007)
150.	*Bombyx mori*	Silk moth	Bm-Em-1	Egg	Embryo	BmNPV; AcMNPV	(Li et al. 2011)
151.	*Bombyx mori*	Silk moth	Bm5	Larva	Ovary	BmNPV	(Grace 1962; Stavroulakis et al. 1991; Lee et al. 2012)
152.	*Bombyx mori*	Silk moth	Bmc140	Pupa	Whole organism	BmNPV	(Lee et al. 2012)
153.	*Bombyx mori*	Silk moth	BmE-SWU1	Egg	Embryo	BmNPV	(Pan et al. 2007)
154.	*Bombyx mori*	Silk moth	BmE-SWU2	Egg	Embryo	BmNPV	(Pan et al. 2006, 2007)
155.	*Bombyx mori*	Silk moth	Bme21	Egg	Embryo	BmNPV	(Lee et al. 2012)
156.	*Bombyx mori*	Silk moth	BmN-SWU1	Larva	Ovary	BmNPV	(Pan et al. 2010; Zhang et al. 2014)
157.	*Bombyx mori*	Silk moth	BmN-SWU2	Larva	Ovary		(Zhang et al. 2014)
158.	*Bombyx mori*	Silkworm	BmN	Larva	Ovary	BmNPV	(Grace 1967; Volkman and Goldsmith 1982; Maeda 1984, 1989; Maeda et al. 1985; Ninaki et al. 1989; McIntosh et al. 1996a, 2005; Grasela et al. 2000; Yao et al. 2010)
159.	*Bombyx mori*	Silk moth	BmN4	Larva	Ovary	BmNPV; SeMNPV	(Grace 1967; Volkman and Goldsmith 1982; Maeda 1989; Yanase et al. 1998; Keith et al. 1999; Katsuma et al. 2005; Taniai et al. 2006; Lee et al. 2012; Iwanaga et al. 2014; Levin et al. 2020)
160.	*Bombyx mori*	Silk moth	BmN4-SFM	Larva	Ovary	BmNPV	(Grace 1967; Iwanaga et al. 2014)
161.	*Bombyx mori*	Silk moth	BmN4-DR	Larva	Ovary		(Grace 1967; Mon et al. 2003)
162.	*Bombyx mori*	Silk moth	BmN4-IR	Larva	Ovary		(Grace 1967; Mon et al. 2003)
163.	*Bombyx mori*	Silk moth	BmN4-SID1	Larva	Ovary		(Grace 1967; Mon et al. 2012)
164.	*Bombyx mori*	Silk moth	BmSG-SWU1	Larva	Silk gland		(Feng et al. 2014)
165.	*Bombyx mori*	Silk moth	DZNU-Bm-1	Larva	Ovary	BmNPV	(Khurad et al. 2006; Deshmukh and Bahekar 2013; Bahekar 2018)

166.	*Bombyx mori*	Silk moth	DZNU-Bm-12	Larva	Ovary	BmNPV	(Khurad et al. 2009; Deshmukh and Bahekar 2013)
167.	*Bombyx mori*	Silk moth	DZNU-Bm-16	Larva	Ovary	BmNPV	(Deshmukh and Bahekar 2013)
168.	*Bombyx mori*	Silk moth	NIAS-Bm-aff3	Larva	Fat Body		(Katsuma et al. 2005; Takahashi et al. 2006; Fujita et al. 2009)
169.	*Bombyx mori*	Silk moth	NIAS-Bm-ao1	Larva	Ovary		(Katsuma et al. 2005; Geisler and Jarvis 2018)
170.	*Bombyx mori*	Silk moth	NIAS-Bm-Ke1	Egg	Embryo	BmNPV	(Imanishi et al. 2006, 2012)
171.	*Bombyx mori*	Silk moth	NIAS-Bm-Ke17	Egg	Embryo	BmPTLNPV	(Imanishi et al. 2012)
172.	*Bombyx mori*	Silk moth	NIAS-Bm-Oyanagi 1	Egg	Embryo		(Zhong et al. 2005; Katsuma et al. 2005)
173.	*Bombyx mori*	Silk moth	NIAS-Bm-Oyanagi 2	Egg	Embryo		(Zhong et al. 2005; Fujita et al. 2009)
174.	*Bombyx mori*	Silk moth	NIAS-Bm-SLBEM-1228	Egg	Embryo		(Zhong et al. 2005)
175.	*Bombyx mori*	Silk moth	NIAS-Bm-SLBEM-1230	Egg	Embryo		(Zhong et al. 2005)
176.	*Bombyx mori*	Silk moth	SES-BoMo-15A	Egg	Embryo	BmNPV; BmCPV; EsCPV; CIV	(Inoue and Mitsuhashi 1984; Asaoka 1987; Inoue 1989; Katsuma et al. 2005; Taniai et al. 2006; Geisler and Jarvis 2018)
177.	*Bombyx mori*	Silk moth	SES-BoMo-15AII	Egg	Embryo	BmNPV; BmCPV; EsCPV	(Inoue et al. 1990)
178.	*Bombyx mori*	Silk moth	NISES-BoMo-15AIIc	Egg	Embryo	BmNPV; BmCPV; EsCPV	(Inoue et al. 1990)
179.	*Bombyx mori*	Silk moth	SES-BoMo-C129	Egg	Embryo		(Imanishi, and Ohtsuki, 1988; Imanishi et al. 1988; Zhong et al. 2005)
180.	*Bombyx mori*	Silk moth	SES-BoMo-J125	Egg	Embryo		(Imanishi, and Ohtsuki, 1988; Imanishi et al. 1988; Imanishi and Tomita 1992)
181.	*Bombyx mori*	Silk moth	SES-BoMo-J125K1	Egg	Embryo	BmNPV	(Imanishi and Tomita 1992)
182.	*Bombyx mori*	Silk moth	SES-BoMo-J125K2	Egg	Embryo	BmNPV	(Imanishi and Tomita 1992; Taniai et al. 2006)
183.	*Bombyx mori*	Silk moth	SES-BoMo-J125K5	Egg	Embryo	BmNPV	(Imanishi and Tomita 1992; Katsuma et al. 2005; Taniai et al. 2006)
184.	*Bombyx mori*	Silk moth	SES-BoMo-J125K6	Egg	Embryo	BmNPV	(Imanishi and Tomita 1992)
185.	*Bombyx mori*	Silk moth	NISES-BoMo-15A	Egg	Embryo		(Inoue et al. 1990)
186.	*Bombyx mori*	Silk moth	NISES-BoMo-Cam1	Larva	Ovary		(Kobayashi and Inoue 1989; Katsuma et al. 2005; Taniai et al. 2006)
187.	*Bombyx mori*	Silk moth	NISES-BoMo-DZ	Larva	Ovary		(Imanishi et al. 1999; Taniai et al. 2006)
188.	*Bombyx mori*	Silk moth	NISES-BoMo-E2	Egg		AcMNPV	(Taniai et al. 2006)

189.	*Bombyx mori*	Silk moth	NISES-BoMo-E3	Larva	Embryo		(Zhong et al. 2005)
190.	*Bombyx mori*	Silk moth	NISES-BoMo-E4	Larva	Embryo		(Zhong et al. 2005)
191.	*Bombyx mori*	Silk moth	NISES-BoMo-KG	Larva	Ovary		(Imanishi et al. 1999)
192.	*Bombyx mori*	Silk moth	NISES-BoMo-MK	Larva	Ovary		(Imanishi et al. 1999; Taniai et al. 2006)
193.	*Bombyx mori*	Silk moth	NISES-BoMo-OH	Larva	Ovary		(Imanishi et al. 1999; Taniai et al. 2006)
194.	*Bombyx mori*	Silk moth	NIV-BM-1296	Larva/Pupa	Ovary	BmNPV; AcMNPV	(Sudeep et al. 2002a, 2005)
195.	*Bombyx mori*	Silk moth	NIV-BM-197	Larva/Pupa	Ovary	BmNPV; AcMNPV	(Sudeep et al. 2002a)
196.	*Bombyx mori*	Silk moth	SES-Bm-1 30	Embryo	Embryo		(Asaoka 1987; Ninaki et al. 1989)
197.	*Bombyx mori*	Silk moth	SES-Bm-1 30A	Embryo	Embryo		(Ninaki 1988)
198.	*Bombyx mori*	Silk moth	SES-Bm-1 30R	Embryo	Embryo		(Asaoka 1987; Ninaki 1988)
199.	*Bombyx mori*	Silk moth	SES-Bm-e 21	Embryo	Embryo		(Asaoka 1987)
200.	*Bombyx mori*	Silk moth	SES-Bm-e 21-12	Embryo	Embryo		(Suzuki et al. 1986)
201.	*Bombyx mori*	Silk moth	SES-Bm-e 21A	Embryo	Embryo		(Ninaki 1988)
202.	*Bombyx mori*	Silk moth	SES-Bm-e 21B	Embryo	Embryo		(Ninaki 1988)
203.	*Bombyx mori*	Silk moth	SES-Bm-e 21R	Embryo	Embryo		(Ninaki 1988)
204.	*Bombyx mori*	Silk moth	TUAT-BME-11	Egg	Embryo	BmNPV	(Pandharipande 1994)
205.	*Bombyx mori*	Silk moth	TUAT-BME-15	Egg	Embryo	BmNPV	(Pandharipande 1994)
206.	*Cactoblastis cactorum*	Cactus moth	BCIRL-Cc-AM/JG Line A	Adults	Ovary	AcMNPV; GmMNPV	(Grasela et al. 2012)
207.	*Cactoblastis cactorum*	Cactus moth	BCIRL-Cc-AM/JG Line J	Adults	Ovary	AcMNPV; GmMNPV	(Grasela et al. 2012)
208.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-200	Larva	Whole gut	CfMNPV; CfGV; CfCPV; CfEPV	(Sohi et al. 1993)
209.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-203	Larva	Midgut	cfMNPV	(Sohi et al. 1993; Hu et al. 2004)
210.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-204	Larva	Whole gut	AcMNPV	Sohi et al. 1993; Feng et al. 2001)
211.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-205	Larva	Midgut	CfMNPV; CfDEFNPV	Sohi et al. 1993; Feng et al. 2001)
212.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-22	Pupa	Ovary	CfMNPV; CfDEFNPV; CfGV; CfEPV; CfCPV	(Feng et al. 2001)
213.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-27	Pupa	Ovary	CfMNPV	(Tremblay et al. 1995; Feng et al. 2001)
214.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-30	Pupa	Ovary	CfMNPV	(Feng et al. 2001)
215.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-300	Egg	Embryo	CfMNPV	(Feng et al. 2001)
216.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-33	Pupa	Ovary	CfMNPV	(Feng et al. 2001)

