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Supplement To

AN ANNOTATED LIST AND BIBLIOGRAPHY OF INSECTS REPORTED TO HAVE VIRUS DISEASES

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AN ANNOTATED LIST AND BIBLIOGRAPHY OF INSECTS REPORTED TO HAVE VIRUS DISEASES[1]

MAURO E. MARTIGNONI[2] and ROBERT L. LANGSTON[3]

IN 1957 HUGHES (166) laid the basis for the "Annotated List and Bibliography" by cataloguing a series of 259 papers dealing with virus infections of insects. While Hughes' list contains most of the important papers published on insect viruses and virus diseases, it does not include many reports which, even if not dealing primarily with virology or pathology, nonetheless contain valuable information for the insect pathologist. This first supplement adds 473 new references to the 259 already published in Hughes' list. Almost all these papers have been seen in the original or, in a few cases, in photostatic copy of the original (as we are quite adverse to the not uncommon practice of quoting from quotations, thus perpetuating errors). Where the linguistic knowledge of the authors was lacking, translators were consulted; in some cases complete translations were available with the original publication.

The present supplement, as in the list by Hughes, includes only a small proportion of the many papers in Japanese or Russian: those included were available in translation or contained a summary complete enough to derive sufficient information on the type of disease concerned. It is gratifying to know that a similar bibliographical survey is being completed at present in the U.S.S.R. (S. Gershenson, personal communication, 1958).

Titles of Japanese and Russian papers appear in translation only, the translation being that given in the summary of the original publication. Papers in English, French, German, and Italian are entered with their original titles and without translations. Translations and original titles appear for papers in Czech, Polish, and Croatian.

As in Hughes' list, an attempt was made to distinguish between nuclear polyhedrosis and cytoplasmic polyhedrosis whenever the information available permitted such a distinction. Those cases in which a polyhedrosis was involved, but without evidence to indicate the type of polyhedrosis, were recorded simply as "polyhedrosis."

[1] Contribution from the Laboratory of Insect Pathology, Department of Biological Control, University of California, Berkeley. Originally submitted for publication July 27, 1959.

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The sources for scientific and common names are the same as in Hughes' list. The only addition is the work "The North American sawflies of the genera *Acantholyda, Cephalcia,* and *Neurotoma* (Hymenoptera, Pamphiliidae)" by W. W. Middlekauff (Univ. Calif. Publ. Ent. **14**:51–173; 1957), on which basis the generic name *Cephalcia* was adopted in place of *Cephaleia.*

The families are arranged alphabetically within the orders. Subgeneric names, where necessary, are in parentheses, after the generic name. In addition to the host list, a general list of references is included in this supplement. Abbreviations of periodicals are those of the "World List of Scientific Periodicals Published in the Years 1900–1950" edited by W. A. Smith, F. L. Kent, and G. B. Stratton (3d ed., Butterworths Scientific Publications, London, xvii–1058 pp.; 1952).

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We are very grateful to Dr. E. A. Steinhaus for having permitted the use of his large reprint collection; to Dr. F. Baldassini and Mr. J. E. Milstead for their generous help in phases of this work; and to the library of the University of California, an invaluable instrument of research.

HOST LIST

ARACHNIDA
ACARINA

"Seta-suppressor substance" (72)

TETRANYCHIDAE

Tetranychus cinnabarinus (Bdv.)

INSECTA
LEPIDOPTERA

AGROTIDAE

(See PHALAENIDAE)

ANTHELIDAE

Pterolocera amplicornis Wlk.
Nuclear polyhedrosis (93, 327)

ANTHROCERIDAE

(See ZYGAENIDAE)

ARCTIIDAE

Apantesis virgo (L.)
Polyhedrosis (137)

Arctia caja (L.), great tiger moth
Nuclear polyhedrosis (324, 336)
Cytoplasmic polyhedrosis (124, 329, 336, 383)
Polyhedrosis (412)

Arctia villica (L.), cream-spot tiger moth
Cytoplasmic polyhedrosis (47, 48, 124, 327, 336)