217.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-34	Pupa	Ovary	CfMNPV; CfDEFNPV	(Feng et al. 2001)
218.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-40	Pupa	Ovary	CfDEFNPV; cfMNPV	(Feng et al. 2001)
219.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-41	Pupa	Ovary	CfMNPV	(Feng et al. 2001)
220.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-50	Pupa	Ovary		(Harvey and Sohi 1985; Harvey and Sohi 1989; Feng et al. 2001)
221.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-60	Pupa	Ovary	AcMNPV	(Harvey and Sohi 1985; Harvey and Sohi 1989; Feng et al. 2001)
222.	*Choristoneura fumiferana*	Spruce Budworm	FPMI-CF-70	Pupa	Ovary	CfMNPV; CfDEFNPV	(Harvey and Sohi 1985; Harvey and Sohi 1989; Sohi et al. 1995; Tremblay et al. 1995; Feng et al. 2001)
223.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-1	Neonate	Whole organism		(Johnson 1984; Harvey and Sohi 1989; Hink et al. 1991; Sohi et al. 1995; Tremblay et al. 1995; Feng et al. 2001)
224.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-10	Neonate	Whole organism	CfMNPV	(Harvey and Sohi 1985; G.T. and S.S. 1989; Feng et al. 2001)
225.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-12	Neonate	Whole organism	CfMNPV	(Harvey and Sohi 1985; Harvey and Sohi 1989; Mitsuhashi 1989b; Feng et al. 2001)
226.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-124	Neonate	Whole organism		(Krywienczyk and Sohi 1976; Bilimoria and Sohi 1977; Harvey and Sohi 1985; G.T Sohi. 1989; Feng et al. 2001)
227.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-2C1 (clone of Cf 124T)	Neonate	Whole organism	CfMNPV	(Harvey and Sohi 1985)
228.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-124T (attached cell line derived from Cf 124)	Neonate	Whole organism	CfMNPV	(Bilimoria and Sohi 1977)
229.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-124T clones other than CF-2C1	Neonate	Whole organism		(Bilimoria and Sohi 1977; Tremblay et al. 1995; Feng et al. 2001)
230.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-16	Neonate	Whole organism	CfMNPV	(Harvey and Sohi 1985; Harvey and Sohi 1989; Feng et al. 2001)
231.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-16T	Neonate	Whole organism	CfMNPV	(Tremblay et al. 1995; Feng et al. 2001)
232.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-5	Neonate	Whole organism	CfMNPV	(Harvey and Sohi 1985; Harvey and Sohi 1989; Feng et al. 2001)
233.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-6	Neonate	Whole organism	CfMNPV	(Harvey and Sohi 1985; Harvey and Sohi 1989; Feng et al. 2001)
234.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-8	Neonate	Whole organism	CfMNPV	(Harvey and Sohi 1985; Harvey and Sohi 1989; Feng et al. 2001)
235.	*Choristoneura fumiferana*	Spruce Budworm	NRCAN-CF-9				
236.	*Choristoneura fumiferana*	Spruce Budworm	IPRI-CF-300	Egg	Embryo	CfMNPV	
237.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-131	Egg	Embryo		
238.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-164	Neonate	Whole organism		

239.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-21	Neonate	Whole organism		
240.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-132	Egg	Embryo		
241.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-112	Neonate	Whole organism		
242.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-113	Neonate	Whole organism		
243.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-114	Neonate	Whole organism		
244.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-115	Neonate	Whole organism		
245.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-134	Egg	Embryo		
246.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-8681	Neonate	Whole organism		
247.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-63	Neonate	Whole organism		
248.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-75	Neonate	Whole organism		
249.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-67	Neonate	Whole organism		
250.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-70	Neonate	Whole organism		
251.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-71	Neonate	Whole organism		
252.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-73	Neonate	Whole organism		
253.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-77	Neonate	Whole organism		
254.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-80	Neonate	Whole organism		
255.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-81	Neonate	Whole organism	CfMNPV	
256.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-86	Neonate	Whole organism		
257.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-162	Neonate	Whole organism		
258.	*Choristoneura occidentalis*	Western spruce budworm	FPMI-CO-163	Neonate	Whole organism		
259.	*Cydia pomonella*	Codling Moth	CP-1268	Egg	Embryo		(Hink and Ellis 1971; Gallagher and Hartig 1976)
260.	*Cydia pomonella*	Codling Moth	CP-169	Egg	Embryo		(Hink and Ellis 1971; Miltenburger et al. 1985; McIntosh et al. 1996a)
261.	*Cydia pomonella*	Codling Moth	CpDW1	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
262.	*Cydia pomonella*	Codling moth	CpDW10	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
263.	*Cydia pomonella*	Codling moth	CpDW11	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
264.	*Cydia pomonella*	Codling moth	CpDW13	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
265.	*Cydia pomonella*	Codling moth	CpDW14	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
266.	*Cydia pomonella*	Codling moth	CpDW15	Egg	Embryo	CpGV	(Winstanley and Crook 1993)

267.	*Cydia pomonella*	Codling moth	CpDW2	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
268.	*Cydia pomonella*	Codling moth	CpDW3	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
269.	*Cydia pomonella*	Codling moth	CpDW4	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
270.	*Cydia pomonella*	Codling moth	CpDW5	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
271.	*Cydia pomonella*	Codling moth	CpDW6	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
272.	*Cydia pomonella*	Codling moth	CpDW9	Egg	Embryo	CpGV	(Winstanley and Crook 1993)
273.	*Cydia pomonella*	Codling moth	IZD-Cp 4/13	Egg	Embryo		(Miltenburger et al. 1985)
274.	*Cydia pomonella*	Codling moth	IZD-Cp-0508	Larva	Hemocytes		(Hink 1980; Miltenburger et al. 1985; Lynn and Harrison 2016)
275.	*Cydia pomonella*	Codling moth	IZD-Cp-1508	Larva	Hemocytes		(Hink 1980; Lynn and Harrison 2016)
276.	*Cydia pomonella*	Codling moth	IZD-Cp-2202	Larva	Hemocytes		(Hink 1980; Miltenburger et al. 1985; Lynn and Harrison 2016)
277.	*Cydia pomonella*	Codling moth	IZD-Cp-2507	Larva	Hemocytes		(Hink 1980; Lynn and Harrison 2016)
278.	*Danaus plexippus*	Monarch Butterfly	BCIRL-Dp-AM/JG	Adult	Ovary	PxMNPV; AgMNPV; AnfaNPV; HzSNPV	(McIntosh and Grasela 2009)
279.	*Danaus plexippus*	Monarch Butterfly	DpN1	Egg	Embryo	AcMNPV	(Palomares et al. 2003; Hillar and Jarvis 2010)
280.	*Diaphania nitidalis*	Pickleworm	IPLB-DnEa3	Egg	Embryo	AgMNPV	(Jackson et al. 2008)
281.	*Diaphania nitidalis*	Pickleworm	IPLB-DnEa4	Egg	Embryo	AgMNPV	(Jackson et al. 2008)
282.	*Diaphania nitidalis*	Pickleworm	IPLB-DnEs1	Egg	Embryo	AgMNPV	(Harrison and Lynn 2008)
283.	*Diaphania nitidalis*	Pickleworm	IPLB-DnEs2	Egg	Embryo	AgMNPV	(Jackson et al. 2008)
284.	*Diaphania nitidalis*	Pickleworm	IPLB-DnEt4	Egg	Embryo	AgMNPV	
285.	*Ephestia kuehniella*	Mediterranean flour moth	IPLB-Ekx4-S	Egg	Embryo		
286.	*Ephestia kuehniella*	Mediterranean flour moth	IPLB-Ekx4-t	Egg	Embryo	AcMNPV; AfMNPV; AgMNPV; GmMNPV; HaMNPV; PxMNPV; RoMNPV	(Lynn and Ferkovich 2004)
287.	*Ephestia kuehniella*	Mediterranean flour moth	IPLB-Ekx4-V	Egg	Embryo	AcMNPV; AfMNPV; AgMNPV; GmMNPV; HaMNPV; PxMNPV; RoMNPV	(Lynn and Ferkovich 2004)
288.	*Estigmene acrea*	Salt marsh moth/Saltmarsh caterpillar	BTI-EAA	Larva	Hemocytes	AcMNPV; AMEPV; EPV;CPV	(Granados and Naughton 1976; Hink et al. 1991; Karger et al. 2010)

289.	*Estigmene acrea*	Salt marsh moth/Saltmarsh caterpillar	BTI-EAH	Larva	Hemocytes	AcMNPV; EPV;CPV	(Granados and Naughton 1976)
290.	*Estigmene acrea*	Salt marsh moth/Saltmarsh caterpillar	Ea.4	Larva	Hemocytes	AcMNPV	(Ogonah et al. 1996)
291.	*Heliothis subflexa*	Subflexus straw moth	BCIRL-HsAM1	Pupa	Ovary	SfaMNPV; AcMNPV	(McIntosh and Ignoffo 1989; McIntosh 1991b; Kariuki et al. 2000; McIntosh et al. 2005; Geisler and Jarvis 2018)
292.	*Malacosoma disstria*	Forest tent caterpillar	FPMI-MD-63	Larva	Ovary		(Krywienczyk and Sohi 1976)
293.	*Malacosoma disstria*	Forest tent caterpillar	FPMI-MD-66	Larva	Hemocytes		(Sohi 1971; Lapointe et al. 2011)
294.	*Malacosoma disstria*	Forest tent caterpillar	FPMI-MD-108	Larva	Hemocytes	AcMNPV	(Sohi 1973; Krywienczyk and Sohi 1976; Volkman and Goldsmith 1982; Lapointe et al. 2011)
295.	*Malacosoma disstria*	Forest tent caterpillar	FPMI-MD-109-1	Larva	Ovary		(Krywienczyk and Sohi 1976)
296.	*Malacosoma disstria*	Forest tent caterpillar	UMN-MDH-1	Larva	Hemocytes		(Kurtti et al. 1983)
297.	*Mamestra brassicae*	Cabbage moth	MB 19A				
298.	*Mamestra brassicae*	Cabbage moth	MB 32A				
299.	*Mamestra brassicae*	Cabbage moth	HPB-MB + sublines	Adult	Ovary	AcMNPV; TnSNPV	(Hink 1980; Hilwig and Eipel 1978; Lynn and Harrison 2016)
300.	*Mamestra brassicae*	Cabbage moth	IZD-MB-0503	Larva	Hemocytes	AcMNPV; MbMNPV	(Miltenburger et al. 1976; Hink 1980; Hink et al. 1991; Davis et al. 1993; McIntosh et al. 1996a; Mandrioli and Volpi 2003; Lynn and Harrison 2016)
301.	*Mamestra brassicae*	Cabbage moth	IZD-MB-0504	Larva	Hemocytes	AcMNPV	(Miltenburger et al. 1976; Lynn and Harrison 2016)
302.	*Mamestra brassicae*	Cabbage moth	IZD-MB-1203	Larva	Ovary/Aorta	AcMNPV	(Miltenburger et al. 1976; Lynn and Harrison 2016)
303.	*Mamestra brassicae*	Cabbage moth	IZD-MB-2006	Larva	Hemocytes		(Miltenburger et al. 1976; Lynn and Harrison 2016)
304.	*Mamestra brassicae*	Cabbage moth	IZD-MB-2007	Larva	Hemocytes		(Miltenburger et al. 1976; Lynn and Harrison 2016)
305.	*Mamestra brassicae*	Cabbage moth	IZD-MB-2506	Larva	Hemocytes	AcMNPV; MbMNPV	(Miltenburger et al. 1976; Lynn and Harrison 2016)
306.	*Mamestra brassicae*	Cabbage moth	MB-020	Larva	Hemocytes	MbMNPV	(Lehmann and Weilepp 1989)
307.	*Mamestra brassicae*	Cabbage moth	MB-021	Larva	Hemocytes		(Kurtti et al. 1983; Lehmann and Weilepp 1989)
308.	*Mamestra brassicae*	Cabbage moth	MB-03	Larva	Hemocytes		(Kurtti et al. 1983; Lehmann and Weilepp 1989)
309.	*Mamestra brassicae*	Cabbage moth	MB-04	Larva	Hemocytes		(Kurtti et al. 1983; Lehmann and Weilepp 1989)

310.	*Mamestra brassicae*	Cabbage moth	MB-H 260	Larva	Hemocytes		(Lehmann and Weilepp 1989; Lynn and Harrison 2016)
311.	*Mamestra brassicae*	Cabbage moth	MB-L11	Larva	Hemocytes		(Lehmann and Weilepp 1989)
312.	*Mamestra brassicae*	Cabbage moth	MB-L2	Larva	Hemocytes		(Kurtti et al. 1983; Lehmann and Weilepp 1989)
313.	*Mamestra brassicae*	Cabbage moth	MBHL-3	Larva	Whole organism	MbMNPV	(Kondo et al. 1995; Lynn and Harrison 2016)
314.	*Mamestra brassicae*	Cabbage moth	NIAS-MaBr-85	Larva	Fat Body	CIV; AcMNPV	(Mitsuhashi 1981, 1989b; Kawai and Mitsuhashi 1997)
315.	*Mamestra brassicae*	Cabbage moth	NIAS-MaBr-92	Larva	Hemocytes	CIV; AcMNPV	(Mitsuhashi 1981, 1989b; Kawai and Mitsuhashi 1997)
316.	*Mamestra brassicae*	Cabbage moth	NIAS-MaBr-93	Larva	Hemocytes	CIV; AcMNPV	(Mitsuhashi and Shozawa 1985; Koike and Asaoka 1988; Mitsuhashi 1989b; Hink et al. 1991; Kawai and Mitsuhashi 1997)
317.	*Mamestra brassicae*	Cabbage moth	NIAS-Mb-19	Pupa	Ovary	CIV	(Mitsuhashi 1977, 1989c; Koike and Asaoka 1988; Hink et al. 1991; Kawai and Mitsuhashi 1997)
318.	*Mamestra brassicae*	Cabbage moth	NIAS-Mb-25	Pupa	Ovary	CIV	(Mitsuhashi 1977, 1989c; Koike and Asaoka 1988; Hink et al. 1991; Kawai and Mitsuhashi 1997)
319.	*Mamestra brassicae*	Cabbage moth	NIAS-Mb-32	Pupa	Ovary	CIV	(Mitsuhashi 1977, 1989c; Koike and Asaoka 1988; Hink et al. 1991; Kawai and Mitsuhashi 1997)
320.	*Mamestra brassicae*	Cabbage moth	SES-MaBr-1	Larva	Fat Body	CIV; AcMNPV	(Inoue and Mitsuhashi 1985; Koike and Asaoka 1988; Inoue 1989; Mitsuhashi 1989c; Hink et al. 1991; Kawai and Mitsuhashi 1997)
321.	*Mamestra brassicae*	Cabbage moth	SES-MaBr-2	Larva	Fat Body	CIV; AcMNPV	(Inoue and Mitsuhashi 1985; Koike and Asaoka 1988; Inoue 1989; Mitsuhashi 1989c; Hink et al. 1991; Kawai and Mitsuhashi 1997)
322.	*Mamestra brassicae*	Cabbage moth	SES-MaBr-3	Larva	Fat Body	CIV; AcMNPV	(Inoue and Mitsuhashi 1985; Koike and Asaoka 1988; Inoue 1989; Mitsuhashi 1989c; Hink et al. 1991; Kawai and Mitsuhashi 1997)
323.	*Mamestra brassicae*	Cabbage moth	SES-MaBr-4	Larva	Fat Body	CIV; AcMNPV	(Inoue and Mitsuhashi 1985; Koike and Asaoka 1988; Inoue 1989; Mitsuhashi 1989c; Hink et al. 1991; Kawai and Mitsuhashi 1997)
324.	*Mamestra brassicae*	Cabbage moth	SES-MaBr-5	Larva	Fat Body	CIV; AcMNPV	(Inoue and Mitsuhashi 1985; Koike and Asaoka 1988; Inoue

							1989; Mitsuhashi 1989c; Hink et al. 1991; Kawai and Mitsuhashi 1997)
325.	*Mamestra brassicae*	Cabbage moth	SPC-Mb 92		Ovary		(Deramoudt F. et al. 1984)
326.	*Mamestra brassicae*	Cabbage moth	SPC-Mb-92-C6		Ovary		(Lopez et al. 1998)
327.	*Manduca sexta*	Tobacco hornworm	FPMI-MS-12	Neonate	Whole organism	AcMNPV; CfMNPV	(Hink and Hall 1989; Sohi 1995)
328.	*Manduca sexta*	Tobacco hornworm	FPMI-MS-4	Neonate	Whole organism	AcMNPV	(Hink and Hall 1989; Sohi 1995)
329.	*Manduca sexta*	Tobacco hornworm	FPMI-MS-5	Neonate	Whole organism	AcMNPV; CfMNPV	(Hink and Hall 1989; Sohi 1995)
330.	*Manduca sexta*	Tobacco hornworm	FPMI-MS-7	Neonate	Whole organism	AcMNPV; CfMNPV	(Hink and Hall 1989; Sohi 1995)
331.	*Manduca sexta*	Tobacco hornworm	MRRL-CH1	Egg	Embryo	AcMNPV	(Eide et al. 1975; Hink 1980; Volkman and Goldsmith 1982; Koval 1983; Hink et al. 1991)
332.	*Manduca sexta*	Tobacco hornworm	MRRL-CH2	Egg	Embryo	AcMNPV	(Eide et al. 1975; Hink 1980)
333.	*Manduca sexta*	Tobacco hornworm	QB-Ms1-8	Egg	Embryo	AcMNPV	(Jiang et al. 2010)
334.	*Manduca sexta*	Tobacco hornworm	QB-Ms2-2	Egg	Embryo	AcMNPV	(Jiang et al. 2010)
335.	*Manduca sexta*	Tobacco hornworm	QB-Ms2-7	Egg	Embryo	AcMNPV	(Jiang et al. 2010)
336.	*Operophtera brumata*	Winter moth	IIBBL-ObE1	Egg	Embryo		
337.	*Orgyia leucostigma*	Winter moth	IPLB-OLE-505A	Egg	Embryo		
338.	*Orgyia leucostigma*	Winter moth	IPLB-OLE-7	Egg	Embryo		
339.	*Papilio xuthus*	Asian swallowtail butterfly	NIAS-Px-58	Pupa	Ovary		(Mitsuhashi 1973, 1976, 1982; Morikawa et al. 1988; Kawai and Mitsuhashi 1997)
340.	*Papilio xuthus*	Asian swallowtail butterfly	NIAS-Px-64	Pupa	Ovary		(Mitsuhashi 1973, 1976, 1989c)
341.	*Papilio xuthus*	Asian swallowtail butterfly	RIRI-PX1	Neonate	Whole organism	AcMNPV	(Zhang et al. 2012b)
342.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	BTI-Pr-10B	Egg	Embryo		(Dwyer et al. 1988)
343.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	BTI-Pr-8A1	Egg	Embryo		(Dwyer et al. 1988)
344.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	BTI-Pr-8A2	Egg	Embryo		(Dwyer et al. 1988)
345.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	BTI-Pr-9A	Egg	Embryo		(Dwyer et al. 1988)
346.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	NYAES-PR4A	Egg	Embryo		(Dwyer et al. 1988)
347.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	NIAS-PRC-819A	Pupa	Ovary		(Mitsuhashi et al. 2003)
348.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	NIAS-PRC-819B	Pupa	Ovary		(Mitsuhashi et al. 2003)

349.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	NIAS-PRC-819C	Pupa	Ovary		(Mitsuhashi et al. 2003)
350.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	Pr-E-HNU9	Egg	Embryo		
351.	*Pieris rapae*	European cabbage butterfly/Small white butterfly	Pr57	Pupa	whole organism		
352.	*Plodia interpunctella*	Indianmeal moth	IPLB-PiE	Egg	Embryo		(Lynn and Harrison 2016)
353.	*Plodia interpunctella*	Indianmeal moth	IAL-PID2	Larva	Imaginal Wing Disc		(Lynn and Oberlander 1983; Koval 1983; Styer and Griffiths 1992)
354.	*Plodia interpunctella*	Indianmeal moth	UMN-PIE-1181	Embryo	Embryo		(Tsang et al. 1985; Styer and Griffiths 1992)
355.	*Plutella xylostella*	Diamondback moth	BCIRL-PX2-HNU3	Pupa	Whole organism	AcMNPV;SfaMNPV;PxGV	(Chen Q. et al. 1983; McIntosh and Ignoffo 1989; Hink et al. 1991; McIntosh 1991b; Lulin and Quhou 1995; McIntosh et al. 1996b; Alhag et al. 2007)
356.	*Plutella xylostella*	Diamondback moth	BCIRL/AMCY-PxE-CLG	Egg	Embryo	AcMNPV; PxMNPV	(Goodman et al. 2001a, b)
357.	*Plutella xylostella*	Diamondback moth	BCIRL/AMCY-PxLP-CLG	Larva/pupa	Whole organism		(Goodman et al. 2001a, b)
358.	*Plutella xylostella*	Diamondback moth	IPLB-PxE1	Egg	Embryo	AcMNPV; AnfaNPV; RoMNPV; AgMNPV	(Lynn 2007)
359.	*Plutella xylostella*	Diamondback moth	IPLB-PxE2	Egg	Embryo	AcMNPV; AnfaNPV; RoMNPV; AgMNPV	(Lynn et al. 1988; Lynn 2003, 2007; Chen et al. 2005)
360.	*Plutella xylostella*	Diamondback moth	PX-1187	Egg	Embryo	AcMNPV;EsCPV	(Lee and Hou 1992; Shih and , Hou 1994)
361.	*Plutella xylostella*	Diamondback moth	KMITL-PX-E1	Egg	Embryo		(Petcharawan et al. 2006)
362.	*Plutella xylostella*	Diamondback moth	Px-E-HNU12	Egg	Embryo		(Wang et al. 2011)
363.	*Plutella xylostella*	Diamondback moth	PxE-PO				
364.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfAO2-0714-TR	Larva	Aorta		(Reall et al. 2019)
365.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfAO-0806-TR	Larva	Aorta		(Reall et al. 2019)
366.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfAO2-0813-TR	Larva	Aorta		(Reall et al. 2019)
367.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-SfFB(susp)-0518-YFL	Larva	Fat Body		
368.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-Sf4FB-0614-SGS	Larva	Fat Body		
369.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-SfFB-0518-YFL	Larva	Fat Body		
370.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-TR	Larva	Central Nervous System		(Reall et al. 2019)
371.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C2-TR	Larva	Central Nervous System		(Reall et al. 2019)