Ardices glatignyi (Le Guill.), woolly bear
Nuclear polyhedrosis (364)

Cycnia mendica (Clerck), muslin moth
Nuclear polyhedrosis (336)

Diacrisia purpurata (L.)
Cytoplasmic polyhedrosis (336)

Estigmene acrea (Drury), salt-marsh caterpillar
Granulosis (47, 74)

Euplagia quadripunctaria (Poda), Jersey tiger moth
Cytoplasmic polyhedrosis (336)

Hyphantria cunea (Drury), fall webworm
Nuclear polyhedrosis (212, 234, 235, 350)
Cytoplasmic polyhedrosis (389)
Polyhedrosis (194, 231)
Granulosis (196, 314)

Hypocrita jacobeae (L.), cinnabar moth
Nuclear polyhedrosis (336)

Panaxia dominula (L.), scarlet tiger moth
Nuclear polyhedrosis (323, 327, 336, 411, 414)

Phragmatobia fuliginosa (L.), ruby tiger moth
Cytoplasmic polyhedrosis (336)

BOMBYCIDAE

Bombyx mori (L.), silkworm

Nuclear polyhedrosis (3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 30, 32, 33, 34, 35, 38, 43, 45, 47, 48, 50, 51, 52, 57, 70, 71, 74, 77, 80, 83, 90, 91, 94, 95, 99, 100, 104, 105, 107, 108, 111, 112, 113, 116, 133, 134, 135, 137, 139, 144, 145, 146, 147, 155, 162, 163, 165, 169, 171, 173, 175, 176, 177, 179, 185, 187, 197, 198, 199, 202, 203, 208, 213, 215, 217, 219, 220, 222, 229, 232, 233, 236, 237, 242, 243, 244, 245, 246, 247, 248, 249, 253, 256, 263, 264, 266, 267, 268, 271, 273, 276, 278, 280, 283, 284, 285, 286, 287, 288, 293, 296, 297, 302, 303, 305, 306, 308, 316, 317, 324, 326, 327, 338, 339, 354, 355, 356, 360, 361, 362, 363, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 387, 393, 396, 398, 401, 402, 403, 408, 410, 414, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473) [Papers 424 and 473 refer to hybrids of *Theophila mandarina* and *Bombyx mori*]

Cytoplasmic polyhedrosis (21, 32, 33, 34, 35, 36, 37, 171, 172, 173, 327, 336)

A poorly defined group of diseases, including those known as flacherie and gattine, believed by Paillot to result from infection by a virus and a bacterium (100, 242, 244, 269, 270, 271, 272, 274, 275, 276, 277, 278, 279, 280, 282, 376)

Theophila mandarina Moore, mulberry wild silkworm
Nuclear polyhedrosis (32, 424, 462, 473) [Papers 424 and 473 refer to hybrids of *Theophila mandarina* and *Bombyx mori*]
Cytoplasmic polyhedrosis (32)

DIOPTIDAE

Phryganidia californica Pack., California oakworm
Nuclear polyhedrosis (47, 74, 137, 159, 170, 341)

DREPANIDAE

Drepana lacertinaria (L.)
Cytoplasmic polyhedrosis (329)

GALLERIIDAE

Galleria mellonella (L.), greater wax moth
Nuclear polyhedrosis (383)
"*Galleria*-adapted silkworm jaundice virus" (21)

GELECHIIDAE

Recurvaria milleri Busck, Lodgepole needle miner
Granulosis (347)