372.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C3-TR	Larva	Central Nervous System		(Reall et al. 2019)
373.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C4-TR	Larva	Central Nervous System		(Reall et al. 2019)
374.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C5-TR	Larva	Central Nervous System		(Reall et al. 2019)
375.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C5a-TR	Larva	Central Nervous System		(Reall et al. 2019)
376.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C6-TR	Larva	Central Nervous System		(Reall et al. 2019)
377.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C8-TR	Larva	Central Nervous System		(Reall et al. 2019)
378.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C11-TR	Larva	Central Nervous System		(Reall et al. 2019)
379.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C11a-TR	Larva	Central Nervous System		(Reall et al. 2019)
380.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C11c-TR	Larva	Central Nervous System		(Reall et al. 2019)
381.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C13-TR	Larva	Central Nervous System		(Reall et al. 2019)
382.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C15-TR	Larva	Central Nervous System		(Reall et al. 2019)
383.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0624-C17-TR	Larva	Central Nervous System		(Reall et al. 2019)
384.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS-0806-TR	Larva	Central Nervous System		(Reall et al. 2019)
385.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-TR	Larva	Central Nervous System		(Reall et al. 2019)
386.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C34-TR	Larva	Central Nervous System		(Reall et al. 2019)
387.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C36-TR	Larva	Central Nervous System		(Reall et al. 2019)
388.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C37-TR	Larva	Central Nervous System		(Reall et al. 2019)
389.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C38-TR	Larva	Central Nervous System		(Reall et al. 2019)
390.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C40-TR	Larva	Central Nervous System		(Reall et al. 2019)
391.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C46-TR	Larva	Central Nervous System		(Reall et al. 2019)
392.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C46a-TR	Larva	Central Nervous System		(Reall et al. 2019)
393.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C46c-TR	Larva	Central Nervous System		(Reall et al. 2019)
394.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0714-C47-TR	Larva	Central Nervous System		(Reall et al. 2019)

395.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS1-0813-TR	Larva	Central Nervous System		(Reall et al. 2019)
396.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0714-TR	Larva	Central Nervous System		(Reall et al. 2019)
397.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0714-C12-TR	Larva	Central Nervous System		(Reall et al. 2019)
398.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0714-C31-TR	Larva	Central Nervous System		(Reall et al. 2019)
399.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0714-C43-TR	Larva	Central Nervous System		(Reall et al. 2019)
400.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0714-C44-TR	Larva	Central Nervous System		(Reall et al. 2019)
401.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0714-C44b-TR	Larva	Central Nervous System		(Reall et al. 2019)
402.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0714-C48-TR	Larva	Central Nervous System		(Reall et al. 2019)
403.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0813-TR	Larva	Central Nervous System		(Reall et al. 2019)
404.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS2-0827-TR	Larva	Central Nervous System		(Reall et al. 2019)
405.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS3-0827-TRL	Larva	Central Nervous System		(Reall et al. 2019)
406.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfNS4-0827-TR	Larva	Central Nervous System		(Reall et al. 2019)
407.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-Sf4NS-0614-SGS	Larva	Ventral Nerve Cord		
408.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-Sf5NS-TS-0615-SGS	Larva	Ventral Nerve Cord/Testes		
409.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-SfNS-0518-YFL	Larva	Central Nervous System		
410.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-SfNS-0518A-YFL	Larva	Central Nervous System		
411.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-SfNS-0518B-YFL	Larva	Central Nervous System		
412.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfTS-0331-CLG	Larva	Testes		(Reall et al. 2019)
413.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfTS-0403-CLG	Larva	Testes		(Reall et al. 2019)
414.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-SfTS-0518-YFL	Larva	Testes		
415.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-Sf5TS-0615-SGS	Larva	Testes		
416.	*Spodoptera frugiperda*	Fall armyworm	Bayer/BCIRL-SfTS-0624-TR	Larva	Testes		(Reall et al. 2019)
417.	*Spodoptera frugiperda*	Fall armyworm	BCIRL-SfTS2-0714-TR	Larva	Testes		(Reall et al. 2019)
418.	*Spodoptera frugiperda*	Fall armyworm	BCIRL/AMCY-SfTS-GES	Larva	Testes	AcMNPV; PxMNPV	(Goodman et al. 2001a, b)

419.	*Spodoptera frugiperda*	Fall armyworm	CT/BCIRL-SfMG1-0611-KZ	Larva	Midgut		(Zhou et al. 2020a)
420.	*Spodoptera frugiperda*	Fall armyworm	CT/BCIRL-SfMG1-0611-E7-KZ	Larva	Midgut		
421.	*Spodoptera frugiperda*	Fall armyworm	CT/BCIRL-SfMG1-0611-E8-KZ	Larva	Midgut		
422.	*Spodoptera frugiperda*	Fall armyworm	CT/BCIRL-SfMG-0617-KZ	Larva	Midgut		(Zhou et al. 2020a)
423.	*Spodoptera frugiperda*	Fall armyworm	IAL-SFD1	Larva	Imaginal Wing Disc	AcMNPV; AgMNPV;TnSNPV	(Lynn and Oberlander 1983; Lynn 2007)
424.	*Spodoptera frugiperda*	Fall armyworm	IPLB-Sf21	Pupa	Ovary	AcMNPV; PxMNPV; SfMNPV; SpliNPV; ThorMNPV	(Vaughn et al. 1977; Volkman and Goldsmith 1982; Mitsuhashi 1989c; Hink et al. 1991; Wickham et al. 1992; Davis et al. 1993; Lulin and Quhou 1995; McIntosh et al. 1996b, 2005; Keith et al. 1999; Grasela et al. 2000; Kariuki et al. 2000; Lynn 2003; Grasela and McIntosh 2003; Chen et al. 2005; Ma et al. 2014; Geisler and Jarvis 2018)
425.	*Spodoptera frugiperda*	Fall armyworm	Sf9	Pupa	Ovary	AcMNPV; PxMNPV; SfMNPV; SpliNPV; ThorMNPV	(Hink et al. 1991; Wickham et al. 1992; Davis et al. 1993; Moos et al. 1994; Tremblay et al. 1995; McIntosh et al. 1996b; Grasela et al. 2000; Iwahori et al. 2002; Jarman-Smith et al. 2002, 2004; Landais et al. 2003; Chen et al. 2005; Alhag et al. 2007; Karger et al. 2010; Krammer et al. 2010; Wu et al. 2011c, a; Curtis et al. 2013; Wilde et al. 2014; Ma et al. 2014; Hashimoto et al. 2017; Nandakumar et al. 2017; Shu et al. 2017; Geisler and Jarvis 2018)
426.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-1A1 (CL1)	Pupa	Ovary		
427.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-1A3 (CL2)	Pupa	Ovary		
428.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-4A2 (CL3)	Pupa	Ovary	AcMNPV	
429.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-3D1a (CL4)	Pupa	Ovary		
430.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-3D1b (CL5)	Pupa	Ovary	AcMNPV	
431.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-5D2 (CL7)	Pupa	Ovary		
432.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-2A1 (CL8)	Pupa	Ovary		
433.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-6A1 (CL9)	Pupa	Ovary	AcMNPV	

434.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-4A1 (CL10)	Pupa	Ovary		
435.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-3A1 (CL12)	Pupa	Ovary		
436.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-4A2b (CL13)	Pupa	Ovary		
437.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-CL1 (CL14)	Pupa	Ovary		
438.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-SC1 (CL15)	Pupa	Ovary		
439.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-1C2 (CL16)	Pupa	Ovary		
440.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-3C1 (CL17)	Pupa	Ovary		
441.	*Spodoptera frugiperda*	Fall armyworm	IBL-21AE2-5C2 (CL18)	Pupa	Ovary		
442.	*Spodoptera frugiperda*	Fall armyworm	IPLB-Sf-1254	Pupa	Ovary	AcMNPV; AgMNPV; TnSNPV	(Vaughn et al. 1977; Koval 1983; Hink et al. 1991)
443.	*Spodoptera frugiperda*	Fall armyworm	Sf158	Pupa	Ovary	AcMNPV	(Frech et al. 1990)
444.	*Spodoptera frugiperda*	Fall armyworm	SF65				
445.	*Spodoptera frugiperda*	Fall armyworm	SfTPS4-3A2				
446.	*Spodoptera frugiperda*	Fall armyworm	SfTPS4-2-1				
447.	*Spodoptera frugiperda*	Fall armyworm	SfTPS4-3				
448.	*Spodoptera frugiperda*	Fall armyworm	SfTPS4-7				
449.	*Spodoptera frugiperda*	Fall armyworm	SfTPS4-10				
450.	*Spodoptera frugiperda*	Fall armyworm	Sf9/TPS4				
451.	*Spodoptera exigua*	Beet armyworm	BCIRL/AMCY-SeE-CLG1	Egg	Embryo	AcMNPV; SeMNPV	(Grasela et al. 2000; Goodman et al. 2001a, b)
452.	*Spodoptera exigua*	Beet armyworm	BCIRL/AMCY-SeE-CLG4	Egg	Embryo	AcMNPV; SeMNPV	(Goodman et al. 2001a, b)
453.	*Spodoptera exigua*	Beet armyworm	BCIRL/AMCY-SeE-CLG5	Egg	Embryo	AcMNPV	(Grasela et al. 2000; Goodman et al. 2001a, b)
454.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-12	Pupa	Ovary	SeMNPV; AcMNPV;SINPV	(Li et al. 2012)
455.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-II	Larva	Fat Body	SeMNPV	(Zhang 2006; Zhang et al. 2006a, 2009a, b)
456.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-II-A	Larva	Fat Body	SeMNPV; AcMNPV	(Zhang et al. 2009b)
457.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-III	Larva	Fat Body	SeMNPV	
458.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-IV	Larva	Fat Body	SeMNPV	(Zhang 2006; Zhang et al. 2009a)
459.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-V	Larva	Fat Body	SeMNPV	(Zhang 2006)
460.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-VII	Larva	Fat Body	SeMNPV	(Zhang 2006)
461.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-X	Larva	Fat Body		

462.	*Spodoptera exigua*	Beet armyworm	IOZCAS-Spex-XI	Pupa	Ovary		(Zhang et al. 2012a)
463.	*Spodoptera exigua*	Beet armyworm	KU-SENL-1	Neonate	Whole organism	AcMNPV	(Chaeychomsri et al. 2016, 2018a)
464.	*Spodoptera exigua*	Beet armyworm	KU-SEPO-1	Pupa	Ovary	SeMNPV	(Chaeychomsri et al. 2018a)
465.	*Spodoptera exigua*	Beet armyworm	KU-SEPO-2	Pupa	Ovary	SeMNPV	(Chaeychomsri et al. 2018b)
466.	*Spodoptera exigua*	Beet armyworm	KU-SEPO-3	Pupa	Ovary	SeMNPV	(Chaeychomsri et al. 2018b)
467.	*Spodoptera exigua*	Beet armyworm	KU-SEPO-4	Pupa	Ovary	SeMNPV	(Chaeychomsri et al. 2018b)
468.	*Spodoptera exigua*	Beet armyworm	Le-H-HNU7	Larva	Hemocytes		(Alhag et al. 2007)
469.	*Spodoptera exigua*	Beet armyworm	NTU-SE	Pupa	All internal tissues	SeMNPV; AcMNPV	(Wu et al. 2012)
470.	*Spodoptera exigua*	Beet armyworm	Qau-Se-E-1	Egg	Embryo	SeMNPV	(Su et al. 2016)
471.	*Spodoptera exigua*	Beet armyworm	Qau-Se-E-2	Egg	Embryo	SeMNPV	(Su et al. 2016)
472.	*Spodoptera exigua*	Beet armyworm	Qau-Se-E-3	Egg	Embryo	SeMNPV	(Su et al. 2016)
473.	*Spodoptera exigua*	Beet armyworm	UCR-SE-1B				
474.	*Spodoptera exigua*	Beet armyworm	UCR-SE-C1-1				
475.	*Spodoptera ornithogalli*	Yellow-striped armyworm moth	BCIRL-SO3-HNU1	Adult	Ovary	SoMNP; HaMNPV	(Quhou 1984)
476.	*Spodoptera ornithogalli*	Yellow-striped armyworm moth	BCIRL-SO4-HNU4	Adult	Ovary	SoMNP; HaMNPV	(Quhou 1984)
477.	*Chilo suppressalis*	Asiatic rice borer moth	ZJBIQ-Chsu-l	Larva	Fat Body	SeMNPV	(Liu et al. 2015)
478.	*Spilarctia seriatopunctata*	Moth	NIAS-SpSe-1	Larva	Fat Body		(Mitsuhashi 1984; Kawai and Mitsuhashi 1997)
479.	*Lemyra imparilis*	Mulberry tiger moth	FFPRI-SpIm-2AM	Larva	Fat Body	PiNPV; HcNPV	(Mitsuhashi 1994)
480.	*Lemyra imparilis*	Mulberry tiger moth	FFPRI-SpIm-2AM-IPL	Larva	Fat Body		(Mitsuhashi 1994)
481.	*Lemyra imparilis*	Mulberry tiger moth	FFPRI-SpIm-2AM-SF	Larva	Fat Body		(Mitsuhashi 1994)
482.	*Spodoptera litura*	Asian cotton leafworm	IBL-SLO-1A	Pupa	Ovary	SpliMNPV	(Shih et al. 1997)
483.	*Spodoptera litura*	Asian cotton leafworm	IBL-SLO-7A	Pupa	Ovary		(Shih and Lin 1995)
484.	*Spodoptera litura*	Asian cotton leafworm	NIAS-SL64	Larva	Fat Body		(Tateishi et al. 2015)
485.	*Spodoptera litura*	Asian cotton leafworm	NIV-SU-1095	Larva	Hemocytes	AcMNPV; SliMNPV	(Pant et al. 2000; Sudeep et al. 2005)
486.	*Spodoptera litura*	Asian cotton leafworm	NIV-SU-893	Pupa	Ovary	AcMNPV	(Pant et al. 1997; Shouche et al. 1999; Sudeep et al. 2005)
487.	*Spodoptera litura*	Asian cotton leafworm	NIV-SU-992	Larva	Ovary	AcMNPV	(Pant et al. 1997; Shouche et al. 1999; Sudeep et al. 2005)
488.	*Spodoptera litura*	Asian cotton leafworm	SL-ZSU-1	Egg	Embryo	SpliMNPV; SfSNPV	(Yi et al. 1988; Alhag et al. 2007; Wu et al. 2011b)
489.	*Spodoptera litura*	Asian cotton leafworm	SL221			SpliMNPV	(Yu et al. 2016; Geisler and Jarvis 2018)

490.	*Spodoptera litura*	Asian cotton leafworm	SPC-PL-40	Adult	Ovary	JcDNV	(Li et al. 1996)
491.	*Spodoptera litura*	Asian cotton leafworm	SPC-PL-65	Adult	Hemocytes	JcDNV	(Li et al. 1996)
492.	*Spodoptera litura*	Asian cotton leafworm	TUAT-SpLi-221	Pupa	Ovary	SpliMNPV	(Mitsuhashi 1995; Yanase et al. 1998)
493.	*Antheraea yamamai*	Japanese oak silkmoth	NISES-Anya-0611	Pupa	Ovary	Anya NPV	(Imanishi et al. 2003)
494.	*Bombyx mandarina*	Wild silkworm	NIAS-Boma-529b	Larva	Fat Body		(Iwanaga et al. 2009)
495.	*Bombyx mori*	Silk moth	NIAS-Bm-M1	Egg	Embryo		(Suzuki et al. 2008, 2010)
496.	*Mythimna separata*	Oriental armyworm	NEAU-Ms-941015	Egg	Embryo	MsNPV	(Yu et al. 2000)
497.	*Mythimna separata*	Oriental armyworm	NEAU-Ms-947311	Egg	Embryo	MsNPV	(Yu et al. 2000)
498.	*Mythimna separata*	Oriental armyworm	NEAU-Ms-980312	Egg	Embryo		(Hong et al. 2003)
499.	*Mythimna separata*	Oriental armyworm	NIAS-LeSe-11	Larva	Fatbody	SeMNPV	(Mitsuhashi 1983; Yanase et al. 1998)
500.	*Mythimna separata*	Oriental armyworm	QAU-Ms-E-10	Egg	Embryo	AcMNPV; MsNPV	(Meng et al. 2017)
501.	*Mythimna separata*	Oriental armyworm	QAU-Ms-E-10c	Egg	Embryo	AcMNPV; MsNPV	(Meng et al. 2017)
502.	*Opodiphthera eucalypti*	Emperor gum moth	Ae	Pupa	Ovary		(Grace 1962; Hukuhara 1966; Yunker et al. 1967; Greene et al. 1972; Asaoka 1987; Mitsuhashi 1989c; Tremblay et al. 1995)
503.	*Samia cynthia*	Ailanthus silkmoth	NISES-SaCy-12	Larva	Fat Body		(Inoue and Imanishi 1995)
504.	*Samia cynthia*	Ailanthus silkmoth	WVB-Pcr-02	Pupa	Ovary	PcrNpv	(Qiuwen et al. 1997)
505.	*Lemyra imparilis*	tiger moth	FRI-SpIm-1229	Larva	Fat Body	SiNpv	(Mitsuhashi and Inoue 1988)
506.	*Tribolium castaneum*	Herbst	NIAS-Tc81	Egg	Embryo		(Kayukawa et al. 2013)
507.	*Cydia kurokoi*	Nut fruit tortrix moth	NARO-Cyku	Larva	Fat Body		(Watanabe et al. 2020)
508.	*Cephonodes hylas*	Coffee bee hawkmoth	NARO-Cehy	Larva	Fat Body		(Watanabe et al. 2020)
509.	*Lymantria dispar*	Gypsy moth	NARO-Lydi	Larva	Fat Body		(Watanabe et al. 2020)
510.	*Haritalodes derogata*	Cotton leaf roller moth	NARO-Haba	Larva	Fat Body		(Watanabe et al. 2020)
511.	*Hyphantria cunea*	Fall webworm moth	NARO-Hycu	Larva	Fat Body		(Watanabe et al. 2020)
512.	*Theretra oldenlandiae*	Impatiens hawkmoth	NARO-Thol	Larva	Fat Body		(Watanabe et al. 2020)
513.	*Spodoptera littoralis*	African cotton leafworm	CLS-79	Pupa	Whole organism	SeMNPV	(Mialhe et al. 1984; Yanase et al. 1998)
514.	*Spodoptera littoralis*	African cotton leafworm	CLS-79-C7	Pupa	Whole organism	SlNPV	
515.	*Spodoptera littoralis*	African cotton leafworm	HPB-SL	Larva	Whole organism	AcMNPV; TnSNPV	(Hilwig and Eipel 1978; Hink 1980)
516.	*Spodoptera littoralis*	African cotton leafworm	HPB-SL 24E	Larva	Whole organism		(Hilwig and Eipel 1978)

517.	*Spodoptera littoralis*	African cotton leafworm	HPB-SL 24S	Larva	Whole organism		(Hilwig and Eipel 1978)
518.	*Spodoptera littoralis*	African cotton leafworm	HPB-SL 25S	Larva	Whole organism		(Hilwig and Eipel 1978; Hilwig and Alapatt 2009)
519.	*Spodoptera littoralis*	African cotton leafworm	HPB-SL 26M	Larva	Whole organism		(Hilwig and Eipel 2009a)
520.	*Spodoptera littoralis*	African cotton leafworm	SPC-Sl-48	Larva	Whole organism		(Mialhe et al. 1984)
521.	*Spodoptera littoralis*	African cotton leafworm	SPC-Sl-52	Larva	Whole organism	EsCPV; AcMNPV; SlMNPV; GmDNV; JcDNV	(Mialhe et al. 1984; Li et al. 1996)
522.	*Spodoptera littoralis*	African cotton leafworm	UIV-SL-373	Pupa	Ovary	AcMNPV; SeMNPV; SlMNPV or SpliMNPV; TnSNPV	(Knudson et al. 1980; Lynn 2007)
523.	*Spodoptera littoralis*	African cotton leafworm	UIV-SL-573	Pupa	Ovary	AcMNPV; SeMNPV; SlMNPV or SpliMNPV; TnSNPV	(Knudson et al. 1980; Lynn 2007)
524.	*Spodoptera littoralis*	African cotton leafworm	UIV-SL-673	Pupa	Ovary	AcMNPV; SeMNPV; SlMNPV or SpliMNPV; TnSNPV	(Knudson et al. 1980; Lynn 2007)
525.	*Trichoplusia ni*	Cabbage looper	BCIRL/AMCY-TnE-CLG1	Egg	Embryo	AcMNPV	(Goodman et al. 2001a, b)
526.	*Trichoplusia ni*	Cabbage looper	BCIRL/AMCY-TnE-CLG1MK	Egg	Embryo	AcMNPV	(Goodman et al. 2001a, b)
527.	*Trichoplusia ni*	Cabbage looper	BCIRL/AMCY-TnE-CLG2	Egg	Embryo	AcMNPV; PxMNPV or PxlyMNPV	(Goodman et al. 2001a, b)
528.	*Trichoplusia ni*	Cabbage looper	BCIRL/AMCY-TnE-CLG2MK	Egg	Embryo	AcMNPV	(Goodman et al. 2001a, b)
529.	*Trichoplusia ni*	Cabbage looper	BCIRL/AMCY-TnE-CLG3	Egg	Embryo	AcMNPV	(Goodman et al. 2001a, b)
530.	*Trichoplusia ni*	Cabbage looper	BCIRL/AMCY-TnTS-GES1	Larva	Testes	AcMNPV; PxMNPV or PxlyMNPV	(Goodman et al. 2001a, b)
531.	*Trichoplusia ni*	Cabbage looper	BCIRL/AMCY-TnTS-GES3	Larva	Testes		(Goodman et al. 2001a, b)
532.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-4A2	Egg	Embryo	AcMNPV; TnSNPV	
533.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-4A14	Egg	Embryo	AcMNPV; TnSNPV	(McKenna et al. 1998)
534.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-4A22	Egg	Embryo	AcMNPV; TnSNPV	
535.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-4B	Egg	Embryo	AcMNPV; TnSNPV	(McKenna et al. 1998)
536.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-4B1	Egg	Embryo	TnGV	(Granados et al. 1986)
537.	*Trichoplusia ni*	Cabbage looper	BTI-Tn4-B31	Egg	Embryo	AcMNPV; TnSNPV	(McKenna et al. 1998)
538.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-4B42	Egg	Embryo	AcMNPV; TnSNPV	
539.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-4B44	Egg	Embryo	AcMNPV; TnSNPV	
540.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5B1	Egg	Embryo	TnGV; TnSNPV	(Granados et al. 1986)