GEOMETRIDAE

Abraxas grossulariata (L.), currant moth
Nuclear polyhedrosis (323, 324, 327, 414)
Cytoplasmic polyhedrosis (327)
Alsophila pometaria (Harr.), fall cankerworm
Cytoplasmic polyhedrosis (255)
Bupalus piniarius (L.)
Cytoplasmic polyhedrosis (325, 328)
Polyhedrosis (109, 181)
Unidentified particles in blood resembling virus inclusion bodies (327)
Crocallis elinguaria (L.)
Cytoplasmic polyhedrosis (336)
Ennomos quercinaria (Hfn.)
Nuclear polyhedrosis (168)
Eulype hastata (L.), spear-marked black moth
Granulosis (343)
Hibernia defoliaria (L.)
Nuclear polyhedrosis (124, 205, 207)
Lambdina fiscellaria fiscellaria (Guen.), hemlock looper
Polyhedrosis (301)
Lambdina fiscellaria lugubrosa (Hulst), western hemlock looper
Nuclear polyhedrosis (291, 310)
Operophtera brumata (L.), winter moth
Nuclear polyhedrosis (330)
Cytoplasmic polyhedrosis (255, 325, 328, 330)
Oporinia autumnata (Borkh.), larch looper
Nuclear polyhedrosis (124)

Ourapteryx sambucaria (L.), swallow tailed moth
Cytoplasmic polyhedrosis (336)
Sabulodes caberata Guen., omnivorous looper
Granulosis (47, 327)

LASIOCAMPIDAE

Dendrolimus pini L.
Polyhedrosis (135)
Malacosoma americanum (F.), eastern tent caterpillar
Nuclear polyhedrosis (86, 136, 215, 402, 408)
Polyhedrosis (137)
Malacosoma californicum (Pack.), California tent caterpillar
Nuclear polyhedrosis (86, 218)
Malacosoma constrictum (Stretch)
Nuclear polyhedrosis (86, 218)
Malacosoma disstria Hbn., forest tent caterpillar
Nuclear polyhedrosis (51, 80, 86, 215, 291, 340, 365, 402)
Polyhedrosis (137, 320)
Malacosoma fragile (Stretch), Great Basin tent caterpillar
Nuclear polyhedrosis (86, 340)
Malacosoma neustria (L.)
Nuclear polyhedrosis (59, 124, 195)
Polyhedrosis (135, 152, 161, 193, 194)
Malacosoma pluviale (Dyar), western tent caterpillar
Nuclear polyhedrosis (309)

LIMACODIDAE

Natada nararia (Moore), nettle grub of tea
Granulosis (167, 325, 326, 327, 328)

LYCAENIDAE

Lycaena phlaeas (L.), small copper butterfly
Cytoplasmic polyhedrosis (336)

LYMANTRIIDAE

Dasychira pudibunda (L.)
Cytoplasmic polyhedrosis (124, 206, 208, 214, 317)
Polyhedrosis (110)
Euproctis chrysorrhoea (L.), brown-tail moth
Nuclear polyhedrosis (124, 205)
Polyhedrosis (114, 151, 193, 194)
Euproctis flava (Bremer)
Nuclear polyhedrosis (20)
Euproctis pseudoconspersa (Strand)
Nuclear polyhedrosis (20)
Hemerocampa leucostigma (J. E. Smith), white-marked tussock moth
Nuclear polyhedrosis (142, 143)
Polyhedrosis (137)

Hemerocampa pseudotsugata McD., Douglas-fir tussock moth
Polyhedrosis (291, 311)
Ivela auripes (Butler), yellow-legged tussock moth
Nuclear polyhedrosis (32)
Lymantria monacha (L.), nun moth
Nuclear polyhedrosis (47, 57, 74, 76, 77, 103, 124, 137, 160, 182, 184, 185, 186, 189, 192, 242, 263, 280, 303, 304, 306, 312, 316, 327, 336, 414)
Cytoplasmic polyhedrosis (164)
Polyhedrosis (45, 106, 107, 108, 114, 132, 138, 141, 161, 191, 257, 292, 295, 298, 307, 366, 367, 394, 395)
Virus disease, not further identified (160)
Porthetria dispar (L.), gypsy moth
Nuclear polyhedrosis (47, 48, 51, 57, 74, 77, 124, 136, 137, 139, 183, 185, 215, 229, 242, 250, 263, 280, 306, 316, 317, 322, 325, 327, 336, 365, 378, 383, 390, 391, 397, 401, 402, 408, 414)
Cytoplasmic polyhedrosis (336, 392)
Polyhedrosis (22, 44, 45, 106, 107, 108, 114, 135, 138, 187, 193, 194, 195, 196, 298, 299, 313, 338)
Stilpnotia salicis (L.) satin moth
Nuclear polyhedrosis (124, 401)