541.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5B1-28	Egg	Embryo	TnSNPV	
542.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5B1-4	Egg	Embryo	AcMNPV; PxMNPV or PlxyMNPV; ThorNPV; TnSNPV	(Davis et al. 1993; Granados et al. 1994; Yanase et al. 1998; Saarinen et al. 1999; Li et al. 2007; Karger et al. 2010; Wu et al. 2011c; Wilde et al. 2014; Fu et al. 2018; Geisler and Jarvis 2018; Chen et al. 2019)
543.	*Trichoplusia ni*	Cabbage looper	H5CL-B	Egg	Embryo	AcMNPV	
544.	*Trichoplusia ni*	Cabbage looper	H5CL-F	Egg	Embryo	AcMNPV	
545.	*Trichoplusia ni*	Cabbage looper	Hi-5 Rix4446	Egg	Embryo		(Monie and Hung 2008; Krammer et al. 2010)
546.	*Trichoplusia ni*	Cabbage looper	High5-ht33	Egg	Embryo	AcMNPV	(Wu et al. 2011c)
547.	*Trichoplusia ni*	Cabbage looper	High5-ht35	Egg	Embryo	AcMNPV	(Wu et al. 2011c)
548.	*Trichoplusia ni*	Cabbage looper	Tn-4h	Egg	Embryo	AcMNPV; TnSNPV	(Joshi et al. 2000, 2001; Hillar and Jarvis 2010)
549.	*Trichoplusia ni*	Cabbage looper	Tn-4s	Egg	Embryo	AcMNPV; TnSNPV	(Joosten and Shuler 2003a, b)
550.	*Trichoplusia ni*	Cabbage looper	Tnms42	Egg	Embryo	AcMNPV	(Chen et al. 2014; Geisler and Jarvis 2018)
551.	*Trichoplusia ni*	Cabbage looper	Tni-FNL	Egg	Embryo	AcMNPV	(Mehalko and Esposito 2016)
552.	*Trichoplusia ni*	Cabbage looper	BTI-Tnao38 (I have added this information to the Notes section).	Egg	Embryo	AcMNPV	(Hashimoto et al. 2010, 2012; Wilde et al. 2014; Geisler and Jarvis 2018)
553.	*Trichoplusia ni*	Cabbage looper	Tni PRO	Adult	Ovary		(Geisler and Jarvis 2018)
554.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5C1	Egg	Embryo	TnGV	(Granados et al. 1986)
555.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5F2	Egg	Embryo	TnGV; TnSNPV	(Granados et al. 1986)
556.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5F2A	Egg	Embryo	TnGV; TnSNPV	(Granados et al. 1986)
557.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5F2P	Egg	Embryo	TnGV; TnSNPV	(Granados et al. 1986)
558.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5G2A1	Egg	Embryo	TnGV; TnSNPV	(Granados et al. 1986)
559.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5G2A1P	Egg	Embryo	TnGV; TnSNPV	(Granados et al. 1986)
560.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5G3	Egg	Embryo	TnSNPV	(Granados et al. 1986)
561.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-5G33	Egg	Embryo	TnGV	(Wickham et al. 1992; Davis et al. 1993)
562.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-AP2	Egg	Embryo	AcMNPV	(Wickham et al. 1992; Davis et al. 1993)
563.	*Trichoplusia ni*	Cabbage looper	HNU-Tn-FB1	Larva	Fat Body	AcMNPV	(Hong and Peng 2001)
564.	*Trichoplusia ni*	Cabbage looper	IAL-TND1	Larva	Imaginal Wing Disc	AcMNPV; AfMNPV or AnfaMNPV; AgMNPV;	(Lynn et al. 1982; Lynn 2003, 2007; Chen et al. 2005)

						PxMNPV or PlxyMNPV	
565.	*Trichoplusia ni*	Cabbage looper	IPLB-TN-R2	Egg	Embryo	AcMNPV; AfMNPV or AnfaMNPV; AgMNPV; PxMNPV or PlxyMNPV	(Rochford et al. 1984; Hink et al. 1991; Lynn 1992, 2003, 2007; Chen et al. 2005, p.)
566.	*Trichoplusia ni*	Cabbage looper	QAU-BTI-Tn9-4s	Egg	Embryo	AcMNPV	(Meng et al. 2008; Shan et al. 2011; Zheng et al. 2014; Geisler and Jarvis 2018)
567.	*Trichoplusia ni*	Cabbage looper	QB-CL-A	Egg	Embryo	AcMNPV	(Shan et al. 2011)
568.	*Trichoplusia ni*	Cabbage looper	QB-CL-B	Egg	Embryo	AcMNPV	(Shan et al. 2011; Geisler and Jarvis 2018)
569.	*Trichoplusia ni*	Cabbage looper	QB-CL-F	Egg	Embryo		(Li et al. 2014)
570.	*Trichoplusia ni*	Cabbage looper	BTI-Tn-MG1	Larva	Midgut	AcMNPV	(Davis et al. 1993; Wu et al. 2011c)
571.	*Trichoplusia ni*	Cabbage looper	TN-368	Adult	Ovary	AcMNPV; AgMNPV; PxMNPV or PlxyMNPV; TnSNPV; GmMNPV	(Hink 1970; McIntosh and Rechtoris 1974; Volkman and Summers 1975; Hink and Strauss 1976; Volkman and Goldsmith 1982; Koval 1983; Harvey and Sohi 1985; Harvey and Sohi 1989; Hink et al. 1991; Styer and Griffiths 1992; Davis et al. 1993; Lin et al. 1999; Lynn 2003, 2007; Chen et al. 2005; Geisler and Jarvis 2018; Bonning 2019)
572.	*Trichoplusia ni*	Cabbage looper	TN-368-3	Adult	Ovary	AcMNPV	(Volkman and Summers 1975, 1976)
573.	*Trichoplusia ni*	Cabbage looper	TN-368-8	Adult	Ovary	AcMNPV	(Volkman and Summers 1975, 1976)
574.	*Trichoplusia ni*	Cabbage looper	TN-368-10	Adult	Ovary	AcMNPV	(Volkman and Summers 1975, 1976; Summers et al. 1978)
575.	*Trichoplusia ni*	Cabbage looper	TN-368-13	Adult	Ovary	AcMNPV	(Volkman and Summers 1975, 1976; Summers et al. 1978)
576.	*Trichoplusia ni*	Cabbage looper	TN-368A	Adult	Ovary	AcMNPV	(Bilimoria and Carpenter 1983)
577.	*Trichoplusia ni*	Cabbage looper	Tn-NVN	Adult	Ovary		(Geisler and Jarvis 2018)
578.	*Trichoplusia ni*	Cabbage looper	TN-CL1	Adult	Ovary	AcMNPV	(McIntosh and Rechtoris 1974; McIntosh and Ignoffo 1989; McIntosh 1991b; McIntosh et al. 1992, 1996b; Grasela et al. 2000; Alhag et al. 2007)
579.	*Helicoverpa armigera*	cotton bollworm	BCIRL-HaAM1	Pupa	Ovary	HzSNPV; HearMNPV, AcMNPV	(McIntosh et al. 1983, 1996c)
580.	*Helicoverpa armigera*	cotton bollworm	CSIRO-BCIRL-HA1	Pupa	Ovary		(McIntosh et al. 1999)

581.	*Helicoverpa armigera*	cotton bollworm	CSIRO-BCIRL-HA2	Pupa	Ovary	HzSNPV; AcMNPV	(McIntosh et al. 1999)
582.	*Helicoverpa armigera*	cotton bollworm	CSIRO-BCIRL-HA3	Pupa	Ovary	HzSNPV	(McIntosh et al. 1999)
583.	*Helicoverpa armigera*	cotton bollworm	HaEpi	Larva	Whole organism	AcMNPV	(Shao et al. 2008)
584.	*Helicoverpa armigera*	cotton bollworm	KMITL-HA-E1	Egg	Embryo		(Petcharawan et al. 2005)
585.	*Helicoverpa armigera*	cotton bollworm	KU-HaAO1	Adult	Ovary	HearMNPV	(Gordon Ogembo et al. 2008)
586.	*Helicoverpa armigera*	cotton bollworm	KU-HaEmb1	Egg	Embryo		(Gordon Ogembo et al. 2008)
587.	*Helicoverpa armigera*	cotton bollworm	KU-HaEmb1	Egg	Embryo		
588.	*Helicoverpa armigera*	cotton bollworm	KU-HaPO1	Pupa	Ovary	AcMNPV	(Gordon Ogembo et al. 2008)
589.	*Helicoverpa armigera*	cotton bollworm	KU-HaPO2	Pupa	Ovary	AcMNPV	(Gordon Ogembo et al. 2008)
590.	*Helicoverpa armigera*	cotton bollworm	NIV-HA-1195	Larva	Ovary	AcMNPV; SfltNPV; HearMNPV	(Sudeep et al. 2002c, 2005)
591.	*Helicoverpa zea*	cotton bollworm	BCIRL-HZ-AM1	Pupa	Ovary	HzSNPV	(McIntosh and Ignoffo 1981; Mcintosh and Ignoffo 1983; McIntosh and Ignoffo 1989; Hink et al. 1991; Lenz et al. 1991; McIntosh 1991a; McIntosh et al. 1996c, 2005; Grasela et al. 2000; Grasela and McIntosh 2003)
592.	*Helicoverpa zea*	cotton bollworm	HzA7	Pupa	Ovary	HzSNPV	(McIntosh and Ignoffo 1981; Mcintosh and Ignoffo 1983; Lenz et al. 1991)
593.	*Helicoverpa zea*	cotton bollworm	BCIRL-HzAM1-CLA11 (or Clone A11)	Pupa	Ovary	HzSNPV	(McIntosh and Ignoffo 1981; Lenz et al. 1991; McIntosh et al. 2001)
594.	*Helicoverpa zea*	cotton bollworm	BCIRL-HZ-AM2	Pupa	Ovary	HzSNPV	(McIntosh and Ignoffo 1981)
595.	*Helicoverpa zea*	cotton bollworm	BCIRL-HZ-AM3	Pupa	Ovary	HzSNPV	(McIntosh and Ignoffo 1981; Mcintosh and Ignoffo 1983)
596.	*Helicoverpa zea*	cotton bollworm	BCIRL/AMCY-HzE-CLG1	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
597.	*Helicoverpa zea*	cotton bollworm	BCIRL/AMCY-HzE-CLG2	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
598.	*Helicoverpa zea*	cotton bollworm	BCIRL/AMCY-HzE-CLG3	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
599.	*Helicoverpa zea*	cotton bollworm	BCIRL/AMCY-HzE-CLG5	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
600.	*Helicoverpa zea*	cotton bollworm	BCIRL/AMCY-HzE-CLG6	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
601.	*Helicoverpa zea*	cotton bollworm	BCIRL/AMCY-HzE-CLG7	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
602.	*Helicoverpa zea*	cotton bollworm	BCIRL/AMCY-HzE-CLG8	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
603.	*Helicoverpa zea*	cotton bollworm	BCIRL/AMCY-HzE-CLG9	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
604.	*Helicoverpa zea*	cotton bollworm	IMC-Hz-1	Egg	Embryo		(Hink and Ignoffo 1970; Mitsuhashi 1989b)

605.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1074	Pupa	Ovary	HzSNPV	(Goodwin et al. 1982)
606.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075	Pupa	Ovary/Fat Body	HzSNPV	(Goodwin et al. 1982; Koval 1983; Kurtti et al. 1983; Corsaro and Fraser 1987; Corsaro et al. 1989)
607.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-B	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
608.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-C	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
609.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-F	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
610.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-G	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
611.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-H	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
612.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-I	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
613.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-K	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
614.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-L	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
615.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-O	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
616.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-R	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
617.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-U	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
618.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1075/UND-V	Pupa	Ovary/Fat Body	HzSNPV	(Corsaro and Fraser 1987; Corsaro et al. 1989)
619.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-1079	Pupa	Fat Body	HzSNPV	(Goodwin et al. 1982)
620.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-110	Pupa	Ovary	HzSNPV	(Goodwin et al. 1982)
621.	*Helicoverpa zea*	cotton bollworm	IPLB-HZ-124Q	Pupa	Ovary	HzSNPV	(Goodwin et al. 1982)
622.	*Helicoverpa zea*	cotton bollworm	RP-HzOV-AW2	Adult	Ovary		(Goodman et al. 2004)
623.	*Helicoverpa zea*	cotton bollworm	RP-HzGUT-AW1	Larva	Midgut		(Goodman et al. 2004)
624.	*Helicoverpa zea*	cotton bollworm	RP-HzVNC-AW1	Larva	Ventral nerve cord		(Goodman et al. 2004)
625.	*Helicoverpa zea*	cotton bollworm	RP-HzVNC-AW1-Clone 14C4	Larva	Ventral nerve cord		(Goodman et al. 2004)
626.	*Helicoverpa zea*	cotton bollworm	BCIRL-Hz1b3	Pupa	Ovary	HzSNPV	(Rice et al. 1989)
627.	*Helicoverpa zea*	cotton bollworm	BCIRL-HzFB33	Larva	Fat Body	PxMNPV	(Kariuki et al. 2000)
628.	*Helicoverpa zea*	cotton bollworm	BCIRL-HzMG8	Larva	Midgut		(Pringle et al. 2003)

629.	*Heliothis virescens*	Tobacco budworm	BCIRL-HV-AM1	Pupa	ovary	AcMNPV; HzSNPV	(McIntosh et al. 1981; Mcintosh and Ignoffo 1983; McIntosh and Ignoffo 1989)
630.	*Heliothis virescens*	Tobacco budworm	BCIRL-HV-AM2	Pupa	Ovary		(Mcintosh and Ignoffo 1983)
631.	*Heliothis virescens*	Tobacco budworm	BCIRL-HV-AM-CL1	Pupa	Ovary		(Grasela et al. 2000)
632.	*Heliothis virescens*	Tobacco budworm	BCIRL-HV-AM-CL2	Pupa	Ovary		(Grasela et al. 2000)
633.	*Heliothis virescens*	Tobacco budworm	BCIRL-HV-AM-CL3	Pupa	Ovary		(Grasela et al. 2000)
634.	*Heliothis virescens*	Tobacco budworm	BCIRL-HV-AM-CL5	Pupa	Ovary		(Grasela et al. 2000)
635.	*Heliothis virescens*	Tobacco budworm	BCIRL-HV-AM-CL7	Pupa	Ovary		(Grasela et al. 2000)
636.	*Heliothis virescens*	Tobacco budworm	BCIRL/AMCY-HvOV-CLG	Adult	Ovary	AcMNPV; AgMNPV; PxMNPV	(Goodman et al. 2001a, b)
637.	*Heliothis virescens*	Tobacco budworm	BCIRL/AMCY-HvTS-GES	Larva	testes	AcMNPV	(Goodman et al. 2001a, b)
638.	*Heliothis virescens*	Tobacco budworm	BCIRL/AMCY-HvE-CLG1	Egg	Embryo	AgMNPV; PxMNPV	(Goodman et al. 2001a, b)
639.	*Heliothis virescens*	Tobacco budworm	BCIRL/AMCY-HvE-CLG2	Egg	Embryo	AcMNPV; AcfMNPV	(Goodman et al. 2001a, b)
640.	*Heliothis virescens*	Tobacco budworm	BCIRL/AMCY-HvE-CLG3	Egg	Embryo	HzSNPV	(Goodman et al. 2001a, b)
641.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-CLG1	Egg	Embryo		(Goodman et al. 2001a, b)
642.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-CLG4	Egg	Embryo		(Goodman et al. 2001a, b)
643.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-CLG5	Egg	Embryo		(Goodman et al. 2001a, b)
644.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-CLG6	Egg	Embryo		(Goodman et al. 2001a, b)
645.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-HN2	Egg	Embryo		(Goodman et al. 2001a, b)
646.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-HN3	Egg	Embryo		(Goodman et al. 2001a, b)
647.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-HN11	Egg	Embryo		(Goodman et al. 2001a, b)
648.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-HN12	Egg	Embryo		(Goodman et al. 2001a, b)
649.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-HN14	Egg	Embryo		(Goodman et al. 2001a, b)
650.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvE-HN16	Egg	Embryo		(Goodman et al. 2001a, b)
651.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvVNC-WG1	Larva	Ventral nerve chord		(Goodman et al. 2001a, b)
652.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvVNC-WG2	Larva	Ventral nerve chord		(Goodman et al. 2001a, b)
653.	*Heliothis virescens*	Tobacco budworm	BCIRL/RP-HvVNC-WG3	Larva	Ventral nerve chord		(Goodman et al. 2001a, b)
654.	*Heliothis virescens*	Tobacco budworm	IPLB-HvE1a	Egg	Embryo	HzSNPV; AcMNPV; AfMNPV 1; RoMNPV; AgMNPV	(Lynn and Shapiro 1998; Lynn 2003; Chen et al. 2005)

655.	*Heliothis virescens*	Tobacco budworm	IPLB-HvE1a-lt	Egg	Embryo	HzSNPV; AcMNPV; AfMNPV 1; RoMNPV; AgMNPV; OlMNPV	(Lynn and Shapiro 1998; Lynn 2003; Chen et al. 2005)
656.	*Heliothis virescens*	Tobacco budworm	IPLB-HvE1s	Egg	Embryo	HzSNPV; AcMNPV; AfMNPV 1; RoMNPV; AgMNPV; OlMNPV	(Lynn and Shapiro 1998; Lynn 2003; Chen et al. 2005)
657.	*Heliothis virescens*	Tobacco budworm	IPLB-HvE6a	Egg	Embryo	HzSNPV; AcMNPV; AfMNPV 1; RoMNPV; AgMNPV; OlMNPV	(Lynn and Shapiro 1998; Lynn 2003; Chen et al. 2005)
658.	*Heliothis virescens*	Tobacco budworm	IPLB-HvE6a-lt	Egg	Embryo	HzSNPV; AcMNPV; AfMNPV 1; RoMNPV; AgMNPV; OlMNPV	(Lynn and Shapiro 1998; Lynn 2003; Chen et al. 2005)
659.	*Heliothis virescens*	Tobacco budworm	IPLB-HvE6s	Egg	Embryo	HzSNPV; AcMNPV; AfMNPV 1; RoMNPV; AgMNPV; OlMNPV	(Lynn and Shapiro 1998; Lynn 2003; Chen et al. 2005)
660.	*Heliothis virescens*	Tobacco budworm	IPLB-HvT1	Larva	Testes	HzSNPV; AcMNPV; AfMNPV 1; RoMNPV; AgMNPV	(Lynn and Shapiro 1998; Lynn 2003; Chen et al. 2005)
661.	*Lymantria dispar*	Gypsy moth	IPLB-LD-65	Pupa	Ovary	AcMNPV	(Goodwin et al. 1978)
662.	*Lymantria dispar*	Gypsy moth	IPLB-Ld-652	Pupa	Ovary	AcMNPV	(Goodwin et al. 1978; Volkman and Goldsmith 1982; Carrillo-Tripp et al. 2014)
663.	*Lymantria dispar*	Gypsy moth	IPLB-Ld-652Y	Pupa	Ovary	AcMNPV	(Goodwin et al. 1978; Gundersen-Rindal et al. 2000; Wu et al. 2011a; Carrillo-Tripp et al. 2014)
664.	*Lymantria dispar*	Gypsy moth	IPLB-LD-65Y	Pupa	Ovary	AcMNPV	(Goodwin et al. 1978; Wurtz et al. 2021)
665.	*Lymantria dispar*	Gypsy moth	IPLB-Ld-65Z	Pupa	Ovary	AcMNPV	(Goodwin et al. 1978)
666.	*Lymantria dispar*	Gypsy moth	IPLB-Ld-66	Pupa	Ovary	AcMNPV	(Goodwin et al. 1978)
667.	*Lymantria dispar*	Gypsy moth	IPLB-Ld-67	Pupa	Ovary	AcMNPV	(Goodwin et al. 1978; Hink 1980)
668.	*Lymantria dispar*	Gypsy moth	IPLB-LdEG	Egg	Embryo		(Lynn et al. 1988)
669.	*Lymantria dispar*	Gypsy moth	IPLB-LdEI	Egg	Embryo		(Lynn et al. 1988)
670.	*Lymantria dispar*	Gypsy moth	IPLB-LdEIt	Egg	Embryo		(Lynn et al. 1988)
671.	*Lymantria dispar*	Gypsy moth	IPLB-LdElta	Egg	Embryo	AcMNPV; LdMNPV	(Lynn et al. 1988; Hink et al. 1991; Lynn 1999, 2003; Gundersen-Rindal et al. 2000; Chen et al. 2005)