NOCTUIDAE

(See PHALAENIDAE)

NOTODONTIDAE

Cerura hermelina (Goeze)
Nuclear polyhedrosis (276)
Cerura vinula (L.), puss moth
Cytoplasmic polyhedrosis (336)
Phalera bucephala (L.), buff tip moth
Nuclear polyhedrosis (336)
Cytoplasmic polyhedrosis (329, 336)

NYMPHALIDAE

Aglais urticae (L.), small tortoiseshell butterfly
Nuclear polyhedrosis (74, 336)
Cytoplasmic polyhedrosis (325)
Polyhedrosis (135)
Junonia coenia Hbn., buckeye
Nuclear polyhedrosis (339)
Granulosis (47, 74, 339, 341)
Nymphalis io (L.), peacock butterfly
Nuclear polyhedrosis (336)
Polyhedrosis (135)
Vanessa atalanta (L.), red-admiral
Polyhedrosis (135)
Vanessa cardui (L.), painted lady butterfly
Nuclear polyhedrosis (41, 256, 325, 328, 330, 336)

Cytoplasmic polyhedrosis (41, 256, 325, 328, 330, 336)
Polyhedrosis (135, 328)

OLETHREUTIDAE

Eucosma griseana (Hbn.), gray larch tortrix, larch bud moth
Polyhedrosis; viral nature of polyhedra not yet established (174, 176, 179, 180, 203)
Granulosis (42, 68, 73, 124, 180, 239, 241)

PAPILIONIDAE

Papilio machaon L.
Cytoplasmic polyhedrosis (329)

PHALAENIDAE

Agrotis segetum (Schiff.), turnipmoth or cutworm
Nuclear polyhedrosis (74, 281)
Cytoplasmic polyhedrosis (330)
Granulosis (74)
Diataraxia oleracea (L.), tomato moth
Cytoplasmic polyhedrosis (330)
Euxoa ochrogaster (Guen.), red-backed cutworm
Granulosis (343)
Heliothis virescens (F.), tobacco budworm
Nuclear polyhedrosis (84)
Heliothis zea (Boddie), corn earworm, bollworm, tomato fruitworm
Nuclear polyhedrosis (56, 334)
Lampra fimbriata (von Schreber), broad-bordered yellow underwing
Cytoplasmic polyhedrosis (336)
Melanchra persicariae (L.), dot moth
Granulosis (329, 330)
Panolis flammea Schiff., pine moth
Polyhedrosis (109)
Peridroma margaritosa (Haw.), variegated cutworm
Nuclear polyhedrosis (339)
Granulosis (47, 74, 167, 327, 337, 339, 341)
Phlogophora meticulosa (L.), angleshades moth
Nuclear polyhedrosis (336, 414)
Cytoplasmic polyhedrosis (325, 326, 327, 336)
Plusia gamma (L.)
Nuclear polyhedrosis (59, 386)
Prodenia "litosia" [This is probably *Prodenia litura* (F.)]
Polyhedrosis (108)
Prodenia litura (F.), cotton leafworm
Nuclear polyhedrosis (2, 54)
Prodenia praefica Grote, western yellow-striped armyworm
Nuclear polyhedrosis (1, 2, 47, 74, 229)
Pseudaletia unipuncta (Haw.), armyworm
Nuclear polyhedrosis (25, 75, 115, 137, 238)
Noninclusion virus disease (327, 330)

Spaelotis clandestina (Harr.), W-marked cutworm
Polyhedrosis (137)
Spodoptera mauritia (Bdv.), lawn armyworm
Nuclear polyhedrosis (58, 353)
Trichoplusia ni (Hbn.), cabbage looper
Nuclear polyhedrosis (137, 157, 230, 318)
Triphaena pronuba (L.), yellow underwing
Cytoplasmic polyhedrosis (330)

PHALONIIDAE

Clysiana ambiguella (Hbn.)
Polyhedrosis (108)

PHYCITIDAE

Ephestia cautella (Wlk.), almond moth
Nuclear polyhedrosis (414)

PIERIDAE

Aporia crataegi (L.), black-veined white butterfly
Nuclear polyhedrosis (124, 206, 208, 209, 211, 212, 317)
Polyhedrosis (135, 346)
Colias philodice eurytheme Bdv., alfalfa caterpillar
Nuclear polyhedrosis (1, 25, 47, 74, 80, 85, 87, 88, 154, 215, 294, 325, 340, 341, 342, 344, 345, 348, 358, 359, 402, 408, 409)
Colias philodice philodice Latr., clouded sulphur butterfly
Polyhedrosis (137)
Pieris brassicae (L.), European cabbage butterfly
Granulosis (60, 74, 148, 212, 242, 276, 280, 330, 340)
Possible virus disease with formation of polymorphic inclusion bodies (74, 242, 265, 276, 280, 287)
Pieris napi (L.), mustard white
Granulosis (330)
Pieris rapae (L.), imported cabbageworm
Polyhedrosis (137)
Granulosis (68, 327, 330, 340, 351)
Virus disease, not further identified (300)

PSYCHIDAE

Cryptothelea junodi (Heylaerts), wattle bagworm
Nuclear polyhedrosis (258, 259, 260, 261, 262, 321)

SATURNIIDAE

Antheraea paphia mylitta (Drury)
Cytoplasmic polyhedrosis (331)
Antheraea pernyi Guér.-Men., Chinese oak silkworm
Polyhedrosis (135, 293)
Antheraea polyphemus (Cram.), polyphemus moth
Nuclear polyhedrosis (323, 324, 336)
Hemileuca maia (Drury), buck moth
Polyhedrosis (137)

Samia cynthia (Drury), Cynthia moth
Nuclear polyhedrosis (325, 336)
Cytoplasmic polyhedrosis (336)
Polyhedrosis (293)
Samia ricini (Bdv.), Arrindy silkorm
Nuclear polyhedrosis (32, 188, 336)
Saturnia pyri (Schiff.)
Nuclear polyhedrosis (276)

SATYRIDAE
Dira megera (L.), wall butterfly
Cytoplasmic polyhedrosis (336)
Pararge aegeria (L.), speckled wood butterfly
Cytoplasmic polyhedrosis (336)

SELIDOSEMIDAE
(See GEOMETRIDAE)

SPHINGIDAE
Celerio euphorbiae (L.), spurge hawk moth
Polyhedrosis (412)
Laothoe populi (L.), poplar hawk moth
Nuclear polyhedrosis (336)
Cytoplasmic polyhedrosis (317, 415)
Smerinthus ocellata atlanticus Austaut
Polyhedrosis (108)
Sphinx ligustri L., privet hawk moth
Nuclear polyhedrosis (336)
Cytoplasmic polyhedrosis (331, 336)

THAUMETOPOEIDAE
Thaumetopoea pityocampa Schiff.
Nuclear polyhedrosis (59, 61, 149, 376, 388)
Cytoplasmic polyhedrosis (61, 317, 385, 415)

TINEIDAE
Tinea pellionella (L.), casemaking clothes moth
Nuclear polyhedrosis (325, 336)
Cytoplasmic polyhedrosis (325, 336)
Tineola bisselliella (Hum.), webbing clothes moth
Nuclear polyhedrosis (323, 325, 383)
Cytoplasmic polyhedrosis (323, 325)
Polyhedrosis (27, 403)

TORTRICIDAE
(See also OLETHREUTIDAE and PHALONIIDAE)
Acleris variana (Fern.), black-headed budworm
Nuclear polyhedrosis (291)
Argyrotaenia velutinana (Wlk.), red-banded leaf roller
Granulosis (47, 140, 315, 319, 327)