672.	*Lymantria dispar*	Gypsy moth	IPLB-LdEp	Egg	Embryo	AcMNPV; AfMNPV; AgMNPV	(Lynn et al. 1988; Gundersen-Rindal et al. 2000, p.; Lynn 2003; Chen et al. 2005; Carrillo-Tripp et al. 2014)
673.	*Lymantria dispar*	Gypsy moth	IPLB-LdFB	Larva	Fat Body	AcMNPV	(Lynn et al. 1988; Malagoli 2008)
674.	*Lymantria dispar*	Gypsy moth	IZD-Ld-1307	Larva	Testes		(Hink 1980; Lynn 2007)
675.	*Lymantria dispar*	Gypsy moth	IZD-Ld-1407	Larva	Testes	AcMNPV	(Hink 1980; Lynn 2007)
676.	*Lymantria dispar*	Gypsy moth	SPC-Ld-135	Pupa	Ovary	GmMNPV; JcDNV	(Quiot 1976; Li et al. 1996)
677.	*Lymantria dispar*	Gypsy moth	IPLB-LdE-G				
678.	*Lymantria dispar*	Gypsy moth	IPLB-LD-FB	Larva	Fat Body		
679.	*Lymantria dispar*	Gypsy moth	IPLB-LdFBc4	Larva	Fat Body		
680.	*Lymantria dispar*	Gypsy moth	Ld6524/Gi [di]				
681.	*Lymantria dispar*	Gypsy moth	FPMI-LD-301	Egg	Embryo		
682.	*Lymantria dispar*	Gypsy moth	LdEITA/Gi				
683.	*Lymantria dispar*	Gypsy moth	652-15				
684.	*Lymantria dispar*	Gypsy moth	IPLB-LdFBcl	Larva	Fat Body		
685.	*Lymantria dispar*	Gypsy moth	IPLB-Ld6524/Gp*			GpPV	
686.	*Lymantria dispar*	Gypsy moth	FPMI-LD-400	Neonate	Whole organism		
687.	*Lymantria dispar*	Gypsy moth	FPMI-LD-404	Neonate	Whole organism		
688.	*Lymantria dispar*	Gypsy moth	FPMI-LD-8	Larva	Ovary		
689.	*Lymantria dispar*	Gypsy moth	64BA				
690.	*Lymantria dispar*	Gypsy moth	64BC				
691.	*Lymantria dispar*	Gypsy moth	65RQ				
692.	*Lymantria dispar*	Gypsy moth	65x/-22				
693.	*Spodoptera exigua*	Beet armyworm	Se301	Neonate	Whole organism	SeMNPV	(Hara et al. 1995; Yanase et al. 1998; Beas-Catena et al. 2011)
694.	*Spodoptera exigua*	Beet armyworm	Se3FH	Neonate	Whole organism	SeMNPV	(Hara et al. 1993, 1994, 1995)
695.	*Spodoptera exigua*	Beet armyworm	Se4FH	Neonate	Whole organism	SeMNPV	(Hara et al. 1993)
696.	*Spodoptera exigua*	Beet armyworm	Se5FH	Neonate	Whole organism	SeMNPV	(Hara et al. 1993)
697.	*Spodoptera exigua*	Beet armyworm	Se6FHA	Neonate	Whole organism	SeMNPV	(Hara et al. 1993)
698.	*Spodoptera exigua*	Beet armyworm	Se6FHB	Neonate	Whole organism	SeMNPV	(Hara et al. 1993)

699.	*Spodoptera exigua*	Beet armyworm	SeHe920-1a	Larva	Hemocytes		(Chisa et al. 2004)
700.	*Spodoptera exigua*	Beet armyworm	UCR-SE-1	Neonate	Whole organism	SeMNPV; AcMNPV	(Gelernter and Federici 1986; Hink et al. 1991)
701.	*Spodoptera exigua*	Beet armyworm	UCR-SE-1a	Neonate	Whole organism	AcMNPV	(Hink et al. 1991; Monette et al. 1994)
702.	*Spodoptera exigua*	Beet armyworm	UCR-SE-1C	Neonate	Whole organism		(McIntosh et al. 1996c; Alhag et al. 2007)
703.	*Trichoplusia ni*	Cabbage looper	MG1-ht33	Larva	Midgut	AcMNPV	(Wu et al. 2011c)
704.	*Trichoplusia ni*	Cabbage looper	MG1-ht35	Larva	Midgut	AcMNPV	(Wu et al. 2011c)
705.	*Spodoptera eridania*	Southern armyworm	BCIRL-SerTS-0128-YFL	Larva	Testes		(Zhang et al. 2018)
706.	*Spodoptera eridania*	Southern armyworm	BCIRL-SerTS-0129-YFL	Larva	Testes		(Zhang et al. 2018)
707.	*Spodoptera eridania*	Southern armyworm	BCIRL-SerFB-0129-YFL	Larva	Fat Body		(Zhang et al. 2018)
708.	*Spodoptera eridania*	Southern armyworm	BCIRL-SerFB-0129A-YFL	Larva	Fat Body		(Zhang et al. 2018)
709.	*Spodoptera eridania*	Southern armyworm	BCIRL-SerFB-0128-YFL	Larva	Fat Body		(Zhang et al. 2018)
710.	*Spodoptera eridania*	Southern armyworm	BCIRL-SerNS-0129-YFL	Larva	Nervous system		(Zhang et al. 2018)
711.	*Spodoptera eridania*	Southern armyworm	BCIRL-SerNS-0128-YFL	Larva	Nervous system		(Zhang et al. 2018)
712.	*Helicoverpa armigera*	cotton bollworm	HNU-Ha-MG1	Larva	Midgut	AcMNPV; HearMNPV	(Li et al. 2015)
713.	*Helicoverpa armigera*	cotton bollworm	IOZCAS-Ha-1	Larva	Fat Body	HaMNPV	(Zhang et al. 2006b)
714.	*Helicoverpa armigera*	cotton bollworm	NIV-HA-197	Egg	Embryo	AcMNPV; SfltMNPV; HaSNPV	(Sudeep et al. 2002b, 2005)
715.	*Helicoverpa armigera*	cotton bollworm	QB-Ha-E-1	Egg	Embryo	AcMNPV; HearMNPV	(Zheng et al. 2010)
716.	*Helicoverpa armigera*	cotton bollworm	QB-Ha-E-5	Egg	Embryo	AcMNPV; HearMNPV	(Zheng et al. 2010)
717.	*Helicoverpa armigera*	cotton bollworm	SFE-HA-831	Adult	Embryo		(Su et al. 1987)
718.	*Helicoverpa armigera*	cotton bollworm	SIE-Ha-798	Pupal	Ovary		(Yang and Xie 1983; Guokai 1991)
719.	*Helicoverpa armigera*	cotton bollworm	SIE-Ha-806	Pupal	Ovary		(Yang and Xie 1983)

Table 2: Insect viruses grown in cell lines.

S.No.	Virus Name	Abbreviation
1.	*Agrotis ipsilon* multiple nucleopolyhedrovirus	AgipMNPV
2.	*Amsacta moorei entomopoxvirus*	AMEPV
3.	*Anagrapha falcifera* multiple nucleopolyhedrovirus	AnfaNPV
4.	*Antheraea yamamai* nucleopolyhedrosis virus	Anya NPV
5.	*Anticarsia gemmatalis* multiple nucleopolyhedrovirus	AgMNPV
6.	*Autographa californica* multiple nuclearpolyhedrosis virus	AcMNPV
7.	*Bactrocera dorsalis cripavirus*	BdCV
8.	*Bombyx mori* cytoplasmic polyhedrosisvirus	BmCPV
9.	*Bombyx mori* macula-like virus	BmMLV
10.	*Bombyx mori* nucleopolyhedrovirus	BmNPV
11.	Recombinant *Bombyx mori* nucleopolyhedrovirus (engineered to express the firefly recombinant luciferase)	BmPTLNPV
12.	Chilo iridescent virus	CIV
13.	*Choristoneura fumiferalza* multiple nucleopolyhedrovirus	CfMNPV
14.	*Choristoneura fumiferana* cypovirus	CfCPV
15.	*Choristoneura fumiferana* defective nucleopolyhedrovirus	CfDEFNPV
16.	*Choristoneura fumiferana* entomopoxvirus	CfEPV
17.	*Choristoneura fumiferana* granulovirus	CfGV
18.	*Costelytra zealandica* iridescent virus	CZIV
19.	*Cydia pomonella* granulosis virus	CpGV
20.	*Drosophila X virus*	DXV
21.	*Exoa scandens* cytoplasmic polyhedrosis virus	EsCPV
22.	*Galleria mellonella* densovirus	GmDNV

23.	*Galleria mellonella* multiple nucleopolyhedrovirus	GmMNPV
24.	*Helicoverpa armigera* nucleopolyhedrovirus	HearMNPV
25.	*Helicoverpa zea* single nucleopolyhedrovirus	HzSNPV
26.	*Heliothis armigera* multiple nucleopolyhedrovirus	HaMNPV
27.	*Hyphantria cunea* nucleopolyhedrosis virus	HcNPV
28.	*Junonia coenia* densovirus	JcDNV
29.	*Lymantria dispar* iflavirus 1	LdIV1
30.	*Dispar multiple nucleopolyhedrovirus*	LdMNPV
31.	*Mamestra brassicae* multiple nucleopolyhedrovirus	MbMNPV
32.	*Mythimna separata* nucleopolyhedrosis virus	MsNPV
33.	*Oryctes rhinoceros* nudivirus	OrNV
34.	*Philosamia cynthia* ricini nucleopolyhedrovirus	PcrNpv
35.	*Pilosoma imparilis* nucleopolyhedrosis virus	PiNPV
36.	*Plutella xylostella* granulosis virus	PxGV
37.	*Plutella xylostella* multiple nucleopolyhedrovirus	PxMNPV
38.	*Rachiplusia ou* multiple nucleopolyhedrovirus	RoMNPV
39.	Rice dwarf virus (Rice dwarf phytoreovirus)	RDV
40.	Rice stripe necrosis virus	RSNV
41.	*Rachiplusia ou* multiple nucleopolyhedrovirus	RoMNPV
42.	Sericesthis iridescent virus	SIV
43.	*Spilosoma imparilis* nucleopolyhedrovirus	SiNpv
44.	*Spodoptera exigua* multiple nucleopolyhedrovirus	SeMNPV
45.	*Spodoptera frugiperda* multiple nucleopolyhedrovirus	SfMNPV
46.	*Spodoptera littoralis* multiple nucleopolyhedrovirus	SlMNPV
47.	*Spodoptera litura* multiple nucleopolyhedrovirus	SpliMNPV; SlNPV; SliNPV
48.	*Spodoptera ornithogalle* multiple nucleopolyhedrovirus	SoMNP
49.	*Syngrapha falcifera* multiple nucleopolyhedrovirus	SfaMNPV
50.	*Thysanoplusia orichalcea* multiple nucleopolyhedrovirus	ThorMNPV
51.	*Trichoplusia ni single nucleopolyhedrovirus*	TnSNPV

52.	*Trichoplusia ni granulovirus*	TnGV

Note: More information on viruses described above can be obtained from the ICTV website. The link is provided here: https://talk.ictvonline.org/taxonomy/.