Cacoecia murinana (Hbn.), fir shoot roller
Nuclear polyhedrosis (82, 216)
Granulosis (47, 48, 74, 79, 82, 124, 215, 229, 306, 316, 327, 402, 407, 408)
Choristoneura fumiferana (Clem.), spruce budworm
Nuclear polyhedrosis (47, 48, 62, 80, 215, 229, 252, 291, 402)
Cytoplasmic polyhedrosis (254)
Granulosis (48, 68, 81, 215, 229, 252)

ZYGAENIDAE

Harrisina brillians B. & McD., western grape leaf skeletonizer
Granulosis (88, 156)

COLEOPTERA

SCARABAEIDAE

Melolontha hippocastani L.
Virus disease, not further identified (160)
Melolontha melolontha L.
Virus disease, not further identified (160)

HYMENOPTERA

APIDAE

Apis mellifera L., honey bee
"Paralysis," a noninclusion virus disease (251, 330)
Sacbrood, a noninclusion virus disease (74, 131, 137, 242, 330)
Pathogenic drone brood, a possible virus disease of the queen bee, with inclusion bodies (127, 128, 129, 130)
Diprion (*Gilpinia*) *hercyniae* (Hartig), European spruce sawfly
Nuclear polyhedrosis (39, 40, 41, 52, 64, 65, 66, 69, 81, 96, 117, 120, 124, 291, 327, 340, 348, 357)
Neodiprion lecontei (Fitch) red-headed pine sawfly
Nuclear polyhedrosis (66, 291)
Neodiprion pratti banksianae Roh., jack-pine sawfly
Nuclear polyhedrosis (66, 67, 291, 340)
Neodiprion pratti pratti (Dyar)
Polyhedrosis (44, 97)
Neodiprion sertifer (Geoff.), European pine sawfly
Nuclear polyhedrosis (25, 39, 41, 44, 63, 64, 66, 81, 97, 98, 117, 118, 119, 120, 121, 123, 124, 125, 126, 200, 201, 204, 208, 210, 291, 294, 325, 327, 340, 348, 357, 402, 408)
Polyhedrosis (107, 108, 110)

PAMPHILIIDAE

Acantholyda (*Itycorsia*) *nemoralis* C. G. Thomson
Virus disease, not further identified (160)
Cephalcia (*Cephalcia*) *abietis* L.
Polyhedrosis; viral nature of polyhedra not yet established (175, 176, 203, 207)

TENTHREDINIDAE

Nematus olfaciens Benson, black currant sawfly
Nuclear polyhedrosis (325)

DIPTERA

CHIRONOMIDAE

(See TENDIPEDIDAE)

CULICIDAE

Anopheles subpictus Grassi
A possible virus disease with inclusion bodies (92)

DROSOPHILIDAE

Drosophila melanogaster Meig.
Virus "σ" (78, 101, 102, 150, 221, 223, 224, 225, 226, 227, 228, 289, 290)

TENDIPEDIDAE

Chironomus tentans F.
A possible virus disease with inclusion bodies (158, 399)

TIPULIDAE

Tipula (*Tipula*) *paludosa* Meig., leatherjacket
Nuclear polyhedrosis (31, 325, 326, 327, 328, 329, 330, 335)
Tipula iridescent virus (31, 190, 317, 325, 327, 328, 329, 330, 331, 332, 333, 335, 405, 406)

SUBJECT LIST

Included in this section are reviews on insect viruses as well as papers concerned primarily with the biological, biophysical, and biochemical properties of insect viruses as a group. A large number of these papers are listed also with certain hosts, if the information seems of interest for a particular virus-host system. Since reviews on insect viruses (*e.g.*, 53) usually mention a large number of hosts from the literature, without adding new information, they have not been listed in the host catalogue.

VIRUSES, INCLUDING THOSE OF INSECTS (Reviews)
24, 229, 306, 316, 317, 326, 328

INSECT VIRUSES ONLY (Reviews)
46, 51, 53, 137, 178, 242, 276, 280, 292

TAXONOMY AND NOMENCLATURE
23, 47, 74, 400

MORPHOLOGY AND DEVELOPMENT
48, 49, 306, 326, 327, 404, 413

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